ANNUAL REPORT
2020-21

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Editors: Bitapi C. Sinha and K.K. Shrivastava
Cover Photo Credit: Varun Kher
Location Map Credit: Alka Aggarwal
Layout & Designing: Saraswati Press, Dehradun

CONTENTS

FROM THE DIRECTOR'S DESK 4

ROLE AND MANDATE 6

YEAR AT A GLANCE 9

RESEARCH 10

ACADEMIC AND TRAINING 101

ACTIVITIES & PROFESSIONAL SUPPORT 115

VISITORS 135

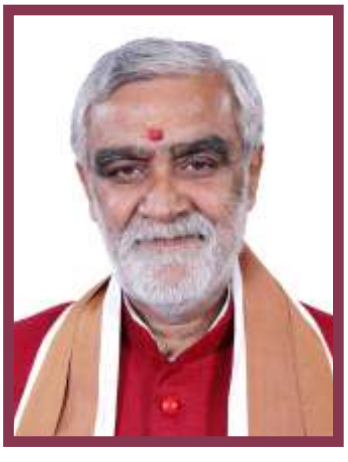
GOVERNANCE 137

PUBLICATIONS 145

ACCOUNTS 154

Sh. Bhupender Yadav

Hon'ble Minister



Sh. Ashwini Kumar Choubey

Hon'ble Minister of State

Ministry of Environment, Forest and Climate Change
Government of India

FROM THE DIRECTOR'S DESK

It is a pleasure to present the Annual Report of Wildlife Institute of India (WII) for 2020-21. The Institute completed its major ongoing programmes despite the lockdown and other obstacles during the reporting period. The worldwide pandemic COVID-19 taught us so many lessons during the year. The online medium has become a regular feature of the modern-day lifestyle. The webinars replaced seminars and conferences. Online classes are the new normal during the fight against the pandemic. The planned schedules of both the M.Sc. programmes were completed during the period under report.

The regular training programme of the Institute, XLI Post Graduate Diploma in Advanced Wildlife Management, was completed in June 2020. The restrictions due to the outbreak of the COVID-19 pandemic necessitated the use of online methods of pedagogy. The mandated research activities were conducted as per their scheduled programmes. A total of twenty research projects were completed during the reporting year. The research activities, especially under Compensatory Afforestation Fund Management and Planning Authority (CAMPA), The National Mission for Sustaining the Himalayan Ecosystem (NMSHE), National Mission for Clean Ganga (NMCG) and Tiger Cell, achieved significant milestones.

During the reporting period, the XVII M.Sc. (Wildlife Science) students underwent II and III semesters of the course. Teaching inputs were given in both the classroom and field. All the students defended their dissertation proposals and appeared for their written and practical examinations in the last week of December 2020.

The UNESCO Category 2 Centre at Wildlife Institute of India introduced a 2-year residential Master's Course in Heritage Conservation and Management in July 2019, affiliated with Saurashtra University, Gujarat. Due to countrywide lockdown, the

regular classes for the II Semester of M.Sc. were suspended from 18 March 2020. However, lectures were continued via online mode during April-June, 2020 and July-December 2020.

Semester exams were conducted through an Open-Book format, as per University Grants Commission (UGC) guideline and approved by Saurashtra University.

All the facilities and Cells at the Institute have contributed to the successful execution of various activities. The Institute provided advisory services to its stakeholders as and when required. Some short courses, workshops and seminars were conducted in online mode. The doctoral research works were continued, and the internship was also offered to some students of other universities. The important days like World Fish Migration Day, GIS Day, World Wetlands Day, International Day for Biological Diversity, Dugong Day, World Elephant Day, Earth Day, Migratory Bird Day, World Turtle Day, World Environment Day, World Wildlife Day and World Heritage Day were celebrated by organizing online activities.

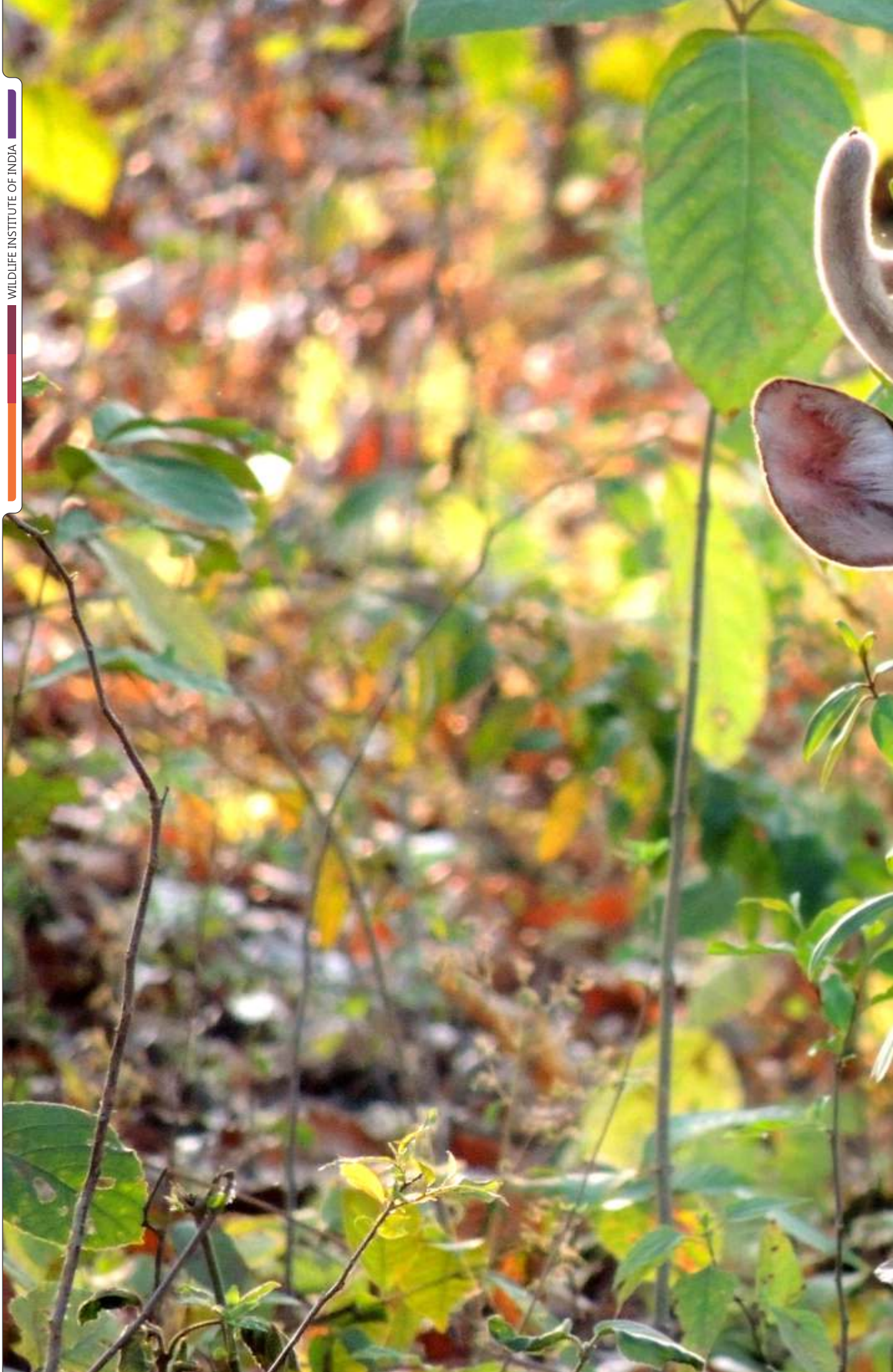
WII conducted an expedition to the Adi Kailash Landscape to identify its key sites of natural and cultural importance for nomination as a UNESCO World Heritage Site. Through the expedition, the team documented a wide variety of its Himalayan and trans-Himalayan ecosystems, habitat and biodiversity alongside the religio-spiritual significance of the Adi Kailash landscape.

Wildlife Institute of India has signed a Memorandum of Understanding (MoU) with the Centre for Public Policy and Good Governance, Department of Planning, Government of Uttarakhand, for three years to improve the policymaking, implementation, monitoring and evaluation for the Government of Uttarakhand. The partnership will help in the implementation of the Global Sustainable Development Goals.

All the activities were conducted in a planned manner. I wish to thank the Institute's governance and administrative committees for their valuable guidance and acknowledge all the stakeholders, faculty colleagues, staff, researchers and students for their contribution to the smooth conduct of the Institute's activities during the year.

(Dr. Dhananjai Mohan)

27 January 2022



ROLE AND MANDATE

ROLE & MANDATE

INTRODUCTION

During the early eighties of the last century, there was a worldwide realisation that the 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 of 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 wide 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 as well as in 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 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.

YEAR AT A GLANCE

The year 2020-21 was a different year in the journey of the Wildlife Institute of India. The worldwide pandemic of COVID19 has changed the working style during the reporting year, but the Institute found a way to perform its mandated programmes. The regular courses were conducted in online mode. Research projects generated valuable scientific information. Their outcomes are presented in the Research Section of this report. The Institute carried out work on 127 research projects and completed twenty of them during the reporting year.

On the academic front, both the Post Graduate programmes, i.e. M.Sc. (Wildlife Science) and M.Sc. (Heritage Conservation and Management) at the Institute, were continued as per their planned schedule. The Institute conducts training programmes for in-service officials of Forest Departments. XLI Post Graduate Diploma in Advanced Wildlife Management was completed during the reporting period. Twenty officer trainees of the rank of DCF/ACF participated in the course. The officer trainees learnt various wildlife management techniques, including estimating prey and predator populations, studying animal behaviour, carrying out radio-telemetry, chemical immobilization and restraint of wild animals, wildlife health monitoring, vegetation sampling, and habitat quantification and occupancy survey. The important days and events were celebrated by organizing online activities. Organizing webinars has become a new normal.

During the reporting period, thirty-two webinars, workshops, seminars, and short duration training courses were organized for various stakeholders and participants. The faculty members and researchers contributed to many national and international peer-reviewed journals. They published 108 papers in Peer-Reviewed International Journals, 12 papers in Peer-Reviewed National Journals, and presented papers in various webinars. Besides these, 14 technical reports were also brought out by the Institute during the reporting period.

All the departments, cells and sections performed their role with complete dedication during the reporting year. This Annual Report covers all the activities mentioned above to present the overall picture of a wide array of activities during the reporting period.

RESEARCH

RESEARCH
COMPLETED

ECOLOGY OF WOLVES WITH EMPHASIS ON DISPERSAL IN A HUMAN – DOMINATED LANDSCAPE, MAHARASHTRA, INDIA

Funding Source
Department of Science and Technology

Investigators
Dr Bilal Habib and
Shri Salvador Lyngdoh

Researcher
Sougata Sadhukhan

Date of Initiation
April 2017

Date of Completion
April 2020

Objectives: The project has the following objectives (i) to estimate the current population status of wolves in Maharashtra State? (ii) To estimate the home-range territorial behaviour of dispersing individuals. (iii) To study the dispersal pattern and habitat use of the existing wolf packs dwelling in the human-dominated landscape of Solapur, Osmanabad, Pune and Ahmednagar districts of Maharashtra (iv) To study the social structure and dynamics of the selected wolf packs for individual behaviours within the pack and their interaction with other words in the vicinity. (v) To delineate critical habitat patches and factors governing their utilisation in a human-dominated landscape.

Progress: A total of eight Individuals were collared to understand the movement pattern and habitat utilisation.

Population Status: The research team conducted 66 playback surveys across three radio-collared wolf packs to study the animal call response rate. The team evaluated the home range of each, and before the response survey, the team confirmed the presence of the pack using a VHF receiver. Once the presence of the pack was confirmed, recorded howls (solo and chorus) were played to solicit a response. Multiple regression analysis was performed to assess the effects of factors influencing howling responses. The team conducted the exercise in each pack's home rang. The research team also assessed the land use in core and home ranges to understand the composition of habitat use. The results suggested that the overall forest's cover was 41% in the core, which decreases to 24% in the home range of the same pack.

The howling survey was conducted with a newly adapted methodology in the system-generated random-grids based on potential wolf habitats in human-dominated arid landscapes of Maharashtra.

Outputs and Outcomes: Ecology of Wolves with Emphasis on Dispersal: The average home range of the three adult wolves of Solapur and Baramati area was found to be 336.53 km^2, whereas the home range of sub-adult wolves of Ahmednagar and Pune area was found 6.86 km^2. The home range of females from the Solapur area was found to be 325.92 km^2, whereas, from Solapur males, it was found 399.56 km^2. The minimum home range among adults was found 284.11 km^2 for Baramati females (Firky). The average home range of sub adults of the Pune area (11.23 km^2) was larger than the Ahmednagar area (2.21 km^2). The core area for adult wolves- Merry, Breeze and Firky were found at 19.03 km^2, 31.56 km^2 and 54.43 km^2, respectively. The average core area of sub-adult wolves of Ahmednagar and Pune was found at 0.30 km^2 and 0.61 km^2, respectively.

Howling Survey: Wolves in their core home range responded more (n=48, p=0.65) as compared to the

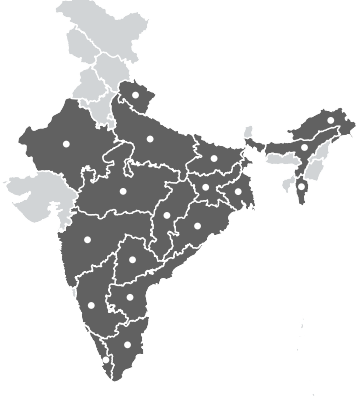
buffer of their home range (n=18, p=0.33). The response rate was higher for chorus howls (p=0.61) compared to solo wolf howls (p=0.25). The results suggest that the rate of response decreases with increasing human footprint within wolf territories. This may be a survival strategy by the wolves to survive and exploit a human-dominated landscape to foster co-existence.

Milestone: This study showed the potentiality of a howl survey as a tool to identify individual wolf. Since the study also specifies the factors that influence the howling response, the team can design a robust howling survey for mark-recapture based population estimation. The fine-scale habitat utilisation data from radio-telemetry helped us delineate the wolf habitat in a more precise manner, which will be beneficial when choosing a study area for howling surveys.

Telemetry data showed that the home range of wolves is more than 300km^2, which is considerably higher than the previous study (~250km^2) in the same landscape. Habitat utilisation data revealed that agricultural land acquisition is fragmenting the wolf habitat, forcing the wolf to use the croplands. This is why most of the collared individuals are using multiple cores fragmented by anthropogenic land-use patterns. Fragmentation also prompts the vulnerability of a wolf toward road kill and death occurring due to human-animal conflict such as electrocutions, poisoning. Since the collared sub-adults are yet to disperse from their parental pack, it is not clear how they manage to disperse with high anthropogenic pressure, what are the critical risk factors, and the success rate of their pack establishment. The study lays the groundwork for future work on monitoring the dispersal success of wolves and the dynamism of their survival in the anthropocene. The study is also a precursor to developing a scientific method of population estimation for wolves using the uniquely identifiable patterns of individual howls.

RESEARCH
COMPLETED

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



Funding Source
National Tiger Conservation Authority

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

Researchers
Ahana Dutt, Akshay Jain, Anup Pradhan, Ashish Prasad, Ashok Kumar, Deb Ranjan Laha, Kainat Latafat, Krishna Mishra and Ninad Mungi

Date of Initiation
March 2012

Date of Completion
July 2020

Objectives: The objectives of the project were to (i) develop and continuously update MSTrIPES software by including user-friendly protocols, applications, analytics, and data archiving; and (ii) implement MSTrIPES and orient field staff to modern techniques on patrolling and ecological monitoring, which will help in adaptive conservation actions.

Progress: Two of the three android applications (Patrol and Ecological) that can be used without internet or mobile connectivity are developed for Android mobile phones up to version 10 and are freely available in 10 official Indian languages (www.mstripes.in). The third application of human-wildlife conflict is under preparation. Desktop software for analyzing the app data, periodic reports, and mapping protection indicators is developed for Windows and is distributed across tiger reserves. Around 1,500 forest staff members were trained in the last year for effectively using these applications.

New software for the analysis of camera trap data was also made in the last year. This software helps geotag every camera trap picture, automatically identifies camera trapped species, records the location and time of species captures, analyses the distribution, activity pattern, relative abundance, and occupancy of any camera trapped species. This software will assist Phase IV monitoring of tiger reserves and can be used by any research team using camera traps. Due to user-friendly, multi-lingual, and open access apps and software, MSTrIPES has been readily imbibed by many protected areas apart from tiger reserves. MSTrIPES is currently being used by 12 such non-Tiger Reserve areas, whose staff has been trained and from where periodic data regarding different protection and ecological indicators are being recorded.

Outputs and Outcomes: Across India, around 5000 users from 35 out of 50 tiger reserves are using MSTrIPES for routine patrolling. On average, ~5,00,000 km of patrolling is done every month within these 35 tiger reserves. Tiger reserves like Kanha, Melghat, Bor, Pench (MH), Nagarjunsagar Srisailam, Mudumalai, Bhadra, and Dudhwa had >90% patrol coverage; Similipal, Satpuda, Navegaon Nagzira, Tadoba, Pench (MP), and Sathyamangalam had >75% patrol coverage, Achanakamar, Satkosia, Panna, Nagarahole, Anamalai, and Sanjay Dubri had >50% patrol coverage, while other had <50% coverage. Around 2500 species sightings and 20 wildlife crimes were recorded on average each month.

MSTrIPES desktop was used to analyze over 50,000 carnivore sign surveys, 60,000 line transects, and 1,50,000 habitat plots for analyzing the data at the landscape scale and site scale for the All India Tiger Monitoring exercise 2018-19. The new camera trap tool (part of the Ecological desktop application of MSTrIPES) was also used for evaluating the relative abundance index and mapping the distribution of ~90 species across all tiger reserves.

Milestone: With more than 5000 users, MSTrIPES helped achieve digital literacy for frontline forest staff. They are now using the applications for recording their regular duties. MSTrIPES can be used to monitor the status of ~90 species across landscapes. It can aid informed decision making for EIA's, permissions for developmental projects, and direct law enforcement efforts to vulnerable areas of the landscape.

MSTrIPES software is open-source and can be used by the broader scientific community.

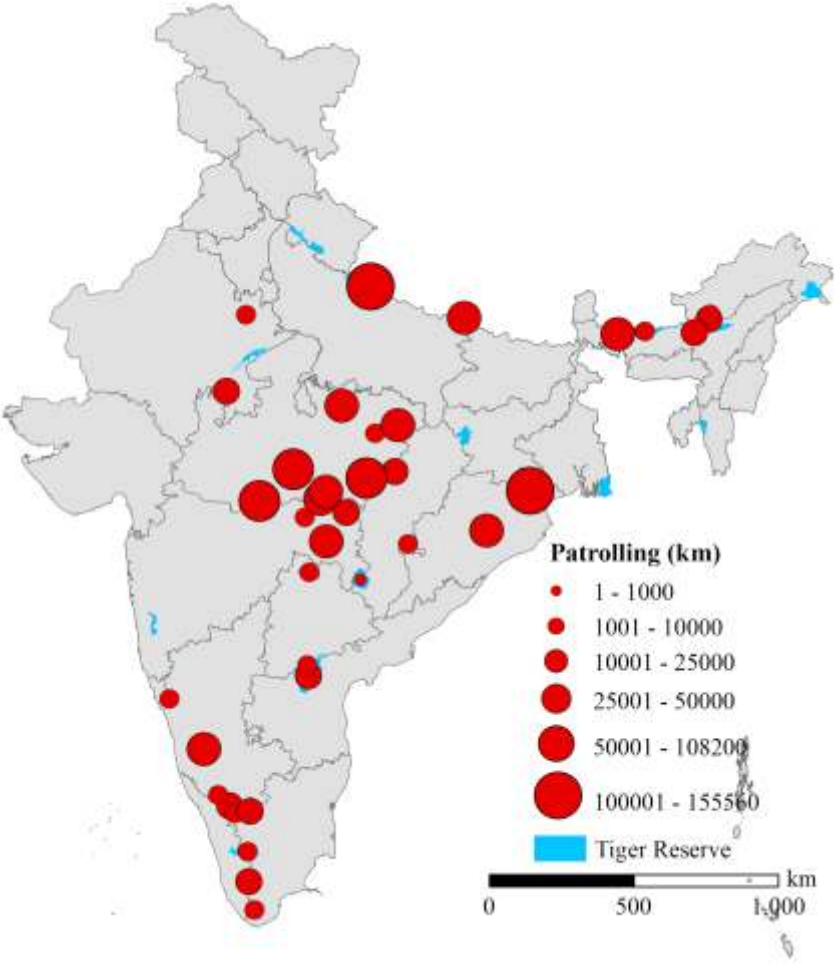


Figure 1: *Tiger Reserve Patrols: Map of patrol efforts (in km) invested by Tiger Reserves during March-April 2020.*

RESEARCH
COMPLETED

HUMAN–WILDLIFE CONFLICT RESOLUTION MECHANISM IN THE INDIAN HIMALAYAN REGION: RISK ASSESSMENT, PREDICTION AND MANAGEMENT THROUGH RESEARCH AND COMMUNITY ENGAGEMENT

Funding Source
G.B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi-Katarmal, Almora

Investigators
Dr G.S. Rawat, Dr S. Sathyakumar and Shri Qamar Qureshi

Researchers
Dr Dipanjan Naha, Dr Sarvesh Kumar Rai, Sayli Suresh Sawant, Nitin Bhushan, Gaurav Sonkar, Arnab Chatterjee, Suraj Kumar Dash, Abhisek Chettri, Pooja Chaudhary, Pooja Pant and Akashdeep Roy

Date of Initiation
March 2016

Date of Completion
June 2020

Objectives: The objectives of the project are to (i) develop risk assessment tools and processes for identifying negative Human-Wildlife Interaction (HWI) in the Indian Himalayas Region (IHR) through investigations on HWI and predict potential hotspots of conflict for regular monitoring and development of site-specific mitigation efforts; (ii) understand the biological factors and ranging patterns of selected wildlife species involved in livestock/crop depredation and attacks on people in the IHR, and (iii) develop and implement adaptive management strategies in some of the identified vulnerable areas through community engagement and use of modern science and technological tools and approaches.

Progress: The data analysis and report writing were completed and the final report was submitted to National Mission on Himalayan Studies (NMHS). Human-Wildlife Conflict (HWC) is a major management issue in the Indian Himalayan Region (IHR) where a large expanse of human habitations and agricultural lands are either interspersed with fragmented wildlife habitats or located close to forests leading to frequent livestock depredation, crop damage and attack on humans.

The first objective of this study provides information on the extent of HWC (focal species) within specific sites in IHR states, highlights potential hotspots, and changes in land-use patterns. The results suggest that HWC has distinct seasonal, temporal, and spatial patterns with high-risk pockets within the landscapes. In Uttarakhand (Chandrabani, 16 km^2 around WII campus, Dehradun), rhesus macaques have used areas with a high presence of garbage dumps. In Khirsu Block of Pauri Garhwal, rhesus macaques (troop size 10 to 100) spent 3-4 hrs/day in crop-raiding (mostly wheat). In Himachal Pradesh (Bharmour Division, Chamba district), the majority (89%) of livestock loss was due to natural calamities and the remaining were lost due to livestock depredation by large carnivores (brown bear, black bear, and common leopard). In North Bengal, the team made field visits to N=1,702 and interacted with the local community members and recorded details of such incidents. The team generated predictive maps for both species (leopard and elephant) which depicted eastern and central regions of North Bengal as conflict risk hotspots. Human-elephant conflicts were nocturnal in the pattern whereas it was diurnal in the case of leopards. In North Sikkim, human-black bear conflict is the major problem. The team visited bear conflict sites (N=530) and the majority of the conflict cases reported was for crop damage (64%), followed by livestock depredation (34%) and attacks on human (2%). An analysis of bear conflict data from the forest department revealed that there were 168 (62%) conflict cases for crop damage, 97 (36%) livestock depredation and 6 (2%) attacks on humans by a black bear. Based on the surveys and spatial modelling, the team generated human-bear conflict hotspots for North Sikkim District. In Ladakh (Hemis NP), HWC was due to snow leopard and Tibetan wolf. The people's attitude towards mountain ungulates and other herbivores was divided, 33% each for both positive and negative, and this could be attributed to crop damage.

The second objective documents certain biological factors, activity, ranging pattern, and abundance of focal species with relevance to HWC. The results

suggest human-wildlife activity overlaps, provocative human behaviour, nocturnal/crepuscular, or diurnal ranging patterns of wildlife as major drivers of HWC. The results also highlight low wild prey, abundant livestock presence, and moderate to high carnivore densities within specific sites.

In Chandrabani, Dehradun, there were 12 rhesus macaque troops. Adult male to adult female sex ratios in summer was 0.63:1 and the ratio of adult females to the infant was 1.23:1. The adult male to adult female sex ratio in autumn was 0.99:1 and the ratio of adult females to the infant was 1.43:1. The research team radio collared four female rhesus macaques to understand the home range and ranging pattern of troops. The average home range (95% kernel) was 0.59 km^2. The average daily movement calculated for four troops was 2 km per day. In Pauri Garhwal, the Spatio-temporal pattern of attacks on humans by leopards and black bears were diurnal and coincided with the peak activity of humans. The attitude of the local community towards the presence of leopards was neutral 45% and 35% were positive for leopard and 20% were negative. In Darjeeling and Gorumara wildlife divisions, the team estimated leopard density in blocks of 180 km^2 each. Leopards in North Bengal were found to be crepuscular, nocturnal from the analysis of camera trap data. The research team radio collared 6 leopards (4 males and 2 females) to understand the activity, habitat use and ranging pattern.

The third objective deals with innovative strategies that have the potential to be implemented in collaboration with local community members.

Outputs and Outcomes: During the studies/ survey, the research team created awareness amongst local communities for proper disposal of organic waste, sowing of alternative crops and vegetables such as chilly, drumstick, lemon, *Justicia adhathoda*, marigold and some varieties of wheat which are not preferred by rhesus macaques to reduce conflict to a certain level. The team conducted 32 outreach programs including three formal workshops at the division level awareness programs. Different stakeholders were involved in those programs in which the team discussed practices on mitigating HWC along with the project outcomes. The team used a community based non-lethal visual deterrent program around households and livestock enclosures to minimize livestock depredation by large carnivores. The team found that Foxlights deterred predation by leopards on livestock. There was a significant decline in livestock predation by a leopard but no difference in leopard visitation or presence between experimental and control sites.

In Himachal Pradesh, experiments with Foxlights (7 each in Bharmour and Dalhousie) were successful as a deterrent against livestock depredation. Livestock grazers with Foxlights reported 8 times less livestock depredation. The team conducted outreach programs (N=9) and created two protocols of "Do's and Don'ts in the Bear country" and "Guidelines to mitigate human-bear conflict" for awareness programs in the conflict-prone area. Multiple measures such as improvement of animal husbandry practices, conservation outreach programs, solar/ electric fencing of settlements, crop fields, use of wildlife deterrents, economic incentives for coexistence, insurance schemes, and village wildlife response teams seem sustainable and should be scaled up.

The study endorses two different tactics to resolve HWC:

The short-term mitigation tools need to be integrated with long-term preventive plans, along with techniques that are effective with multiple species. When traditional low-cost methods are not that effective, approaches such as early warning systems, wildlife deterrents, formation of community-based response teams, unpalatable crops (repellents), electric or solar fencing of farmlands, and alternate livelihoods should be considered. All strategies have to be customized considering the local socio-ecological conditions and the effectiveness of such measures should be rigorously tested.

The report provides recommendations to focus future HWC interventions, and improve existing techniques. A holistic approach should ensure that the social development of local communities is prioritized, a certain proportion of economic benefits from wildlife, protected areas are utilized for improving overall well-being and reduction in financial losses to depredation. Conservation planning should be based on a combination of scientific knowledge, existing traditional indigenous knowledge, and collaborations. Community-based conservation should provide local communities with the right to utilize a limited and sustainable part of the natural resources and ensure a sense of ownership. To ensure human-wildlife coexistence in IHR, emphasis should be given to protecting rural livelihoods, minimizing damage, providing economic benefits, and adapting community-based conservation measures. A framework for multi-interest group collaborations should also be planned to ensure a common platform to discuss challenges and implement appropriate measures for the conservation of ecosystems and biodiversity.

Milestone: The team was successful in generating awareness in more than 7,500 people and encouraging young community leaders. They were also successful in creating a common platform for diverse stakeholders to share their views and propose necessary action in mitigating HWC in IHR. The efficacy of a few animal repellents was successfully tested.

RESEARCH
COMPLETED

DEMOGRAPHY OF URBAN BLACK KITES, IN *MILVUS MIGRANS* IN DELHI

Funding Sources
Raptor Research and Conservation Foundation; Microwave Telemetry Inc. USA; University of Oxford (Felix Scholarship Trust); Somerville College (University of Oxford); Spanish National Research Council (CSIC, Spain)

Collaborating Agency
(i) Donana Biological Station; Spanish National Research Council (CSIC, Spain), (ii) Edward Grey Institute of Field Ornithology; Department of Zoology (University of Oxford) United Kingdom

Investigators
Dr Y.V. Jhala, Shri Qamar Qureshi and Dr Dhananjai Mohan

Researchers
Urvi Gupta and Nishant Kumar

Date of Initiation
December 2012

Date of Completion
July 2020

Objectives: The objectives of the project were to (i) monitor the breeding population and breeding success of kites along a gradient of urbanization; (ii) study flight initiation distance of parent kites in the breeding season; (iii) model nest survivorship as a function of explanatory variables, picked by the final model on the Habitat selection Criteria identified in Kumar *et al*. 2018a, by known fate modelling; (iv) model the growth rate of chicks as a function of foraging resource acquisition, trail cameras fixed on 21 nests sampled this season, within multiple sampling units, to study their diet and behaviour; (v) to understand the movement ecology of resident kites; (vi) monitor the blood parasite load in migrants and residents; (vii) examine how feather based corticosterone-D levels are likely an index of the stress in kites sampled along the urbanization gradient, food availability and other factors; and (viii) study migration of Black Eared Kites.

Progress: Nesting density has been calculated on 30 independent sampling plots (1 km^2 each) along an urbanisation gradient. The nests have been monitored for data on breeding success and chick growth. Camera traps were installed on 40 nests to observe the diet and parental care. While approaching the nest, the parent kite's behaviour was observed. The distance at which they left the nest/tree on noticing the team's arrival was noted as Flight Initiation Distance. Regular growth measurements of chicks are taken during nest monitoring. Before fledging, they are wing tagged. An adult breeding female kite was trapped using the bal-chatri method, and a GPS-GSM tag was deployed to study its movement ecology.

With an estimate of 20.09 ± 7.93 nests/km^2, the breeding density of Black Kites in Delhi, India, arguably represents the highest concentration of a medium-sized raptor recorded in the world. The research team used GPS telemetry to uncover the unknown migration routes and breeding areas of the massive population of migratory Black-eared kites *Milvus migrans lineatus*, which winter around the megacity of Delhi, thus contributing to generating the largest raptor concentration of the world. Kites migrated along a relatively narrow corridor, almost invariably crossed the Himalaya at extremely high elevations (up to > 6000 m a.s.l.) through its western portion by the K2 of the Karakoram Range and spent large portions of their journey (up to > 500 km) at elevations above 3,500 m. They then crossed or circumvented the Taklamakan Desert and the massive Tian Shan Range to reach their previously unknown breeding quarters at the intersection between Kazakhstan, Russia, China and Mongolia.

Outputs and Outcomes: Rapid worldwide urbanization is generating a steep growth in studies on urban ecology, but tropical cities have had extremely scarce attention. In particular, the team focused on the dependence of this population on anthropogenic subsidies, afforded as human waste and as intentional "ritual offerings" of meat scraps for religious purposes, especially by people of Islamic faith that are concentrated in "Muslim settlements".

The research team found that for the kite breeding population(s), individual-level preferences translated into population-level effects, with kite density tightly tied to food subsidies. Ecological responses were accompanied and mediated by behavioural adjustments to the urban gradient, which provided not only adaptive benefits but also generated potential

conflicts with humans. In particular, offspring defence was finely tuned on human subsidies, probably as a result of the associated parental investments and familiarity with humans. In its most extreme form, nest defence led to attacks on humans, sometimes with serious physical harm. The research team showed that such aggression was tied to frequent exposure to humans by kites while accessing their ritual subsidies and constant proximity to them while breeding, as caused by local architecture (balconies in the immediate proximity of nests).

Milestone: (i) Preservation/ afforestation of woodlots near landfill sites to improve the ecosystem service of scavenging by kites. (ii) Conservation of hotspots for migratory avian populations along the Central Asian Flyway.

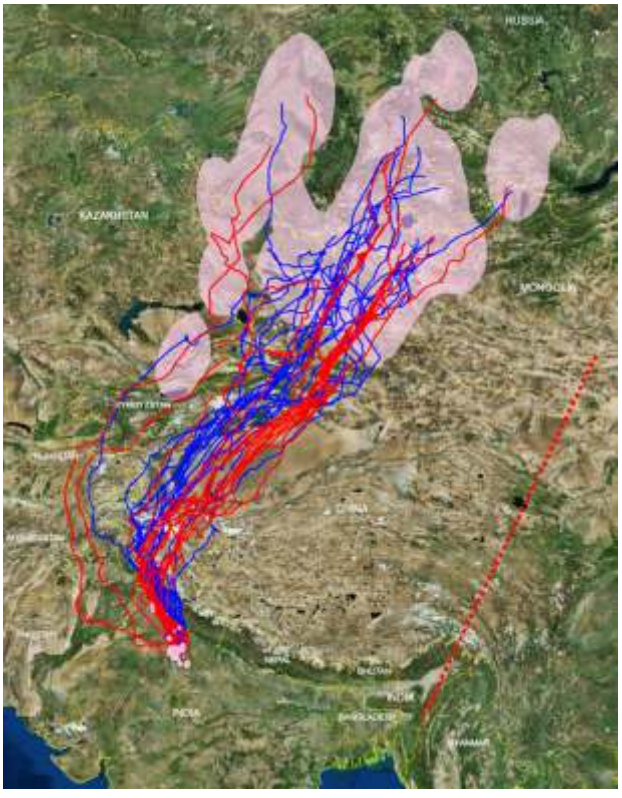


Figure 1: *Pre-breeding (blue tracks) and post-breeding (red tracks) migration routes, and breeding and non-breeding ranges (pink polygons) of Black-eared kites GPS-tagged in Delhi (India). The polygons of the ranges represent 99 % Kernels built on the cumulative sum of the GPS locations of all tagged individuals.*

RESEARCH
COMPLETED

PREPARATION OF CONSERVATION PLAN FOR BIODIVERSITY LIKELY TO BE IMPACTED BY GREENFIELD JEWAR INTERNATIONAL AIRPORT, GAUTAM BUDHA NAGAR, UTTAR PRADESH

Funding Source
Yamuna Expressway Industrial Development Authority (YEIDA), Government of Uttar Pradesh

Investigators
Dr Bilal Habib, Dr S P Goyal, Dr Asha Rajvanshi and Dr AK Bhardwaj

Researchers
Athar Noor, Aimon Bushra, Rahul De, Ravi Kumar Sharma, Sultan and Akash Aggarwal

Date of Initiation
August 2019

Date of Completion
July 2020

Objectives: The objectives of the project are to (i) Identify the key sources of impacts and the nature of impacts (direct and indirect, long term and short term and irreversible impacts if any associated with the airport) that would help guide the preventive, ameliorative and restorative strategies to be adopted in the conservation planning; (ii) identify the significant biodiversity values represented by rare, endangered and threatened (RET) floral and faunal species belonging to major taxa (herpeto-fauna, birds and mammals) within the zone of influence of the project; (iii) assess the vulnerability of habitats and landscape features within a 10 km radius to impacts during different phases of the airport development and the likely implications; (iv) prepare a conservation plan for rare, endangered and threatened (RET) faunal species (herpeto-fauna, birds and mammals) that is based on preventive and restorative measures for impact mitigation; and (v) propose Phase-II plan (Five Years) for the "Post-Development Monitoring" for the status of RET species.

Progress: As the project was initiated in October 2019, the primary aim was to survey the proposed airport area, including a buffer of a 10 km radius, to understand the status and number of the associated flora and fauna of the landscape. The team collected data on the birds, mammals and vegetation.

The survey revealed that the Indian antelope or Blackbuck, *Antilope cervicapra* is the primary conservation and management concern among large mammals in the surveyed landscape. Blackbuck populations are scattered and patchy throughout the landscape of varying population sizes (1 to 29). The largest population size (~29 individuals) observed, lies at the eastern side of Jewar-Bulandshahar road, which bisects the GJIA site. Most of the habitats used by the Blackbucks within the Greenfield Jewar International Airport (GJIA) site are the agricultural land belonging to villages Ranhera, Rohi, Parohi, Banwaribas, and Bankapur. Outside the GJIA site, ~22 Blackbuck individuals were observed in agricultural land belonging to the villages, *viz*. Jhuppa, Shyam Nagar and Shamsham Nagar area in the southwest of Jewar town. The research team also observed another population of ~19 individuals around the forest patch along the Jewar to Jewar Khadar road.

In the case of birds, Sarus crane, *Grus antigone* has been identified as the species of immediate conservation and management concern. It is well spread throughout the landscape and is a commonly observed species. In total, 64 birds in 21 independent observations were recorded across the landscape, and the flock size ranged from 1 to 5. The majority (n=18) of these were outside the GJIA site. The largest flock of five birds was observed within the GJIA site. Other birds of conservation importance include Egyptian vulture, *Neophron percnopterus*, a few individuals (n=6) of which were observed at four different occasions during the survey, suggesting its very low abundance whereas Indian. Peafowl, *Pavo cristatus* is

very common, abundant and found distributed throughout the landscape close to villages.

Output and Outcomes: The survey's preliminary findings have been submitted to Yamuna Expressway Industrial Development Authority (YEIDA), Government of Uttar Pradesh, as an Inception Report of the project in January 2020 by Wildlife Institute of India. A workshop was also conducted, "Planning Effective Biodiversity Conservation Strategies around the Greenfield Jewar International Airport, Gautam Budh Nagar, Uttar Pradesh, India", on 1 February 2020 to brief various stakeholders about the Framework of Biodiversity Conservation Plan for the wildlife recorded in and around the proposed Greenfield Jewar International Airport site. The stakeholders were also apprised about the preliminary findings from the field survey. A detailed conservation plan is being prepared to be submitted to YEIDA.

Figure 1: *A herd of Blackbuck was recorded inside the proposed GJIA site.*

RESEARCH
COMPLETED

SECURING LIVELIHOODS, CONSERVATION, SUSTAINABLE USE AND RESTORATION OF HIGH RANGE HIMALAYAN ECOSYSTEMS (SECURE HIMALAYA)

Funding Source
Global Environment Facility (GEF)

Investigators
Dr V.B. Mathur, Dr G. S. Rawat, Dr S. Sathyakumar, Dr Gautam Talukdar, Dr Salvador Lyndogh and Dr Amit Kumar

Senior Project Biologists
Dr Mansi Mungee, Paridhi Jain, Dr Rupali Sharma and Bhawna Pandey

Junior Project Biologists
Deepika Chetri, Irina Das Sarkar, Nidhi Rawat, Oyndrila Sanyal, Diksha Barthwal, Yashaswi Rao, Somdeep Gangopadhyay, Monika Sharma, Manisha Mathela, Himanshu Bargali, Anindita Debnath, Meghma Ghosh, Shiv Narayan Yadav and Nidhi Singh

Date of Initiation
March 2018

Date of Completion
August 2020

Objectives: The central objectives of the SECURE-Himalaya project are: (i) Improved management of high range Himalayan landscapes for the conservation of snow leopard and other endangered species, their habitats and sustaining ecosystem services; (ii) Improved and diversified livelihood strategies and improved capacities of community and government institutions for sustainable natural resource management and conservation; (iii) Enhanced enforcement, monitoring and cooperation to reduce wildlife crime and related threats; and (iv) Effective knowledge management and information systems established for the promotion of sustainable management practices in the high range Himalayan ecosystems.

Progress: The project "Securing Livelihoods, Conservation, Sustainable Use and Restoration of High Range Himalayan Ecosystems" (SECURE Himalaya), with financial support from the GEF, is an integrated programme of the MoEFCC and the United Nations Development Programme (UNDP) towards conservation of high-altitude biodiversity and reducing the dependency of local communities on natural ecosystems. The project is being implemented in coordination with the Forest/ Wildlife Department of State Governments of Jammu and Kashmir (including Ladakh), Himachal Pradesh, Uttarakhand and Sikkim and has been divided into several components, of which seven are currently being implemented by the Wildlife Institute of India (three in Uttarakhand & Himachal Pradesh and one pan-India).

To achieve the objectives, following research components are currently carried out at Wildlife Institute of India: (i) Prepare participatory integrated landscape-level management strategy and plans by defining extent of landscape (alpine & subalpine) and evaluating landscape-level existing strategies in SECURE Himalaya project landscapes in Uttarakhand; (ii) Design a comprehensive Human-Wildlife Conflict (HWC) Management Strategy in select Districts/ Landscapes of Uttarakhand; (iii) Identifying, delineating and mapping areas with High Conservation Values (HCVs) and developing recommendations for the SECURE Himalaya landscapes in Himachal Pradesh; (iv) Assessment of medicinal and aromatic plant species including their collection, usage, demand, markets, price trends and life cycle, focusing on landscapes in Himachal Pradesh; (v) Assessment of capacity and training needs of key government staff and community members/institutions for long-term effective biodiversity conservation, and development of a framework for implementation in SECURE Himalaya Project landscapes (Lahaul, Pangi and Kinnaur) of Himachal Pradesh; and (vi) Effective knowledge management and information systems for monitoring & evaluation.

Outputs and Outcomes: *Prepare participatory integrated landscape-level management strategy and plans by defining the extent of landscape (alpine & subalpine) and evaluating landscape-level existing strategies in SECURE Himalaya project landscapes in Uttarakhand*: The component aims to promote a knowledge-based and adaptive conservation framework in large landscapes involving local communities and other stakeholders in conservation efforts. The four objectives have been addressed

using a combination of direct and indirect approaches to assess information on biodiversity, human society, local institutions, existing strategies and plans, and threats.

Design a comprehensive Human-Wildlife Conflict (HWC) Management Strategy in select Districts/ Landscapes of Uttarakhand: A significant component of the SECURE Himalaya project pertains to the complex issue of Human-Wildlife Conflict. The main objective is to assess the nature and extent of HWC in the project landscapes in Uttarakhand and then design a comprehensive conflict management strategy including reducing losses, providing suitable compensatory mechanisms (where needed), exploring options for alternative livelihoods and improving attitudes towards conservation. The research team adopted a multi-pronged approach to collect information from various qualitative and quantitative sources. Primary data was obtained through extensive individual-household questionnaire surveys. Formal and informal consultations were carried out with the Forest Department officials to gather ongoing schemes in both the landscapes. Further, four stakeholder workshops were conducted in different landscapes.

Identifying, delineating and mapping areas with High Conservation Values (HCVs) and developing recommendations for the SECURE Himalaya landscapes in Himachal Pradesh: High conservation value Areas (HCVAs) is an emerging concept used to identify essential areas based on a variety of parameters, including biodiversity, landscape context, threatened or endangered ecosystems, ecosystem services etc. The six criteria for identifying HCVAs are Species diversity, Landscape-level ecosystems, Ecosystems and habitats, Ecosystem services, Community needs and Cultural values. The study has been conducted in the trans-Himalayan region of Lahaul & Pangi Valley, Himachal Pradesh. Village-level meetings were organized, and data were collected using a semi-structured open-ended questionnaire to validate potential high conservation value areas (HCVAs) identified through the literature survey. The research team visited 28 villages (13 in Lahaul and 15 in Pangi valley) in the entire landscape. After final validation, a total of 12 potential areas were identified in both the landscape of Lahaul and Pangi Valley.

Assessment of medicinal and aromatic plant species, including their collection, usage, demand, markets, price trends and life cycle, focusing on landscapes in Himachal Pradesh: The major objective of this component is to assess Medicinal and Aromatic Plant (MAP) species with a focus on ensuring sustainable cultivation and harvesting by identifying usage patterns and studying existing value chains. Principal outcome involves improved and diversified livelihood strategies, improved capacities of communities and government institutions for sustainable natural resource management and conservation, and practical knowledge management and information systems established to promote sustainable management practices in the High range Himalayan ecosystems.

Effective knowledge management and information systems for monitoring & evaluation: This component aims to provide an information base in an Interactive, Live and Dynamic Web portal. The primary objective of this work is to furnish a knowledge repository through web-based databases and integrate the outputs from other baseline studies carried out under the SECURE Himalaya Project. Individual web pages for the four databases titled "Studies", "Best practices", "Experts", and "Ongoing schemes" have been created, and their contents have been integrated into the portal.

Milestones: Final report of the above project was submitted and accepted. In Uttarakhand, a landscape-level management strategy, a comprehensive draft human-wildlife strategy, species-specific SOPs, and training needs assessment for the Gangotri-Govind and Darma-Byans-Chaudans landscapes has been submitted for discussion with the state forest department. In Himachal Pradesh, 17 potential areas were identified in both the landscapes of Lahaul and Pangi Valley.

A separate web page is developed for baseline studies commissioned under the SECURE Himalaya project. Secure Himalaya portal has links to the websites of its stakeholders and other related organizations. This Portal is currently being hosted and maintained by WII and is available at this link: http://securehimalaya.in/beta/home.

RESEARCH
COMPLETED

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

Funding Source
Department of Science & Technology under the National Mission on Sustaining the Himalayan Ecosystem (NMSHE) Programme

Investigators
Dr V.B. Mathur, Dr S. Sathyakumar, Dr G.S. Rawat, Dr Ruchi Badola, Dr Pratap Singh. Dr V.P. Uniyal, Dr K. Sivakumar, Dr K. Ramesh, Dr J.A. Johnson, Dr Gautam Talukdar, Dr Abhijit Das

Project Scientists
Dr Soumya Dasgupta, Dr Vineet Dubey and Arun Kumar

Project Fellows
Ranjana Pal, Shashank Arya, Naitik Patel, Aashna Sharma, Pamella Bhattacharya, Tanvi Gaur and Prashant Tariyal

Project Assistants
Neha Aswal, Anshu Panwar, Shagun Thakur, Gurpit Singh Khalsa, Shuvendu Das, Amar Paul Singh and Priyanka Kashyap

Date of Initiation
August 2014

Date of Completion
August 2020

Objectives: The project's primary goal is to develop strategies to mitigate climate change effects on wild animal species and ecosystems in the Indian Himalayan Region (IHR). To achieve the above objective, the following research/task components have been put forth under the Theme on Fauna and Ecosystems: (i) To identify the drivers of landscape change (climatic and anthropogenic) in the IHR (Ganges River Basin) and their effects on the ecological and social systems. (ii) To conduct focussed research on wildlife aspects (terrestrial and aquatic fauna, micro flora and their habitats) and human dimensions in IHR (Ganges River Basin) for framing evidence-based policy measures. (iii) To develop monitoring and Decision Support Systems (DSS) for indicator species in the IHR (Ganges River Basin). (iv) To undertake climate change scenario analyses and visualization for predicting potential effects on fauna and ecosystems as a strategy to communicate with stakeholders and to influence policy and decision making. (v) To develop a spatial and inter-operable database to facilitate and policy decision making. (vi) To build capacities within WII and of other stakeholders for sensitization and development of action plans for climate change impact mitigation and to enhance capabilities for negotiations at the national and international forums.

Progress: Data analysis and report writing were completed during the reporting period, and the final report was submitted to DST. The significant findings of the study conducted in three landscapes in the Indian Himalayan Region *viz*., Bhagirathi Basin (UK), Beas Basin (HP) and Teesta basin (SK) are presented below. The team recorded six mammal species that were hitherto not reported in Uttarakhand State. The team tested the usefulness of the recent extension of the point-transect method using camera traps for estimating density for two mountain ungulates, i.e. Himalayan blue sheep, *Pseudois nayaur* and Himalayan musk deer, *Moschus leucogaster*.

As a result of intensive camera trapping, the presence of tiger and crab-eating mongoose was recorded for the first time from Sikkim. Tiger got photo-captured from an elevation of 2,647m and 1,430m in Pangolakha Wildlife Sanctuary. The climate vulnerability of two prime cold-water fishes of the Himalayas, the snow trout, *Schizothorax richardsonii* and a non-native brown trout, *Salmo trutta fario* was assessed. Two hundred ninety-one lichen species were identified, including micro and macro-lichens from various habitat types to different elevation and vegetation types. Fifty-seven genera belong to 30 families; Eight orders of soil nematode from Gangotri valley and thirty-four genera belong to 20 families. Eight orders were recorded from Nelang valley during the study. The difference in the abundance of different soil nematodes along the elevation gradient was also studied. Indicator-based adaptive capacity assessment and socio-economic vulnerability was also assessed in the Bhagirathi, Beas and Teesta basins of the Indian

Himalayan region. A total of 1,345 households of 77 villages of the three basins were surveyed to get information on adaptive capacity, climate sensitivity and climate stress.

Outputs and Outcomes: The extensive monitoring and research work under the TF-4 of the NMSHE was primarily focused on three major river basins-Beas, Himachal Pradesh in North-western Himalaya; Bhagirathi, Uttarakhand in Western Himalaya; and Teesta, Sikkim in Eastern Himalaya; which provided a solid context to understand the climate-related impact and vulnerabilities. The research team developed a large-scale date base comprising 5,042 articles on wild fauna and microflora of the IHR. Locations of suitable climate refugia across the IHR for two terrestrial (musk deer, Himalayan pit viper) and an aquatic species (snow trout) were identified based on different modelling approaches.

The results emphasized that contiguity is highly required among the Protected Areas (PA) for musk deer. Indicator based vulnerability assessment was done in the Beas, Bhagirathi and Teesta river basin of the Indian Himalayan Region. Capacity building of field personnel from Himachal Pradesh, Uttarakhand and Sikkim Forest Departments was carried out for skill enhancement. Sixty eight research personnel were trained on species distribution modelling and vulnerability analysis using present and future climate scenarios. A program has been initiated through the school level Do-It-Yourself (DIY) Activity book "Climate Cool-Kit" to create awareness about climate change education and sustainable living among young students. The research outputs from the NMSHE project have been brought forth through national and international peer-reviewed Journals. So far, the research team has published a total of 25 research publications.

Milestone: For the first time, a long-term monitoring of data-loggers based on air temperature and humidity has been initiated. Spatially-explicit predictions for climate habitat suitability in the current and future environments were developed for selected indicator ichthyofauna (snow trout and brown trout), mammals (musk deer, blue sheep, and snow leopard), and herpetofauna (Himalayan pit viper).

RESEARCH
COMPLETED

ASSESSING THE IMPACTS OF POWER-LINES ON AVIAN SPECIES IN THE ARID PLAINS OF WESTERN GUJARAT

Funding Source
Power Grid Corporation of India Limited

Investigators
Dr. R. Suresh Kumar and
Dr. Anju Baroth

Researchers
Harindra Baraiya

Date of initiation
November 2017

Date of completion
September 2020

Objectives: The objectives of the project were to (i) assess the electrocution and collision risk to birds due to existing power-lines and wind farms, identify problematic configurations and generate comprehensive data on mortality of avifauna; and (ii) identify sensitive bird habitats along existing and proposed power-line and wind farm corridors in Western Gujarat

Progress: The project has been completed and the draft of final report is prepared. A nearly 200-page draft report has been prepared that details the information gathered on the above objectives. The report provided details on the critical power-line stretches that can pose potential collision risk to large avian species in the arid landscape of western Gujarat. Further, the report details the distribution of raptor species in Kachchh and electrocution risk posed on them by distribution lines in the landscape. This report also details the possible influence of windmills on the space-use by migratory cranes in the region.

Outputs and Outcomes: As part of this study, a landscape-level distribution of four large avian species viz. Greater Flamingo, Lesser Flamingo, Common Crane and Demoiselle Crane was assessed using both,

vehicular road surveys and Species Distribution Modeling approach in the Kachchh district. Also, the tracking of Greater and Lesser flamingos has been carried out for the first time in Gujarat, the prime breeding habitat of the flamingos. This tracking effort provided crucial insights in flight behavior, movement patterns and habitat use by flamingos during breeding and non-breeding seasons and also led to the identification of four breeding sites of flamingos across Greater and Little Rann of Kachchh.

Flamingo tracking information and large avian species distribution data helped in the identification of power-line corridors that can potentially pose risk on birds. Further, the tracking effort of Common Crane provided insights in the migration and movement patterns on breeding (Kazakhstan) and wintering (Gujarat) grounds. As part of the study, high-use areas for raptors were identified using field surveys and electrocution risk on them was assessed using distribution line characteristics.

Milestones: The surveys carried out to record space-use by Common crane in windmill and no-windmill areas revealed that windmills are possibly displacing cranes from their suitable habitats. Lastly, detailed guidelines to minimize the risks posed by energy infrastructure on birds were provided for the arid plains of western Gujarat based on the findings of this project.

RESEARCH COMPLETED

ASSESSMENT OF MEDICINAL AND AROMATIC PLANT SPECIES INCLUDING THEIR COLLECTION, USAGE, DEMAND, MARKETS, PRICE TRENDS AND LIFE CYCLE, FOCUSING ON LANDSCAPES IN HIMACHAL PRADESH UNDER SECURE HIMALAYA

Funding Source
UNDP & Global Environment Facility (GEF)

Date of Initiation
March 2019

Date of Completion
December 2020

Investigators
Dr Amit Kumar, Dr S. Sathyakumar, Dr BS Adhikari and Dr GS Rawat

Researchers
Dr Rupali Sharma, Monika Sharma, Manisha Mathela and Himanshu Bargali

Objectives: The objective of the project was to assess Medicinal and Aromatic Plant (MAP) species with a focus on ensuring sustainable cultivation and harvesting by (i) Identifying usage patterns; and (ii) Studying existing value chains.

Progress: The current study revealed that the major issues adversely impacting the MAP species in the Lahaul and Pangi landscape include illegal/ over/ premature/ unorganized harvesting of Medicinal and Aromatic Plants (MAPs), high demand and non-transparent operations in the markets of MAPs. Besides these issues, few gaps such as knowledge on available stock of MAPs, lack of information on cultivation and harvesting methods of key MAP species specific to Lahaul and Pangi landscape, lack of information on end users and middlemen and inadequate information on quantity of raw material traded have been reported.

In order to optimize the benefits to the local communities and adopt the concepts of sustainable harvesting and benefit sharing, it is important to assess the availability, market trends and methods for collection of MAPs including gathering information on population of selected MAPs. This will help in identifying High Conservation Value Areas (HCVAs) and delineating MPCAs for *in-situ* conservation in the landscape. Additionally, identification of large traders and industries that acquire their raw materials from Lahaul and Pangi will strengthen the implementation of Access and Benefit Sharing model on pilot basis. Furthermore, identification of hidden markets *viz*., local, regional and national, price trends, value

addition and strengthening BMCs will help in sustainable management of MAPs in the landscape.

The first step towards conservation is identifying the existing population base, and information on the species distribution and abundance. Identification of the best cultivation practices, R&D to reduce long-gestation periods, cost effective technology, organic-farming, buy-back mechanisms, policy-revision in the interest of stakeholders, protocols for post-cultivation management, quality-control and awareness training are some measures in this direction. It can be concluded that in order to optimize the benefits to the local communities, and to adopt the concepts of sustainable harvesting and benefit-sharing, it is important to assess the availability, market trends and methods for collection of MAPs, including gathering information on population of selected MAPs. A major step towards species conservation can be spreading awareness on the dwindling populations amongst the stakeholders. It is also important to identify alternative sources of income for the locals to create in them confidence that wild harvest of MAPs was not the only source of cash income and, thus to dissuade them from ruthless wild harvest and to make them participate in conservation programs. Identifying and building the capacities of stakeholders including the forest officials, locals, school children, traditional healers and plant traders can help in community based natural resource management. These issues need to be addressed to ensure long-term conservation of the MAP resources of the landscape in a way that livelihood needs of the local communities depending on this resource are not compromised.

Outputs and Outcomes: The livelihood strategies were improved and diversified. The capacities of communities and government institutions were also enhanced for sustainable natural resource management and conservation. Effective knowledge management and information systems were established to promote sustainable management practices in high-range Himalayan ecosystems. The following key recommendations have emerged after this study: (i) Documentation of the Conservation Status of Key MAPs; (ii) Setting aside Conservation Areas around Viable Populations of Priority MAPs; (iii) Strengthening of Biodiversity Management Committees (BMCs); (iv) Value addition by adopting best Post-Harvest Management Techniques; (v) Developing Farm-scale Agro-Techniques for Priority MAP Species; (vi) Developing Germplasm Banks of the Priority MAP Species; and (vii) Study and Monitor Impacts of Climate Change.

Milestone: Six MPCDAs were identified in Lahaul and Pangi region, Himachal Pradesh.

RESEARCH
COMPLETED

ECOLOGICAL IMPACT ASSESSMENT OF EXISTING AND PROPOSED ROAD INFRASTRUCTURE IN IMPORTANT WILDLIFE CORRIDORS IN INDIA FOR STRATEGIC PLANNING OF SMART GREEN INFRASTRUCTURE

Funding Source
National Tiger Conservation Authority, New Delhi

Investigators
Dr Bilal Habib and Dr Y.V. Jhala

Researchers
Akanksha Saxena, Mahima and Bhanupriya Rabha

Date of Initiation
December 2015

Date of Completion
December 2020

Objectives: The objectives of the project are to (i) Assess ecological impacts (direct, indirect and cumulative) of road infrastructure on select wildlife taxa and their habitats within three landscapes in India; (ii) Evaluate the cumulative impacts of existing multiple road developments on conservation values of landscape and integrity of the wildlife corridors in these landscapes; (iii) Assess the implications of future road development in the landscape with special emphasis on wildlife corridor function; and (iv) Provide

a regional road development plan based on current and future road development plans to be implemented in the landscape to avoid, reduce and mitigate impacts on areas critical for promoting conservation in the identified landscape.

Progress: Fieldwork to assess the impacts of the state highway 33, the Mysore-Mananthavadi Highway (MMH), near the Nagarhole Tiger Reserve on wildlife was carried out during December 2018 – May 2019. The study included an assessment of the use of habitat and behaviour of the large mammal community in Nagarhole in response to vehicular traffic on two segments of SH 33 passing through the park. Fieldwork to assess the impacts of the National Highway 37 circumventing the Kaziranga National Park, Assam, on wildlife was carried out during December 2018 – December 2019. The study included an assessment of the characteristics of animal-vehicle collisions on NH 37, including species involved in collisions, hotspots of collisions and corridors most susceptible to collisions.

Camera trap image

In Central India, fieldwork to study impacts of the National Highway 44 (earlier seven) passing through the Pench Tiger Reserve was completed as of December 2019. The study included the assessment of changes in habitat use patterns by the large mammal community in Pench Tiger Reserve (MP and Maharashtra) in response to traffic on NH 44, assessment of road kill on NH 44, and behaviour of select species near the highway. Monitoring of the animal underpasses on National Highway 44 is being carried out as part of the project since February 2019.

Outputs and Outcomes: The study on SH 33 on mammals in Nagarhole Tiger Reserve was part of an M.Sc. dissertation report entitled "Impacts of road-related disturbances on mammalian and vegetational assemblages- a case study of SH 33 passing through Nagarhole Tiger Reserve, Karnataka". Fortnightly and quarterly reports of the monitoring of animal underpasses on National Highway 44 were regularly submitted to the Forest Department in 2019. A summary of the results of the first year of underpass monitoring was published in the form of an information brochure entitled "Monitoring of Underpass Usage by Wildlife on NH 67 (Now NH 44), Pench Tiger Reserve: A report on the use of animal underpasses by wildlife (2019)". Yearly report for the period December 2018 – December 2019 was submitted to NTCA.

Milestone: Monitoring of India's first animal underpasses was carried out this year as part of the project. The research team obtained 5,450 photo captures of 18 wild animal species during the year, including 89 tiger crossings of 11 individuals. The findings from the monitoring were published in the form of an information brochure.

Camera trap image

STATE OF INDIA'S BIRDS REPORT

Funding Sources
Grant-in-Aid, Foundation for Ecological Security, National Centre for Biological Sciences and Nature Conservation Foundation

Collaborating Agencies
Ashoka Trust for Research in Ecology and the Environment (ATREE), Bombay Natural History Society (BNHS), Foundation For Ecological Security (FES), Nature Conservation Foundation (NCF), National Biodiversity Authority (NBA), National Centre for Biological Sciences (NCBS), Salim Ali Center for Ornithology and Natural History (SACON), Wetlands International, and World Wildlife Fund (WWF)

Investigators
Dr Monica Kaushik, Dr Sutirtha Dutta, Dr Suresh Kumar, Dr Malvika Onial, Dr Gautam Talukdar, Dr Gopi GV, Dr Manoj Nair, Shri Qamar Qureshi and Dr Vishnupriya Kolipakam (all from WII); Dr Ashwin Vishwanathan, Dr Suhel Quader, Dr MD Madhusudan, Dr Kulbhushan Suryawanshi and team (from collaborating agencies)

Date of Initiation
2019

Date of Completion
2020

Objectives: This report aims to present the first comprehensive assessment of the distribution range, trends in abundance, and conservation status for most bird species that regularly occur in India.

Progress: Work is completed, and the report has been published. This report assesses the status of 867 bird species using data uploaded by birdwatchers to the online platform eBird. This assessment is based on three indices. Two are indices of change in abundance: Long-term Trend (*i.e.* over 25+ years) and Current Annual Trend (*i.e.* over the past five years); and the third is a measure of Distribution Range Size. Of the 261 species, only could be determined (*i.e.* not Uncertain or Data Deficient). 43% of species showed a stable long-term trend, and 5% showed an increasing trend. Current annual trends could be estimated for 146 species (excluding those Uncertain or Data Deficient). Of these, nearly 80% are declining, with almost 50% declining strongly. Just over 6% are stable and 14% increase.

Outputs and Outcomes: The range size of all but six species was estimated. Most species (46%) have Moderate range sizes. A further 33% have Large or Very Large range sizes, and 21% have Restricted or Very Restricted range sizes. Using these three indices together with the IUCN Red List, each species was classified of conservation concern for India: 442 into Low Concern, 319 into Moderate Concern and 101 into High Concern. Species of High Concern include those whose abundance indices have declined considerably in the long term and continue to fall today. Species were also categorised as High Concern if their current range is Very Restricted or if their abundance trend could not be assessed, but they are classified as globally threatened in the IUCN Red List.

Milestone: Of the species in the High category of conservation concern, 26% (26 species) are classified as globally 'Least Concern' by the IUCN Red List 2019. On the other hand, this assessment has classified seven species considered globally 'Near Threatened' or 'Vulnerable' as being of Low Concern in India.

RESEARCH
COMPLETED

TIGER RECOVERY STRATEGY AND LONG-TERM MONITORING IN SAHYADRI TIGER RESERVE, MAHARASHTRA

Funding Source
Sahyadri Tiger Conservation and National Tiger Conservation Authority

Investigators
Dr K. Ramesh and Shri Satyajit Gujar

Researchers
Shah Nawaz Jelil, Avinash Gaykar and Natasha Girkar

Date of Initiation
April 2016

Date of Completion
March 2021

Objectives: The objectives of the project are to (i) conduct feasibility analyses of the area in the context of current habitat condition, natural colonization possibility and social acceptance; (ii) undertake to monitor of prey species and tiger populations looking into movement patterns, population growth, behaviour, genetic structure and physiological profile; (iii) estimate the population size of tiger, co-predator and prey species and model the habitat correlated to understand the species habitat relationship and support the ongoing Phase IV monitoring activity; (iv) map landscape composition and configuration, and estimate patch properties, connectivity, landscape permeability and spatial conservation prioritization within and across the landscape; and (v) quantify human-wildlife interface issues and ecological correlates liked to economics and system services.

Progress: The first objective has been accomplished, and the feasibility study has also been completed. The report was also submitted to all concerned in 2018. Recently an interim technical report summarizing the work during 2018 – early 2020 has also been submitted to the concerned forest department. Regular monitoring in opportunistic sign surveys, standard line transects, and camera trapping in tiger reserve has been continued. During the reporting period, prey density was modelled within the tiger reserve (using random encounter modelling REM framework) and habitat in the larger Sahyadri landscape.

Outputs and Outcomes: For the reporting period, our camera trapping effort totalled 7,682 trap nights and captured 23 mammal species belonging to 13 families. Wild boar was the most captured mammal species (18.78/100 trap nights), followed by Indian gaur (11.23). Among felids, leopards had the highest capture rate (5.53). No tiger was captured in 2019. Only one canid, the dhole (0.52), was captured. Small Indian civet was the highest captured civet species (2.46), and the least captured was the brown palm civet (0.14).

Previously, comparisons between encounter rates from line transect and capture rates of camera traps revealed that density estimates derived from line transect sampling were inaccurate and highly underestimated. The research team estimated prey density using the camera trap data using the Random Encounter Modelling (REM). Using Sentinel-2A, DEM, Landsat-8 data, the team mapped eight important variables necessary to support tiger recovery — elevation, slope, aspect, land-use, vegetation cover, water index (NDWI), nightlight and human footprint.

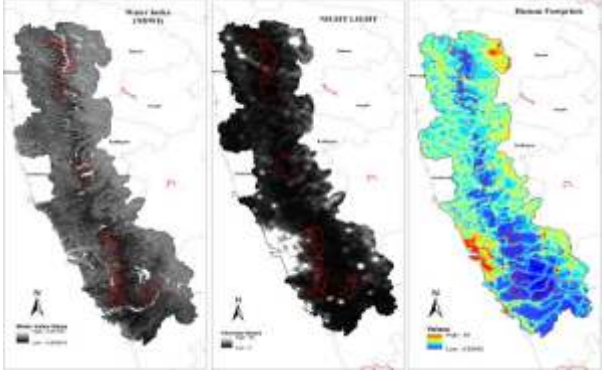


Figure: *Spatial layers used in landscape analyses of larger Sahyadri landscape*

Milestone: The research team successfully adopted the REM framework in the field and estimated prey densities. This has been done for the first time for this landscape, and the team intends to continue estimating prey densities in the future using this framework. All relevant spatial layers for corridor connectivity are now ready for analysis. After completing feasibility analyses and bridging the knowledge gap, the project is now prepared for the next phase of recovery activities.

RESEARCH
COMPLETED

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

Funding Source
Compensatory Afforestation Fund Management and Planning Authority (CAMPA), Ministry of Environment, Forest and Climate Change, Government of India

Investigator
Dr Ruchi Badola

Researchers
Dr Chongpi Tuboi,
Mirza Ghazanfarullah Ghazi,
Dr Sharmila Naosekpam,
Akoijam Santikumar Singh,
Tennison Gurumayum,
N Bijyaluxmi Devi,
Endrea Moirangthem and
Padichunbou Newmai

Date of Initiation
March 2016

Date of Completion
March 2021

Objectives: The objective of the project was to secure the long-term survival of Sangai in the wild. The project primarily addresses: (i) Strengthening the existing population in Keibul Lamjao National Park (KLNP); (ii) Establishment of a second population in the 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: Capacity building of frontline staff of Forest Department and local volunteers was carried out every year. Conservation Breeding-cum-Rescue Centre for the sangai and a Veterinary Centre has been established for disease surveillance and handling emergent situations. An action plan for the conservation breeding centre has been prepared. A survey of the area for earth filling and further development has been initiated and is under process. An integrated management plan of KLNP has been prepared after a comprehensive consultation with all stakeholders. Drone (UAVs) survey in the park is ongoing. A total of 722 fish farms were visited, out of which data regarding management practice were collected for 485 fish ponds randomly.

Establishment of a Second Population in Wild: As a part of the establishment of a second population in the wild for sangai, a series of meetings were organised with local people of Pumlen Pat to discuss the current affairs of villagers on the establishment of conservation reserve, and reintroduction of sangai in Pumlen Pat and Thongam Mondum Reserve Forest. A stakeholder consultation meeting was organized to consult the stakeholders regarding their perceptions on the problems and issues affecting the integrity of the lake and its biodiversity conservation. A five-day orientation-cum-training workshop on 'Conservation reserve and its prospects of sustainable development' was organized for the community representatives, followed by a field exposure tour-cum-training at Kaziranga National Park, Assam.

The 8th State Board for Wildlife was held on 12 March 2021 at the Chief Minister's Secretariat with the Hon'ble Chief Minister, Manipur. Following the recommendations of the meeting, the WII, in collaboration with Manipur Forest Department, initiated the development at the proposed conservation breeding site.

Improved Habitat Condition and Protection Measures: From April to September 2020, wildlife, including birds and turtles, were rescued, and necessary treatments were given before rehabilitation. A total of eight animals were rescued and released. The Forest Department of Manipur has acquired 10 ha of land in the adjoining area of KLNP to establish Conservation Breeding-cum-Rescue Centre for the Sangai and has fenced the area. An action plan for conservation breeding has been prepared.

Involving the Local Community in Conservation Efforts: A series of webinars was conducted for different target groups to build a larger constituency of support for sangai conservation. Several trust-building activities are being conducted to garner the support of the local communities for Sangai conservation. Livelihood training camps for women groups and local communities from the peripheral villages of KLNP and reintroduction sites were organised. Following these training and activities, Self Help Groups (SHGs) of women were formed. A series of training were planned out for building their capacities with the help of resource persons from the Manipur State Rural Livelihoods Mission (MSRLM).

Conducting Applied Research on the Ecology of the Species: For improved habitat conditions and enhanced protection measures, areas vulnerable to poaching and human disturbances have been identified, and appropriate measures have been incorporated in the Integrated Management Plan of KLNP. Extensive questionnaire surveys regarding the aquaculture practices were conducted to assess the management practice of the aquaculture ponds around the Park.

Outputs and Outcomes: Scientific management regime for the conservation of Sangai at KLNP has been put in place. Action plan for conservation breeding is in place, and conservation breeding centre has been planned, and ground work has been initiated. The human resources were trained for the conservation management of Sangai and its habitat. Alternative livelihood options for the local communities were considered for an effective management regime in place.

The existing population was strengthened in KLNP by monitoring the people, with interventions to decrease the chance of disease spread and transmission from surrounding village livestock using various diagnostic, treatments and vaccination following protocols of proper animal husbandry techniques. The second population was established in the wild after developing the land acquired. Applied research was conducted on the ecology of species by using various interdisciplinary methods.

RESEARCH
COMPLETED

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

Investigators
Dr K Ramesh, Dr JA Johnson and Dr Abhijit Das

Researchers
Satyam Verma, Manjari Malviya, R. Rajasekar, Sankarshan Chaudhary, Amit Kaushik, Dibyendu Biswas, Nazrukh Sherwani, Ajay Singh, Babu Lakhan, Priyanka Das, Pallabi Mitra, Susmita Khan, Vishal Kumar Prasad, Rahul Gandhi and Priyanka Kumari

Date of Initiation
April 2018

Date of Completion
March 2021

Objectives: The objectives of the project are to (i) Undertake landscape-level assessment for the status of tiger, co-predator, prey species and habitat quality in the entire landscape, including Nauradehi Wildlife sanctuary (NDWLA) and Rani Durgawati Wildlife Sanctuary (RWLS) in Madhya Pradesh, and Ranipur WLS and Mahavir Swami WLS in Uttar Pradesh; (ii) Map the nest site availability (existing as well as potential) of vultures and their ranging pattern in and around Panna Tiger Reserve; (iii) Map surface water resources and study the distribution and abundance of aquatic indicator species in Ken river; (iv) Quantify multi-taxa distribution and abundance in Panna Tiger Reserve and map the biodiversity values along spatial context linked to various zones of impact; (v) Document and establish a baseline of

socio-economic conditions of the people in the landscape; and (vi) Suggest mitigation measures to reduce/minimize the negative impacts of KBLC project.

Progress: During the project's second year, the camera trapping exercise was completed in the entire landscape. Camera trap data obtained were sorted and analyzed to observe the presence of tiger, co-predator, and prey species and understand the mammalian diversity in the landscape. Camera trapping of submergence zone and highways passing through PTR was initiated. Behavioural study and population estimation of vultures in PTR was also initiated. Multiple spatial layers were generated for the landscape, *viz*. LULC, NDWLS and RWLS to understand habitat quality; and Drainage density to map surface water resources. Groundwater potential zones and Micro watersheds for the entire landscape, including PTR, were delineated. Based on this, aquatic indicator species sampling was started in Ken river, within PTR. Multi-taxa assessment of relocated villages within PTR was also initiated. The socio-economic survey was completed in the landscape. Data was entered and analyzed. A series of consultation workshops were also organized, first to understand grass-root level issues faced by forest staff and local communities at range level and then at the landscape level to get inputs of experts and stakeholders on the work done in phase one and the proposed data collection strategy for phase two.

Outputs and Outcomes: Analyses of camera trap data from the first phase (landscape excluding PTR) revealed the presence of 31 mammal species in the landscape, of which 11 are carnivores, and 20 are herbivores. The tiger capture rate was very low. The livestock and human capture rates were high throughout the landscape, indicating high anthropogenic pressure on the forest. A total of 144 species (54 families) of vegetation life forms have been recorded from the landscape, including 94 tree species (32 families), 40 herbs species (14 families) and ten shrubs species (8 families). Mean tree density per hectare and mean seedling density in the landscape were calculated in the study areas.

Five invasive herb species have been recorded in the landscape. LULC map reveals that a major portion of the landscape is dominated by agriculture and forest land. Habitat suitability analyses suggest that apart from protected areas, there are important tiger suitable habitats in the landscape, which can be identified and developed into satellite cores. These areas form parts of South Panna, North Panna, Satna and Chhattarpur Forest Divisions. 2904 vultures belonging to seven species were recorded in the landscape. During the abundance survey in PTR, 144 active and four inactive vulture nests were identified. During the behavioural study, key behaviours like bathing and chick-rearing have been observed. With the help of NDWI, a total of 19,960 surface water bodies in the landscape were identified, including ponds, rivers, canals and small check dams. Two nesting sites of Muggers, *Crocodylus palustris* were also recorded in Ken Gharial Sanctuary.

The households in the landscape were dependent primarily on natural resources for their livelihood. Around 90.76% of households reported dependence on fuel wood, and 47.59% of sampled families reported dependence on NTFPs. Regular training on equipment handling should be provided to the staff. As for local communities, it was found that wildlife-related crop and livestock loss was their biggest problem, followed by boundary issues and the inability to collect certain forest produce. It was suggested that fencing to prevent crop-raiding should be explored, and EDCs should be strengthened with an adequate inflow of funds. Both forest staff and village representatives indicated that alternate grazing land and plantation area should be delineated to reduce pressure on the forest.

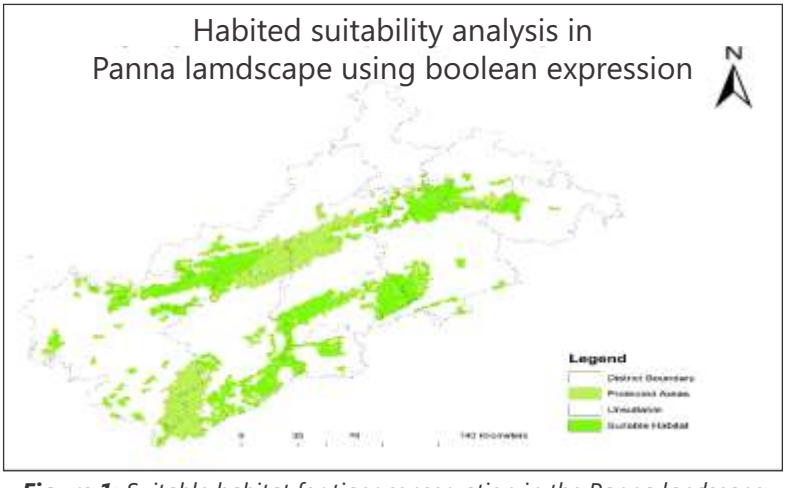


Figure 1: *Suitable habitat for tiger conservation in the Panna landscape*

Milestone: The framework and the methodological approach of developing a management plan have received endorsement from the key stakeholders and field functionaries. The field team has accomplished a landscape-level survey on major thematic groups. Stakeholder workshops for officers and local communities have been completed, giving further insights into the strategies to be followed and resources to be allocated, which shall be incorporated in the landscape management plan.4

RESEARCH
COMPLETED

TIGER REINTRODUCTION AND RECOVERY PROGRAM IN PANNA TIGER RESERVE AND THE LANDSCAPE COMPLEX, MADHYA PRADESH: PHASE II

Funding Source
National Tiger Conservation Authority and Madhya Pradesh Forest Department

Investigators
Dr K. Ramesh, Dr J.A. Johnson and Shri Subhranjan Sen

Researchers
Supratim Dutta and Kamana Pokhariya

Date of Initiation
February 2015

Date of Completion
March 2021

Objectives: The objectives of the project were to (i) monitor and study the population growth of translocated/re-established tiger population in Panna Tiger Reserve, including their genetic variation and physiological profile; (ii) understand the dynamics of co-predator and prey populations in relation to tiger occupancy pattern, food habits, habitat association and other management interventions; (iii) study landscape ecology of tiger and ranging patterns incorporating human interface issues such as human use of core and buffer, poaching pressure and ecological correlates linked to economics and system services, including water sources and stream ecology; and (iv) upgrade the skills of PTR staff to independently execute the Phase IV tiger monitoring in next two years.

Progress: The first and fourth objective has been fully accomplished, while the other two objectives are near completion. Phase IV report has been submitted to the forest department. Monitoring activities, i.e. sign surveys, line transects and camera trapping, in tiger reserve has been continued. Fieldwork in order to study the vegetation type and mapping of forest type was conducted.

Outputs and Outcomes: The camera trapping effort totalled 8,192 trap nights in the core area for the reporting period. From the total 466 tiger photo captures obtained during phase IV camera trapping (2019-20), a total of 39 tigers (both adult and sub-adult) were uniquely identified. Nine radio-collared tigers were regularly tracked using radio telemetry to monitor their movement and observe their home ranges. Tiger locations were collected by triangulation and home in methods. Later the triangulated locations were analyzed by Locate III software to get the actual position of tigers. A minimum convex polygon-based home range map for individual tigers was generated using Arc GIS 10.5 and projected locations. During the reporting period, 144 transects were walked in January. The effort length was 864km. Results show the density of all the prey species was 48.79±4.36/km^2. In core, 76 transects were walked, the effort length was 456km, analysis for core reveals the density of prey species inside the core was 42.59±5.47/km^2.

Milestone: The project ensured that necessary technical and management capacities were available locally. After reaching the carrying capacity, the tiger population shows dispersal behaviour while still space is left in the area.

RESEARCH
COMPLETED

INFLUENCE OF MICRO-CLIMATIC VARIABLES ON HERBACEOUS PLANT COMMUNITIES IN TREELINE ECOTONE IN THE HIMALAYA

Funding Source
NMHS, New Delhi through CHEA, Nainital

Investigator
Dr B.S. Adhikari

Researcher
Rahul Kumar

Date of Initiation
April 2016

Date of Completion
March 2021

Objective: The project aims to understand the impact of depletion of snow-melt water on the growth of grassland species composition and selected functional processes.

Progress: Seasonal snow cover is a prominent characteristic feature of most alpine regions. The present study examines the impact of different snowmelt regimes and constant warming on vascular plants' abundance, growth, and diversity. The study was conducted in Timberline ecotone in and around Tungnath, Western Himalaya. An experiment on snow manipulation was conducted in Shokhark, a small meadow in the southern aspect during the winter season. Two major communities, *Potentilla*-Mixed and *Fragaria*- Mixed, were identified in the alpine meadow.

Five plots at 3m intervals were identified and marked permanently with different snow regimes before the first snowfall in each community. The phenology of 35 species across communities was recorded following the BBCH scale. There was hardly any variation in species abundance across months within Open Top Chambers (OTC). Inside OTC regimes, the species growth was much vigorous than outside OTC regimes. This may be because warming advances the growing phase by early snowmelt, shifts plant phenol-phases and expands growing season leading to higher plant productivity. Kruskal-Wallis test showed a significant difference between control and OTC snow regimes for species richness, density and diversity.

Outputs and Outcomes: The results highlight that the warming temperature with an increase in snow cover will not have much effect on richness and density, whereas the rise in temperature with no snow cover will favour an increase in species richness and density in herbaceous alpine meadows, however, the increasing temperature will not have a significant impact on the diversity of herbaceous meadows. With similar temperatures, an increase and decrease in snow cover and no snow cover will adversely impact herbaceous alpine meadows' richness, density, and diversity. However, the results suggest a positive influence of warming on species richness and density in snow-free conditions, while the negative impact on richness, density and diversity in present conditions.

RESEARCH
COMPLETED

SPATIAL ECOLOGY OF HIMALAYAN TORRENT FROG, NANORANA VICINA (STOLICZKA, 1872) IN RESPONSE TO HABITAT DYNAMICS

Funding Source
Grant-in-Aid (TRAC-MoEFCC)

Date of Initiation
October 2017

Investigator
Dr Abhijit Das

Date of Completion
October 2021

Researcher
Swati Nawani

Objectives: The objectives of the project are to (i) determine the movement pattern and home range size of *Nanorana vicina*; (ii) understand stream habitat and microhabitat preference by the species; and (iii) Factors responsible for the movement of individuals.

Progress: This is a first of its kind project initiated in Binog Wildlife Sanctuary (BWLS) and Kedarnath Wildlife Sanctuary. The research team recorded 18 species of herpetofauna belonging to 16 genera. Among them, the amphibian was represented by five species, and reptiles were represented by 13 species, including eight species of snakes and five species of lizards. Among the recorded species in Visual Encounter Surrvey (VES), *Nanorana minica* was the most abundant species. *Asymblepharus himalayanus* has the lowest relative abundance value (0.04) with an encounter rate of 0.4/person hour. In Kedarnath Wildlife Sanctuary, the team recorded 16 species of herpetofauna belonging to 13 genera and nine families. Amphibians were represented by nine species of anurans, while reptiles were represented by four species of snakes and three species of lizards. Among all recorded species of herpetofauna, *Megophrys* cf *parva* has the highest relative abundance value (0.3).

Outputs and Outcomes: Radiotelemetry results suggest that *N. vicina* is a stream-dwelling frog that is mainly confined to the stream's pool section and moves less. It showed high philopatry, narrow habitat uses and obligate adaptations to torrent stream environment. The trend of individuals to move less has also been observed in other stream frogs', support that *N. vicina* is a stream-dwelling frog. In the present study area, a significant portion of the amphibian habitat of the stream has been modified to create artificial pools and check dams. Check dams may directly impact *N. vicina* as they lay eggs under the tree roots and boulder undercut. Making an artificial pool may impact the stream's natural flow and likely impacts flow-dependent species such as *A. formosus* and *A. jaunsari*. Being situated near a popular tourist destination Mussoorie, Binog attracts many tourists throughout the year. People coming for picnics, study

tours, trekking groups often leave plastic wrappers, plates and bottles and other wastes in the stream water. These activities may negatively impact the stream ecology.

Milestone: The results of this study suggest that *N. vicina*, like many riparian anurans, is a sedentary animal. Inhabiting riparian zones, animals probably obtain sufficient ecological necessities such that long-distance movements are not required. The radio telemetry results have been supported by a visual encounter survey where they were mostly encountered in the pool section of the stream.

RESEARCH
COMPLETED

DEVELOPMENT OF CONSERVATION ACTION PLAN FOR RIVER DOLPHIN

Funding Source
CAMPA, MoEFCC

Investigators
Shri Qamar Qureshi,
Dr Vishnupriya Kolipakkam,
Dr Ruchi Badola and Dr Bitapi C. Sinha

Researchers
Dr Abdul Wakid, Shovana Roy, Vineet Singh, Sajal Sharma, Sunny Deori, Merin Jacob, Gargi Roy Choudhury, Kanad Roy, Abhishek B., Harshini Jhala, Hiyashri Sharma, Ayan Dutta, Anurag Rokade, Madhavi, Bhavna Pant, Sneha Mane, Vishruta Rao, Ranjana Negi, Aaranya Sekharan, Gautam, Abhijit Konwar, Jitul Kalita, Subhasree Das, Karuna and Tabassum

Date of Initiation
April 2016

Date of Completion
March 2021

Objectives: *Ecological monitoring*: (i) To develop a monitoring protocol for Ganges river dolphins and associated riverine fauna. (ii) Quality assessment of river habitat in terms of water quality, anthropogenic pressure and landscape surrounding river scape.

Participatory conservation planning and action: Involve stakeholders to develop a network, which will assist in Ganges river dolphin conservation.

Progress: *Population estimation of Ganges river dolphin in Ganga (UP, Bihar & West Bengal)*: Ganges river dolphin abundance estimation was conducted in River Ganga (mainstream). The Independent double observer method was followed along with underwater acoustic hydrophones. The data generated were arranged in capture-recapture format to estimate the abundance using Lincoln- Petersens' (L-P) estimator. A total of around 1,500 dolphins were estimated in the mainstream Ganga. However, this data needs to be corrected for unavailability, and the actual estimate would be between 1800-2000 dolphins. This is the first scientifically robust estimate of the Ganges River dolphin from Allahabad to Ganga Sagar. The stretches above Varanasi and tributaries of Ganga need to be surveyed for complete abundance estimation of dolphins in Ganga.

Table 1: *Population status of Ganges river Dolphin in main stream Ganga*

River	Stretch	Total Length surveyed (Km)	Least count	Encounter rate (Dolphin/km)	L-P estimates (SE)
Ganga	Hooghly	520	429	0.83	521 ± 16
	UP	260	191	1.13	203(5)
	UP-Bihar	129	76	1.11	80 (2)
	Bihar	548	735	1.95	785(9)

Baghjan Oil Spill: The oil spill due to blowing out of well number 5 of Baghjan on 27 May 2020 and subsequent fire on 9 June 2020 destroyed about 60-70ha of the area around the site. The oil spread out not only on land but also dispersed into the

surrounding rivers and wetlands. A rapid impact assessment survey followed by a detailed survey was done at Baghjan oil well blowout site, Assam and the effect of the oil spill in the surrounding landscape. A large amount of oil and associated pollutants were discharged in the surrounding aquatic and terrestrial systems following the blowout. This has also resulted in sound pollution and loss of biodiversity. The dissolved oxygen level declined in the river and surrounding wetlands. Carcinogenic Polyaromatic Hydrocarbons (PAHs) were released in water. All these caused large-scale mortality of fishes, one Ganges river dolphin, several insects, birds and herpetofauna. The cause of mortality of the river dolphin was oil poisoning from the explosion. There was an 89% decline in the use of the affected area by Ganges river dolphins. Fish richness was less by 71% and abundance by 81% in the impacted site when compared with the unimpacted site. The total PAHs concentration reported in fish samples appears to be 10-100 fold higher than the reported concentration from unaffected sites. A decline in bird richness (when compared with before the incident) is evident, with a 59% decline in adjoining grasslands and an 85% decline in the wetland near the impact site. The impact on the surrounding Important Bird Area (IBA), Maguri Motapung beel, was severe.

Effectiveness of "Pingers" as bycatch mitigation devices: Pingers were used as an acoustic deterrent device to keep the aquatic mammals alert of the presence of fishing gears and to avoid net entanglement. In the study, the research team tried to understand the effect of pingers on Ganges dolphins by comparing its activities near monofilament gillnets when the fishing gear was without pingers and with loaded active pingers. It was observed that the activity of dolphins declined when the pingers were activated in the fishing gears. The minimum visual distance estimation was 20m without pingers and 70m with active pingers loaded in the fishing gears.

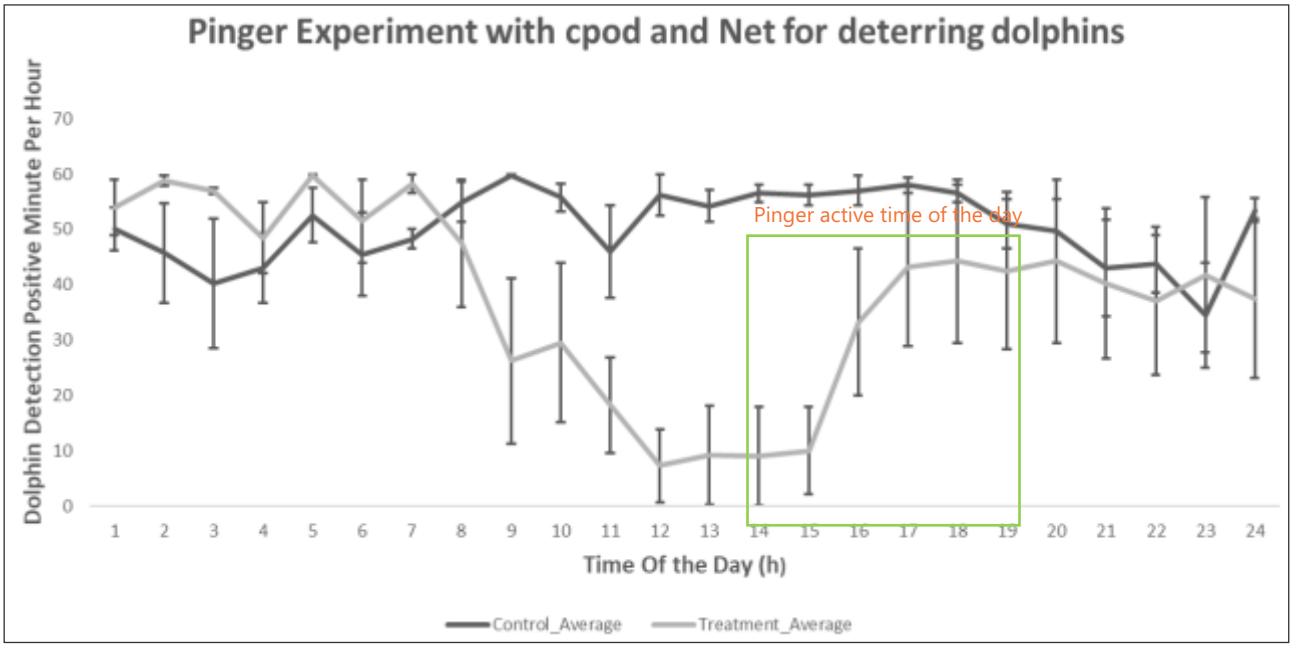


***Figure 1**: Comparision of Dolphin activity at the nets where acoustic deterrent devices (pingers) are deployed. The black line indicates the control experiment, and the grey indicates the experiment when the pingers were active at a particular part of the day.*

Participatory Conservation Efforts: As part of the project objectives, in engaging and developing sensitized future generations of stakeholders, there is continuous engagement with the local communities in forming the developed Dolphin Conservation Network. As part of this participatory approach, land-based dolphin monitoring involving Dolphin Conservation Network (DCN) members was carried out from October to December 2020. Total 28 DCN monitoring sites were surveyed and 37 DCN members participated. Each site was replicated 1-3 times with a total transect effort of 486km. The maximum

encounter rate of 4.83 dolphins per km was observed in Malabari in the first replicate in November and 4.67 dolphins per km were observed in Pobitora in the second replicate of the same month.

Outputs & Outcomes: The abundance of Ganges River dolphins in mainstream Ganga were estimated to be ~1500 dolphins, without correcting for unavailability. Dolphin hotspots were mapped and would be critical for conservation investments. Net entanglement is one of the major causes of dolphin mortality. This study was also able to successfully demonstrate the efficacy of bycatch mitigation devices like pingers, which will help reduce dolphin mortality through net entanglement. Large scale deployment is envisioned to secure the future of river dolphins. The monitoring of river dolphins by trained local community members in Assam is encouraging and demonstrates the success of a participatory approach to conservation.

Milestones: Scientifically robust abundance estimation of Ganges river dolphins in mainstream Ganga (from Varanasi to Ganga Sagar). Identifying and demonstrating the use of acoustic deterrent devices to reduce by-catch mortality of Ganges river dolphins.

RESEARCH
ONGOING

PREY, PREDATOR AND HABITAT: LONG-TERM MONITORING OF THE ASIATIC LION LANDSCAPE

Funding Source
Gujarat Forest Department and Grant-in-Aid

Collaborating Agency
Gujarat Forest Department

Investigator
Dr Y.V. Jhala

Researchers
Keshab Gogoi and Doli Bohra

Date of Initiation
April 2019

Date of Completion
May 2022

Objectives: The project has the following objectives (i) Monitoring of lions and their prey in the Greater Gir Landscape; (ii) Monitoring of lion habitats in the Greater Gir Landscape of Saurashtra; and (iii) Assess the attitude and perception of locals towards lion conservation in Saurashtra.

Progress: The research team used geographic locations of 27 radio-collared individuals from the long-term research project on Asiatic lions in the Saurashtra landscape by Wildlife Institute of India and direct sightings and indirect signs of lion presence. The detections resulted in>23,000 geographic locations across the landscape. The long-term ecological study on the lion's habitat use in the human-dominated landscape reveals that the minimum patch size needed for the breeding lioness in the human-dominated landscape is >4 km^2 in size. Therefore, the team have mapped all the habitat patches that are more than 4 km^2 in size outside the protected area boundary and subsequently ground validated through field visits. The team used Maxent software to model the habitat suitability of lions, wherein eco-geographical covariates of drainage density; Distance to urban sprawl; Enhanced Vegetation Index (EVI); Distance to water sources, Elevation; and Distance to habitat patches; were used at a scale of 1 km^2.

Outside the protected area boundaries of Gir, in the north, the forest patches around the Hingolgadh area were found to be highly suitable for lions. In the west Barda-Alech forest complex were another suitable habitat for lions to thrive among the multi-used human-dominated landscape of Saurashtra. However, the colonization of lions in these areas highly depends on the permeability of the matrixes and connectivity with the source populations. The forest patches along river Shatrunjay and Palitana hill ranges in the districts of Amreli and Bhavnagar have been already colonized by lions. These habitat patches are the lifeline of lions in the human-dominated eastern landscape. The coastal forest patches of Mangrol, Veraval, Sutrapada, Una, Rajula-Jafrabad and Mahuva were also suitable to

Asiatic lions. A handful number of lions have already colonized these forest patches in the last few decades. However, due to rapid urbanization and land-use changes, these suitable habitat patches are vulnerable to anthropogenic alteration. Therefore management authorities should emphasize protecting these habitats for the long-term conservation of Asiatic lions in the human-dominated landscape of Saurashtra.

A breakthrough into the social system of female Asiatic lions: An effort of 2040 hours of observation was invested in understanding the social system of female Asiatic lions, which was not documented earlier. The team studied seven points of pride that range from two to seven adult females and their offspring. The team identified each lioness individually based on their vibrissae and permanent markings and collected fresh scats for genotyping each lioness. A panel of 15 microsatellites was used for genotyping lions and subsequently computing their kinship. The team then constructed social networks, indices of dominance and correlated these with group sizes and age-category of lionesses.

Outputs and Outcomes: The results indicate a strict linear order of hierarchy (based on both affiliative and agonistic interactions) in the upper strata of the dominant females. In the lower strata, this linearity

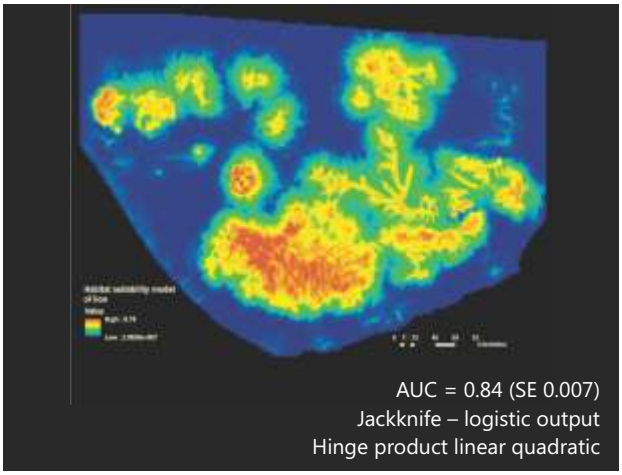


***Figure 1**: Habitat suitability model of Asiatic lions in the Greater Gir Landscape of Saurashtra.*

tapers off into more amorphous dominant-subordinate relationships. Surprisingly, the team found unrelated lionesses within the pride of related individuals. These non-kin lionesses were usually at the lower strata of dominance within a pride. Dominance was found to be age-related, with older females mostly being dominant over younger ones. The study opens up new questions for an in-depth, long-term study on kinship related fitness within social pride.

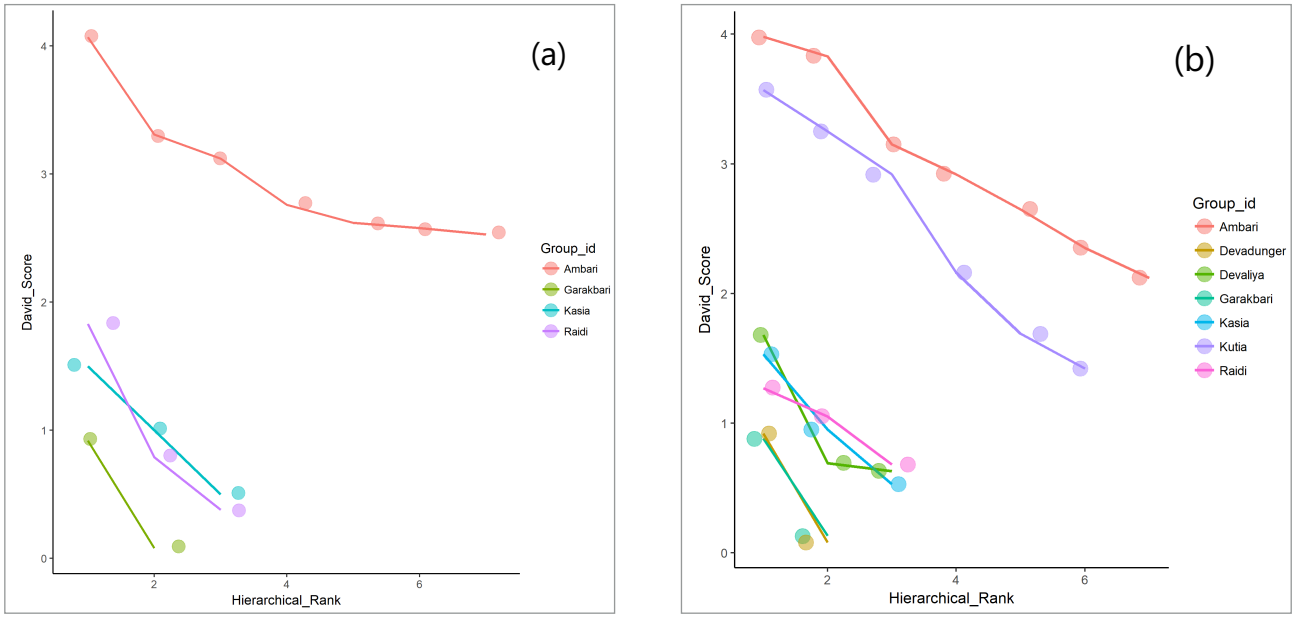


***Figure 2:** Graph showing the steepness of hierarchical order among pride members based on (a) Agonistic and (b) Affiliative Interactions*

RESEARCH
ONGOING

KNOWLEDGE SUPPORT TO DEVELOPMENT OF GUIDELINES, SPECIALIZED FIELD STUDIES AND TRAINING ON HUMAN-WILDLIFE CONFLICT MITIGATION IN INDIA

Funding Source
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Collaborating Agency
Ministry of Environment, Forest and Climate Change, India and GIZ

Investigators
Dr Dhananjai Mohan,
Dr S. Sathyakumar and Dr C. Ramesh

Project Scientists
Dr Upma Manral, Dr Rishi Kumar and Aditya Bisht

Date of Initiation
July 2018

Date of Completion
April 2021

Objectives: The project has the following objectives (i) supporting the development of National Strategy and Action Plan & SOPs, leading the state-level Human Wildlife Conflict (HWC) mitigation guidelines for Uttarakhand, and supporting in Karnataka and West Bengal, in a participatory manner engaging all key stakeholders; (ii) support to the database on human-wildlife conflict in India; (iii) specialized field studies and other pilot measures at the project pilot sites in Karnataka, West Bengal and Uttarakhand; and (iv) Implementation of training and other capacity development measures engaging key stakeholders.

Progress: The project has four measures under which various activities and work were conducted as follows:

Project Measure A: Supporting the development of National Strategy and Action Plan & SOPs, leading the state-level HWC mitigation guidelines for Uttarakhand, and supporting in Karnataka and West Bengal, in a participatory manner engaging all key stakeholders: Due to pandemic-related restrictions, various meetings and events for completing National Human-Wildlife Conflict mitigation Strategy and Action Plan (NAP), guidelines for key species, and Uttarakhand HWC State Action Plan were conducted on virtual platforms for authors and other experts. WII team also participated in national workshops and meetings (virtual) organized by GIZ to discuss and further develop the State Action Plan (SAP). WII team contributed to developing various chapters and sections of National Action Plan (NAP) after comments from National Technical Group (NTG) members. Similarly, teams working on HWC mitigation guidelines incorporated comments and suggestions from NTG members and finalized zero drafts. The process for developing the HWC State Action Plan for Uttarakhand (SAP) and division level HWC Management Action Plans (MAP) for project pilot sites in Uttarakhand *viz*., Rajaji Tiger Reserve, Dehradun and Haridwar Forest Divisions was also initiated. Four consultation meetings with Uttarakhand Forest Department officials and writing workshops with authors were conducted from September 2020 to April 2021.

Project Measure B: Support to the database on human-wildlife conflict in India: The work under this project measure has been completed by the WII team during the reporting period. However, data was collected from Uttarakhand Forest Department on HWC for the last 10 years (2009-2019). A technical report has been prepared to look at the spatial-temporal patterns of HWC in Uttarakhand with an emphasis on conflict hotspots.

Project Measures C: Specialized field studies and other pilot measures at the project pilot sites in Karnataka, West Bengal and Uttarakhand: The project team led the development of division level MAP for the Haridwar-Rajaji-Dehradun landscape, in line with the Common Framework for developing HWC Management Action Plans shared by the GIZ team. Six training programmes for Rapid and Primary Response Team members and frontline staff from UKFD for capacity building in HWC mitigation with key species and handling emergencies were conducted from December 2020 to March 2021. The project team and other experts from WII supported and led the collaring of leopards and elephants in the Uttarakhand, particularly in the Rajaji-Haridwar-Dehradun landscape.

Project Measures D: Implementation of training and other capacity development measures engaging key stakeholders: The 'Human Dimensions of Wildlife Management and Conflict Resolution' module was

organized for the XLI Advanced Postgraduate Diploma Course in Wildlife Management under this project. The module started on 17 March 2020, however, due to the Covid-19 emergency and subsequent lockdown classes were suspended and classes resumed in virtual mode from 27th April. This involved zoom lectures from WII faculty members and guest speakers. A five-day Virtual 'Training of Trainers' course on 'Training Excellence and Human-Wildlife Conflict Management' for the faculty members of State Forest Training Academies and Rangers Colleges was organized in April 2021. The module on training excellence was conducted by a master trainer from Dale Carnegie, India.

Outputs and Outcomes: Final zero drafts of guidelines on conflict mitigation with Crocodile, Bear, Blue bull, Wild pig, Rhesus macaque and Snakes, and Occupation Health and Safety were developed and shared with GIZ. These guidelines will be pilot-tested in select landscapes of partner states *viz*., Karnataka, Uttarakhand and West Bengal. A zero- draft for the Uttarakhand HWC SAP was developed and submitted for comments from Uttarakhand Forest Department and other experts. One hundred and fifty-five frontline staff and members of Rapid and Primary Response teams of Uttarakhand Forest were trained in various skills and tools for HWC mitigation. The movement of six collared leopards and four collared elephants are being monitored in the human-use landscape and various forest divisions of Uttarakhand by the trained personnel of UKFD. Thirteen faculty members of State Forest Training Academies and Rangers Colleges from across the country were trained in the Training Excellence and Human-Wildlife Conflict Management

Milestone: Various policy and guiding documents for mitigating HWC, developed under the project would prove crucial tools for HWC mitigation and management across the country. The trained workforce of the partner state (Uttarakhand) would strengthen the HWC management efforts in the state and provide success stories.

RESEARCH
ONGOING

ATLAS OF COLONIAL NESTING WATER BIRDS IN TAMIL NADU

Funding Source
Grant-in-Aid

Date of Initiation
April 2017

Investigators
Dr Gopi GV and Dr Bivash Pandav

Date of Completion
April 2021

Researcher
Frank Sadrack Jabaraj D

Objectives: The objectives of the project are to (i) conduct a state-wide survey for documenting the existing nesting water bird colonies; (ii) raise baseline ecological information about each of the nesting colonies; (iii) assess the conservation threats to these identified colonial water bird colonies; and (iv) distinguish key colonial areas based on a number of species as well as number of threatened species.

Progress: Anthropogenic disturbance and climate change have significantly affected the distribution of wetlands globally, especially in Asian countries. In India, numerous wetlands have been lost, or their size has been reduced in recent years due to various factors affecting the flora and fauna that depend on them. Colonial nesting water birds typically nest in colonies in wetlands and their associated areas, making them vulnerable to disturbance. This has resulted in the loss or shifting of many sites of heronries. The present study was conducted in the Indian state of Tamil Nadu to document the existing and unknown heronries of the landscape.

Outputs and Outcomes: Around 101 heronries were documented in 22 districts. Nineteen of the 26 colonial nesting water birds that breed in India have been reported from the state. The Little Cormorant was the most dominant species, occurring in 79.20% of the sites, with relative abundances of 24 and 26 during 2017-2018 and 2018-2019, respectively. In about 24.75 % of the heronries, *Vachellia nilotica* trees were used for nesting. 18.81% of the heronries were situated inside protected areas, and 81.19% were located outside protected areas. Species distribution

modelling with presence-only data indicated that the sites with a high probability of occurrence were confined to the major water bodies and rivers. Spatial correlation showed that across the landscape, the heronries were randomly dispersed.

Milestone: All the districts of Tamil Nadu are taken into account, and a survey is being conducted in almost all the districts covering most of the water bodies. Most of the recorded heronries during the current study were recorded for the first time compared to the previous studies in Tamil Nadu.

RESEARCH
ONGOING

MAINSTREAMING LANDSCAPE APPROACH TO BIODIVERSITY CONSERVATION, IMPROVED LIVELIHOODS AND ECOSYSTEM HEALTH IN KAILASH SACRED LANDSCAPE PART OF INDIA

Funding Source
National Mission on Himalayan Studies (NMHS), MoEFCC, New Delhi through State Biodiversity Board, Uttarakhand

Date of Initiation
May 2018

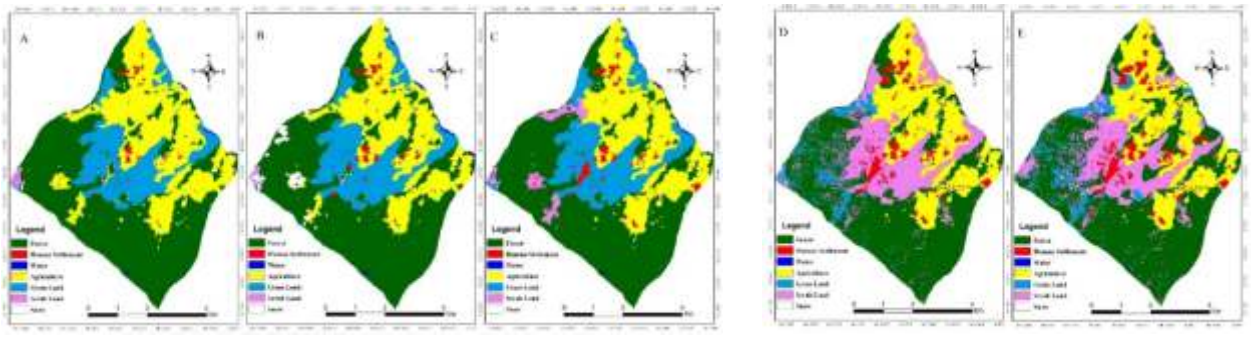
Date of Completion
April 2021

Investigators
Dr B.S. Adhikari and Dr G.S. Rawat

Objective: The major objective of the study was to strengthen community institutions, restoration of degraded habitats and management of ecosystem and identification of critical ecosystems/ habitats/ corridors and suggest evidence-based management plans on Biodiversity Conservation, Improved Livelihoods and Ecosystem Health.

Progress and Outcomes: The study area forms the watershed of Dharanti and Bhadoligad and is a part of the catchment of the Gori Ganga river and extends with an altitudinal range between 2,200-3,725m. The area is vulnerable to disasters such as landslides and earthquakes due to its location in the vicinity of Munsiyari. For five decades, Landsat Multispectral Scanner and Sentinel 2A Level-C data were used. Rule-based and threshold classification techniques were employed to identify LULC changes. Seven LULC classes were identified in the area, which is: Forest, Water, Agricultural Land, Scrubland, Grassland, Settlement and Snow. The LULC of the study area has changed dramatically over five decades (1976 to 2018).

Milestone: The decadal change increased several folds, which is mainly because of the inward migration of people from other very remote areas, such as Namik, Panchu, Burfu and several other remote villages, which lie in the Johar region, and remains snowbound for almost half of the year. Changes in the snow class were identified, which were low as compared to other classes.



Decadal changes (1976-2018) in LULC in a part of Gori Ganga Valley, KSL

RESEARCH
ONGOING

SPATIO-TEMPORAL AND THERMAL ECOLOGY OF INDIAN PYTHON, *PYTHON MOLURUS MOLURUS*, LINN. 1758 IN MOYAR RIVER VALLEY, TAMIL NADU

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

Date of Initiation
March 2017

Date of Completion
April 2021

Investigators
Dr Ramesh Chinnasamy,
Dr Gautam Talukdar and
Dr Abhijit Das

Researcher
Vishnu C.S.

Objectives: The objectives of the project are to (i) determine movement pattern and home range characteristics of Pythons; (ii) Generate information on relocated pythons; (iii) Document the thermoregulatory behaviour and compare the previous study in Northern India; and (iv) generate information of python distribution and people perception towards snakes.

Progress: In India, the first telemetry study on pythons was completed through this project. Total 14 pythons were implanted with the transmitters & i-buttons, and all of them were retrieved successfully and released back to the wild after completion of the field study. Thermoregulation- I buttons- Python body temperature data and hobo temp data retrieved at the end of the study. The temperature changes during feeding, digestion and mating observation data were analysed. Existing studies and information on thermoregulatory behaviour of Indian pythons in Northern India results were compared with southern India python's behaviour, to know different behaviour according to climatic variations.

Data collection has already been completed. Current and future distribution prediction modelling of pythons in the Moyar river valley landscape successfully prepared, and it's being finalized for publication.

Outputs and Outcomes: All the objectives were successfully achieved without any deviation. Based on the field data, Python distribution and modelling for current and future distribution in various types of vegetation and habitat are being prepared for SCI journal publication. Publication on the ecological significance of two large heritage trees in Moyar River Valley, Southern India, is published in a peer-reviewed journal. First time in this study, it was recorded that the smallest adult male (198 cm TL) mated with females. This is vital information for this species biology. In India, the first time python scavenged by Mugger Crocodile was recorded in this landscape. Study results show Sexual dimorphism exists in Indian Python. First documentation in the study area revealed a total of 34 reptile species recorded during the surveys. Photographic evidence is available for most species.

Milestone: A total of 14 Indian python's transmitter and i-buttons implantation surgery and retrieved the same at the end of the study was completed. Several new observations and field data are being recorded in these pythons. The outcome of this study results is being used to prepare the Operative Guidelines for the country.

RESEARCH
ONGOING

DEVELOPING GENETIC DATABASE TO UNDERSTAND METAPOPULATION DYNAMICS AND CONNECTIVITY OF TIGERS AND OTHER LARGE PREDATORS ACROSS TIGER LANDSCAPE OF MAHARASHTRA, INDIA

Funding Source
Maharashtra Forest Department

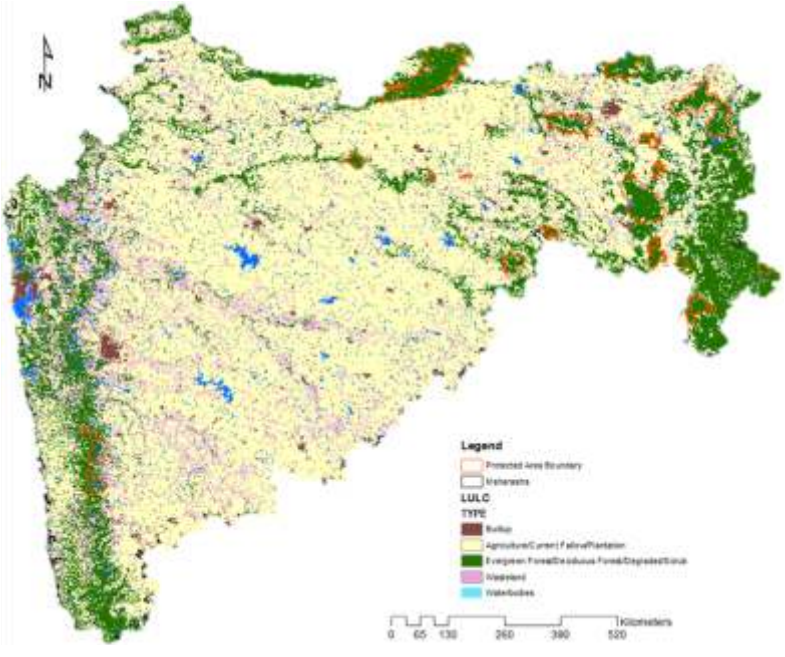
Date of Initiation
March 2016

Investigators
Dr Bilal Habib and Dr Samrat Mondol

Date of Completion
May 2021

Researchers
Shrushti Modi and Shaheer Khan

Objectives: The project has the following objectives (i) Develop an exhaustive genetic database of individual tiger, leopard, dhole and sloth bear; (ii) Determine population structure, relatedness and sex ratio of these large carnivores; (iii) Population connectivity rates and direction of gene flow at metapopulation scale; (iv) Identify landscape features, if any, affecting connectivity in this landscape; and (v) Understand social dynamics of all these species within this landscape.



Progress: The field sampling for the project has been completed. The database generation for tiger leopard and dhole has been done for the whole landscape. A total of 200 tigers, 95 leopards and 305 dhole individuals have been identified. The genetic structure analyses with landscape-scale microsatellite data revealed low to moderate levels of genetic differentiation with leopard showing the lowest genetic differentiation and dhole showing the highest. For dholes, out of six sampled areas, the five major tiger reserves Melghat Tiger Reserve (MTR); Pench Tiger Reserve (PTR); Tadoba-Andhari Tiger Reserve (TATR); Navegaon-Nagzira Tiger Reserve (NNTR); and Sahyadri Tiger Reserve (STR) represent the five clusters. While the UKWLS, a known connecting habitat between PTR and TATR showed a mixture of genetic signals from the four major clusters (TATR, NNTR, MTR and PTR).

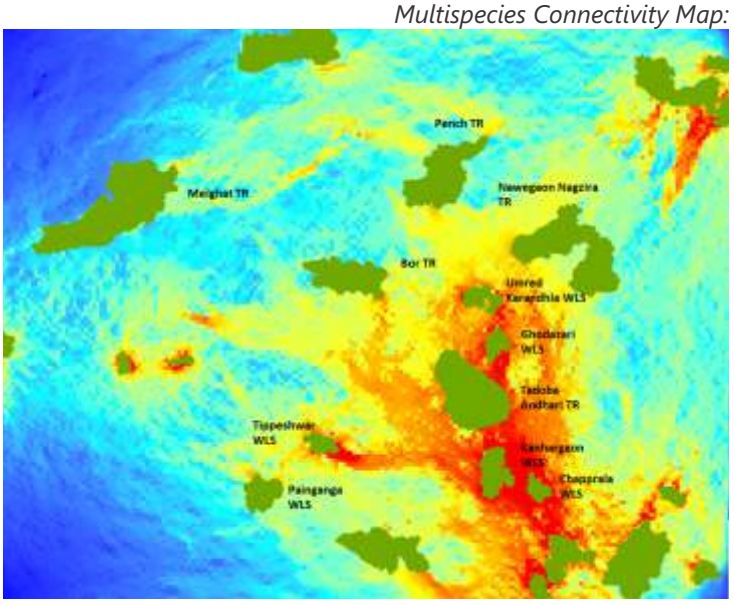
The genetic clusters were separated with very few mixed genetic signals in Umred-Karandhla Wildlife Sanctuary (UKWLS). Despite any assignment cluster for UKWLS, it was included further in connectivity analysis due to its strategic geographical location in the landscape acting as a connecting link. For tiger, no differentiated clusters, representing the protected areas were found, while in the case of leopard, a generalist, two major clusters, one representing the eastern Vidarbha landscape (MTR, PTR, TATR, NNTR, UKWLS) and second representing the Western Ghats population of STR were found. The distinct genetic structure for leopard of STR shows that even the most adaptable species out of the three which have the least differentiation and highest geneflow is not connected with the rest of the Vidarbha population resulting in a distinct signature of

its own. It also suggests a complete loss of connectivity between STR and the rest of the eastern Vidarbha landscape.

Genetic Structure:

Outputs and Outcomes: Microsatellite panel for individual identification of sloth bear has been standardised and validated. Analysis was conducted to determine the genetic connectivity for the three carnivores determined that Asiatic wild dog, a habitat specialist requires continuous patches for maintaining the well-connected genetic populations due to their affinity for deep forests and shorter dispersal range compared to the other two carnivores in the study. Tigers being a long-ranging species are traversing very large distances in Maharashtra as evident from the telemetry data and which often leads to crossing non-protected human-dominated areas. Both in the case of the tiger as well as an Asiatic wild dog the current density was found to be high around the TATR complex with nearby wildlife sanctuaries. These wildlife sanctuaries *i.e.* Ghodazari WLS, Umred-Karandhla WLS, Kanhargaon WLS are critical in maintaining the long-term connectivity among the subpopulations for both species. For tiger connectivity, these protected areas are crucial as they act as a small refuge for the dispersing individual. While for dholes these protected areas may harbour small populations for maintaining continuous connectivity. For habitat generalists like leopards, these forested patches can act as a hideout and prevent the human-wildlife conflict, a major menace in the present Anthropocene era. Therefore, for a healthy meta-population network these protected areas are crucial links. The Melghat-Pench complex is also an important habitat for all three species but because of the absence of interspersing small patches, it cannot support the metapopulation network.

Multispecies Connectivity Map:



Milestone: Three papers were published during the reporting period, 'Non-invasive DNA-based Species and Sex Identification of Asiatic wild dog, Cuon alpinus. Standardization and Validation of a Panel Of Cross-Species Microsatellites' were done to identify the Asiatic wild dog, *Cuon alpinus* individually. Genetic analyses reveal demographic decline and population differentiation in an endangered social carnivore, the Asiatic wild dog.

RESEARCH
ONGOING

ASSESSMENT AND CONSERVATION PRACTICES OF POLLINATORS THROUGH COMMUNITY PARTICIPATION IN THE INDIAN TRANS – HIMALAYAN REGION: CLIMATE CHANGE PERSPECTIVE

Funding Source
Ministry of Environment, Forest & Climate Change

Investigator
Dr V. P. Uniyal

Researchers
Mona Chauhan, Agni Chandra, Vandna and Pooja Thakur

Date of Initiation
May 2018

Date of Completion
May 2021

Objectives: The project has the following objectives (i) *Assessment:* Diversity and status of pollinators in Agro-ecosystem and alpine pastures, risks associated with the loss of pollinators its biology and ecosystem services; (ii) *Adaptive management:* Identifying the best management practices and technologies to overcome decline in pollinators; (iii) Capacity building of different stakeholder groups to assess the health of pollinators, plan conservation measures and its implementation through hands-on training workshops; and (iv) *Mainstreaming:* Supporting national plans for the conservation and sustainable use pollinators, and increasing the awareness of governments, industry and the public.

Progress: Citizen scientific methods and capacity building are key tools to raise awareness of species of pollinators and their protection. The team organized practical courses for young people to cultivate the basic knowledge of pollinator insects. So far, 38 variants from pollinating insects have been recorded in agricultural ecosystems and natural forests, including *Lepidoptera* (butterfly-19 species) and *Hymenoptera* (19 species). Forty-three sampling sites were selected for research in Lahaul-Spiti, Himachal Pradesh; Chamoli and Pithoragarh, Uttarakhand. Monoculture, cash crops and improper use of pesticides dominate. The team organized capacity building activities for local institutions (forestry staff/ rural youth/ local community organizations). Discussions and group activities were held for residents. Adolescents and elementary school students discuss pollination insect protection work with children.

A total of 128 species of insect pollinators from agricultural ecosystems of Leh-Ladakh were identified, including *Diptera* (17), *Hymenoptera* (51) and *Lepidoptera* (60) from surveyed areas units of fertilizers and pesticides, and their reliance on modern technology. Various seminars were also organized in schools of Leh-Ladakh district. The seminar focused on the importance and protection of pollinators. From the agro-ecosystem and natural forest composed of *Diptera, Hymenoptera* and *Lepidoptera*, the study area recorded 146 major pollinator species overall. A total of 3,516 people were trained, 26 training seminars were held, and publicity activities were carried out. 264 people were interviewed directly in Lahaul-Spiti; however, in Leh-Ladakh a total of 295 people were interviewed by PRA. Farmers in Lahaul-Spiti use large amounts of inorganic fertilizers and pesticides to increase crop yields, so the region reports that inorganic agriculture accounts for 71%, while farmers in Leh-Ladakh account for 97% of the organic farming. Publications such as brochures and leaflets on the protection of pollinating insects have been produced and distributed in the research area. Citizen science methods and capacity building were key tools to raise awareness of pollinating insects and their protection. In the trans-Himalayan region, bee-keeping has now shifted to commercial farms rather than village households. Seen in some of the villages in the Garwhal Himalayas, wall cavities are used by the bees to construct their hives.

Species diversity of Lahaul-Spiti: A total of 146 species have been identified from the study area. Thirty-two sites in Leh-Ladakh; 17 sites in Uttarakhand; 18 sites in Himachal Pradesh have been identified. In all, 63 species of *Hymenoptera* (Bees and Wasps), 58 of *Lepidoptera* (Butterflies) and 26 of *Diptera* (flies) were sampled. Species diversity indices for Lahaul-Spiti revealed that species diversity (*Hymenoptera, Lepidoptera* and *Diptera*) was higher in Spiti valley, however, concluding all the valleys of Lahaul region the species diversity is much more prominent because of the high floral vegetation compared to Spiti. Species rarefaction curve revealed that adequate sampling of *Hymenoptera, Lepidoptera* and *Diptera* has been done in each valley. Tod and Teenath valley have almost similar species compositions. *Diptera* species composition of Spiti valley has found 55% similarity with other valleys based on clustering analysis. Miyar and Teenath valley have similar percentages of 87 and 90 respectively. Tod and Pattan valley have almost similar species compositions. Rank abundance test revealed that *Syrphus* sp. was most dominant in the Lahaul-Spiti region followed by *Pieris brassicae* and the least abundant species was *Apis florae*.

Species diversity of Leh-Ladakh and Munsyari: Species diversity indices for species diversity (*Hymenoptera, Lepidoptera* and *Diptera*) in Leh and Nubra valley revealed that Nubra valley is more diversified than Leh. Rank abundance test revealed that Bombus asiaticus was the most dominant pollinator species in the Leh-Ladakh region followed by *Amigella* sp. and the least abundant species was *Megachile centuncularis*. A total of 3,516 individuals have been trained with 26 Capacity building workshops, training programmes/ awareness & outreach programs in which 264 people were directly interviewed in Lahaul-Spiti. However, in Leh-Ladakh a total of 295 people were interviewed for the PRA exercise. Assessment of organic, inorganic farming practices in the study area is also done by questionnaire survey and impact of modern architecture on traditional beekeeping

practices in the trans-Himalayan regions and also delivered to the locals and students as well as development of beekeeping boxes designed in indigenous methods was also provided. Two annual assessment reports have been printed to circulate the research outcomes of the project.

Outputs and Outcomes: People of Lahaul-Spiti were well aware of provisioning services followed by regulating and supporting services and cultural services however people of Leh-Ladakh were found quite aware of provisioning services followed by cultural services and regulating and supporting services. Instead of being aware of the role of pollinators and practices that can harm them, inorganic fertilizers and pesticides were intensively used by the farmers to increase the production of cash crops because the farming system proved to be a major or sometimes only income source for them, which is why 71% of inorganic farming was reported from the region. However, 97% of organic farming was being practised by the farmers of Leh-Ladakh as they had attached some spiritual values towards biodiversity.

It was noted that such knowledge of ecosystem services and pollinators importance is typically acquired in biology class at secondary or high schools in the western trans-Himalaya. Sustainable farming practices were promoted through workshops in the fragile Himalayan ecosystem to protect ecological integrity and ecosystem functioning. Spatial modelling on bumblebees of the Lahaul-Spiti region, model was also predicted in the area of 19068 km^2 with 68 occurrence points. Thirty-one sampling sites in the Leh-Ladakh region in Jammu & Kashmir, Navdanya Biodiversity Conservation Farm in Dehradun district, five villages in Mandakini watershed, around Kedarnath Wildlife Sanctuary and 12 villages in Munsiyari block, Pithoragarh district, Uttarakhand have been covered. Brochures and pamphlets on the conservation of insect pollinators have been distributed in the study area. One hundred twenty-eight species of insect pollinators have been identified. Total 21 Training/ capacity-building programmes/ workshops have been conducted for local communities, institutions and administrations in different villages of the study area.

RESEARCH
ONGOING

THE ASSESSMENT OF IMPACTS OF THE PROPOSED NAGPUR – MUMBAI SUPER COMMUNICATION EXPRESSWAY, MAHARASHTRA, SAMRIDDHI CORRIDOR ON WILDLIFE VALUES AND MEASURES RECOMMENDED TO MITIGATE NEGATIVE IMPACTS

Funding Source
Maharashtra State Road Development Corporation

Researchers
Bhumika P. Morey, Nakul Markandey and Nilanjan Basu

Investigators
Dr Bilal Habib, Dr Gautam Talukdar, Dr Abhijit Das and Dr Navendu Page
Subject Matter Specialist: Dr S.P. Goyal
Project Scientists: Dr Indranil Mondal and Shivam Shrotriya

Date of Initiation
July 2018

Date of Completion
July 2021

Objectives: The project has the following objectives (i) To identify areas of conservation importance in terms of connectivity, important wildlife habitats and important natural features; (ii) To evaluate habitat, characteristics, species diversity, population and conservation status, habitat use by key wild animal

species near proposed alignment; (iii) Based on the observations above, suggest a location, type, size and number of the mitigation measures across the alignment of the roads for ensuring permeability in the context of identified key wild animal species; (iv) provide technical guidance during construction and implementation of mitigation measures; (v) To assist in the monitoring of the effectiveness of the mitigation measures during the operation phase; and (vi) Suggest measures for achieving the carbon-neutral goal.

Progress: Data collected during a detailed field survey inside WFAs during January-March 2019 was analysed to know the presence of wildlife for further recommendations towards effective planning of mitigation measures. Mammal sign survey protocol of All India Tiger Monitoring was followed during this survey. The surveys were conducted within the 10 km buffer area on either side of the road within the WFA. The 10 km buffer area was adapted from the MoEFCC guidelines for eco-sensitive zone around the protected areas. The research team generated intensity maps of animal presence to identify the critical locations on the alignment where mitigation measures are required. The suggestions are made to consider surrounding habitat and Land Use Land Cover to avoid anthropogenic interference and ensure habitat connectivity across the landscape. Following this analysis and report writing, WII had a meeting with MSRDC officials in Nagpur on 25 September 2019, where the technical feasibility of the suggested mitigation inside WFAs was discussed. After considering and incorporation suggestions from MSRDC, the report was finalised as Proposed Mitigation Measures in Wildlife Focus Areas along Samruddhi Expressway.

During the 13th Maharashtra State Board for Wildlife (SBWL) meeting held on 17 January 2020, the above report prepared by WII was tabled for discussion. The members of the committee and the concerned forest officers raised some important concerns about mitigation structures in some important wildlife areas. A team consisting of SWLB, Wildlife Institute of India, State Forest Department and MSRDC visited DPR package-I on 4 February 2020, DPR package-II on 5 February 2020 and DPR package V on 13 March 2020.

Outputs and Outcomes: During the detailed field survey inside the WFAs, the team recorded a total of 2,941 signs (direct and indirect) of 25 different wildlife species in 564.25 km Nilgai, *Boelaphus tragocamelus* was the most commonly encountered species present all across the landscape. The selected Wildlife Focus Areas fall into three ecological zones according to the landscape and prevalent vegetation of the areas. Most of the signs were recorded in Vidarbha region due to more efforts spent in this zone. Among carnivores, Indian wolf, Indian fox, Golden Jackal, Leopard and Jungle cat were present in all the three zones. Indian wolf represents the grassland habitat, a characteristic of the landscape around Samruddhi Expressway. Nilgai, Chinkara and Blackbuck were the widespread ungulate species.

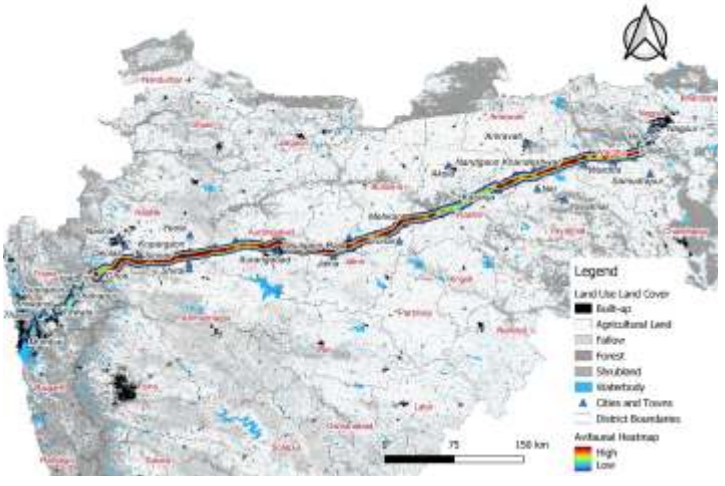


Figure 1: *Variation of the avifaunal diversity along Samriddhi Expressway, Maharashtra.*

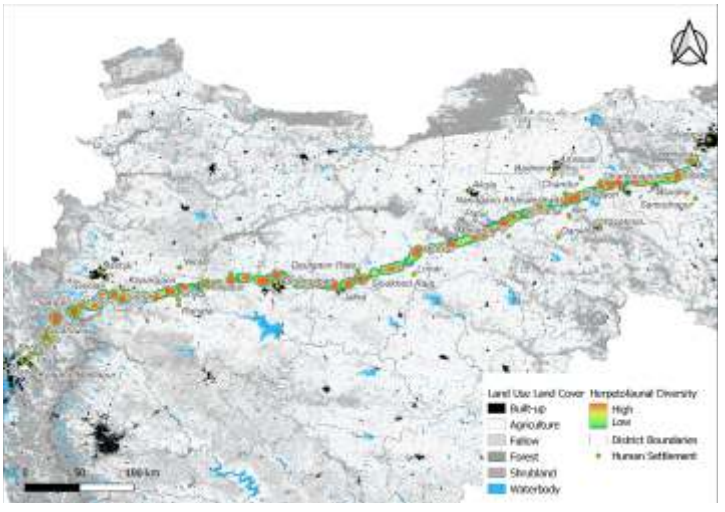


Figure 2: *Patterns of herpetofauna diversity along Samriddhi Expressway, Maharashtra during December 2020 to March 2021.*

Rarely sighted species such as Barking Deer and Indian Pangolin were recorded only from Northern Western Ghats. Samruddhi expressway is a Greenfield project, therefore passing through previously underdeveloped areas. The research team summarised the data for land use classes in the region to see how wildlife species were utilising the landscape.

Based on the analysis of data collected during the field survey on habitat characterization and presence of various mammal species, the team recommended expansion of 34 box culverts and specific modifications of 26 structures within and nearby the WFAs. Most of the recommendations are modifications of existing systems proposed by MSRDC with five additional wildlife overpasses (WOP). As wildlife underpasses (WUP), six structures are recommended outside WFAs since appropriate structures within WFA were not feasible.

Recommendations: All the wildlife mitigation structures recommended here should have a minimum height of 4-5 meters. The box culverts at chainage are important for providing wildlife connectivity within their respective landscapes and should be a priority for expansion: (i) Structures are accepted as proposed. (ii) Proposed tunnels are recommended to be landscaped on the top to make them conducive to wildlife movement. (iii) All the viaducts, bridges (major and minor), wildlife overpasses and underpasses are recommended to have landscaping suitable for wildlife. (iv) The WOP should be either a parabolic-shaped design or a straight-edged parabolic design. Parabolic arch design overpass creates better opportunities for wildlife to locate approach ramps. (v) All the structures that are present in WFAs should have proper noise and sound barriers. Noise and sound barriers must be present for 50 meters on either side of the structures.

Milestones: Sign survey data was analysed, and the location and dimension of mitigation measures were decided. Draft of the report "Proposed Mitigation Measures in Wildlife Focus Areas along Samruddhi Expressway" prepared. A flyer was designed for broader circulation among forest managers and policymakers.

RESEARCH
ONGOING

POPULATION MANAGEMENT OF SPECIES INVOLVED IN HUMAN-WILDLIFE CONFLICT

Funding Source
The Ministry of Environment, Forest and Climate Change

Investigators
Shri Qamar Qureshi, Dr Y.V. Jhala, Dr Vishnupriya Kolipakam and Dr Lallianpuii Kawlni

Project Personnel:
Project Coordinator: Dr Kafil Hussain
Project Scientists: Dr Sanath Muliya and Dr Priya Gusain
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
August 2018

Date of Completion
August 2021

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: Reproductive control needs an understanding of optimal demographic age and sex ratios to be maintained for the sustenance of species. An extensive study to understand the same has been continued in Uttarakhand for Rhesus macaques and

Karnataka for elephants. Telemetry studies are also being continued in Rhesus macaques (4 females) and elephants (6 females, 5 males) to assess the ranging patterns, resource use, social organization and ethology of study species.

Among the reproductive control methods, immune-contraception using Porcine Zona Pellucida (PZP) vaccine has proven useful, especially in managing certain wild animal populations abroad. The said vaccine was thus selected for trials on focal species in the first phase of the study. Since the said vaccine and raw materials to produce them are unavailable in India, the MoU was signed with HSI India and their South African counterparts to procure the technical expertise and actual vaccine for initial trials. The study requires simultaneous vaccination trials in captivity and free-ranging setups to evaluate the efficacy and applicability of vaccines in focal species. Permissions to carry out capture, handling, health assessment, collaring, and field trials have been secured from concerned forest departments, *viz* Karnataka Forest Department (Elephant), Uttarakhand (Rhesus Macaque) and Madhya Pradesh (Nilgai and Wild Pig). Similarly, permissions to carry out studies in captive animals were secured through an MoU with Sri Chamarajendra Zoological Gardens, Mysuru.

Apart from fieldwork, the implementation of immunocontraception also involves extensive laboratory analysis. Based on inputs from experts and personal visits by the project team, an advanced 'Reproductive Ecology Laboratory' has been constructed inside the WII campus. While the laboratory construction is underway, the laboratory works are being carried out utilizing the following laboratories within and outside WII: (i) Conservation Genetics Lab in WII; (ii) Biotechnology Department Lab of Graphic Era University, Dehradun; and (iii) Department of Veterinary Pharmacology & Toxicology, Banaras Hindu University.

The health of the targeted population is also closely being monitored through laboratory analysis of collected field samples. Additional human resources were also hired to carry out laboratory activities and extend the field work to focal sites in Uttarakhand, Karnataka and Madhya Pradesh.

Outputs and Outcomes: Administrative approval to carry out the project work was secured from Uttarakhand (*Rhesus macaques*), Karnataka (Elephants and Wild pigs), and Madhya Pradesh (Nilgai and Wild pig). Additionally, permissions to initiate the captive trials on nilgai have also been secured from the Zoo Authority of Karnataka and the Central Zoo Authority.

Extensive demographic data for Rhesus macaques in Chandrabani, Dehradun, a mosaic of forest, urban and rural habitats has been collected. Additionally, based on radio telemetry in four females (one each from study troop), information on ranging patterns, resource use, social organization and behavioural aspects were also established. A study to evaluate the zoonotic threat from macaques, an underemphasized subset of HWC, was initiated. As a beginning, the role of macaques in enterobacterial and helminthic zoonoses by examining the micro flora and endoparasites obtained from freshly collected faeces and their role in the maintenance and transmission of parasites 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 the Protected Area, plantations and urban habitats has been collected. Additionally, based on radio telemetry in 11 elephants (six matriarchs/ herds and five solitary males), information on ranging patterns, resource use, social organization and behavioural aspects are being established. Further, laboratory studies for gender identification and reproductive endocrinology have been initiated with the help of existing facilities at the institute. Data on socio-economics of human-elephant conflict since 1992 in the Kodagu landscape has been collated to understand trends of HEC in the landscape. The captive elephant population in Karnataka to be used in the study have been screened for Elephant Endotheliotropic Herpes Virus and enterobacterial pathogens.

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. The compilation of extensive demographic and ecological data for elephants in Karnataka study sites; and the 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.

RESEARCH
ONGOING

UNDERSTANDING THE AMUR FALCON FALCO AMURENSIS, THEIR STOP-OVER SITES IN NAGALAND AND THEIR MIGRATORY ROUTES FOR BETTER CONSERVATION PLANNING

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

Investigator
Dr. R. Suresh Kumar

Researcher
Alex Jacob

Date of Initiation
September 2016

Date of Completion
October 2021

Objectives: The objectives of the project are to (i) deploy modern technology in the form of lightweight satellite tags fitted to Amur Falcons in Nagaland to track their migration journeys; (ii) carry out a state-wide survey to locate and identify Amur falcon roost sites; and (iii) identify and document prey species from regurgitated pellets of the Amur falcons in Nagaland, India.

Progress: Field study has been completed and the preparation of the final report is underway. The report provides in-depth information on the Amur Falcon conservation initiative in Nagaland State, and documented for the first time the trans-hemispheric long-distance migration of Amur Falcon, stop-over sites across Northeast India and their prey species during the stop-over.

Outputs and Outcomes: This study as part of the Amur Falcon Conservation Initiative helped create mass awareness and with the satellite tracking of Amur Falcons, the study effectively engaged local communities in falcon conservation. Secondly, with the help of satellite telemetry, the migration of Amur Falcons, their breeding and non-breeding grounds, stop-over sites, and their migration strategies was documented. Systematic surveys carried out in the region led to the identification of 20 Amur Falcon stop-over sites across Nagaland and adjoining States of Assam, Manipur and Meghalaya. Additionally, using the satellite-tracking data several other stop-over sites were identified in the region. Further, using a GIS-based Site-Suitability Modelling approach was also adapted to located stop-over sites in the remote and hilly terrain of Northeast India. Thirdly, the diet of Amur Falcons during their stop-over in the region was examined using their regurgitated pellets which revealed termites to be the dominant and primary prey. On further identification, the termite species present in the diet of Amur Falcons during their stop-over in Northeast India were found to be *Odontotermes horni* and *O. feae*.

Milestone: This tracking project apart from creating conservation awareness has helped in the understanding of the Amur falcons passing through Nagaland and adjoining areas that is critical for conservation planning.

RESEARCH
ONGOING

SATELLITE TRACKING AMUR FALCONS, *FALCO AMURENSIS* FROM THEIR STOP-OVER SITES IN MANIPUR TO SUPPORT CONSERVATION EFFORTS

Funding Source
Manipur State Forest Department

Investigator
Dr. R. Suresh Kumar

Date of Initiation
October 2018

Date of Completion
November 2021

Objectives: The objectives of the project are to (i) deploy modern technology in the form of lightweight satellite tags fitted to four Amur Falcons in Manipur to track their amazing migration journeys and to support conservation efforts; and (ii) carry out a state-wide survey to locate and identify Amur falcon roost sites.

Progress: Field study has been completed and the preparation of the final report is underway. The study led to the satellite-tracking of two Amur Falcons in 2018 which was followed by tagging of five move Amur Falcons in 2019. Of these, four Amur Falcons, namely, Tamenglong, Irang, Chiulon and Barak could be tracked and together transmitted nearly 9,500 locations. Of all the tagged Amur Falcons, Chiulon and Irang are currently active and are transmitting locations. Given the vast breeding and non-breeding range of Amur Falcons, it is believed that populations stopping over in Manipur were likely different than that of Nagaland as the tagged falcons returned to same stop-over site in Manipur in subsequent years. Therefore, a need of tagging a lot more Amur Falcons from the region is required to better understand their migration, breeding and non-breeding grounds and stop-over sites.

Outputs and Outcomes: This study as part of the Amur Falcon Conservation Initiative replicated the Nagaland conservation success story in Manipur State successfully. The study helped create mass awareness and effectively engaged local communities in Manipur in falcon conservation. With the help of satellite telemetry, for the first time in Manipur, Amur Falcons were satellite tagged and their migration, breeding and non-breeding grounds, and stop-over sites were documented. Further, systematic surveys to locate and document stop-over sites were carried out which led to the identification of three major Amur Falcon stop-over sites in Tamenglong district of Manipur. In addition, stop-over sites in other districts of Manipur in Jiribam and Churachandpur were also identified using the satellite-tracking data of tagged Amur Falcons. Further, a GIS-based Site-Suitability Modelling was also adapted to locate several other potential stop-over sites in the region.

Milestone: The tracking project along with the Nagaland project has helped in the understanding of the Amur falcons passing through Manipur and Northeast India that is critical for conservation planning and has helped in bringing the local communities together to adopt a landscape-level conservation approach for the Amur Falcons stopping over in the region.

RESEARCH
ONGOING

LINKING PROTECTED AREA NETWORKS AND NEAR REAL-TIME RAIN-BIRD LOCATIONS WITH IBIN

Funding Source
Department of Biotechnology and Department of Space

Investigators
Dr Gautam Talukdar and Dr R. Suresh Kumar

Researcher
Debanjan Sarkar

Date of Initiation
March 2018

Date of Completion
September 2021

Objectives: The objectives of the project are to (i) Arrive at common schemas and understanding of the data exchange modalities for Protected Areas; (ii) Generate as well as update the information on PA network; (iii) Synthesize the lessons learnt on protected areas; and (iv) Near real-time monitoring of the "rain bird" predicting the Indian Monsoon and linking it to IBIN.

Progress: Common schemas for different attributes have been developed so that the protected area information, as well as the metadata, can be incorporated into the web map services of the IBIN portal. A document has also been prepared to describe

the database on protected areas of India as well the schema of the database.

The database of protected areas of India has been prepared along with the metadata, standard schema & manual of the database, which will be incorporated into the IBIN web portal as a web service for further analysis.

Two individuals of 'Rain-bird' Pied Cuckoo have been tagged and fitted with 2gm Argos satellite PTT in July 2020 to track its migratory pattern.

Outputs and Outcomes: The database of the protected area network has been submitted to IIRS along with different attributes. The study reveals that from northern India the species migrates to Africa after the monsoon and that the species migration is influenced by the Indian monsoon.

Milestone: Common schema has been developed for the protected area database. Two Pied Cuckoos have been tagged with a 2gm satellite transmitter for the first time.

RESEARCH
ONGOING

MOVEMENT ECOLOGY OF TIGER, PANTHERA TIGRIS FOR CONFLICT PREDICTION AND LANDSCAPE MANAGEMENT IN SATHYAMANGALAM – NILGIRI BIOSPHERE COMPLEX

Funding Source
National Tiger Conservation Authority

Date of Initiation
October 2018

Investigators
Dr K. Ramesh and Dr Vaibhav Mathur

Date of Completion
September 2021

Researchers
Neha Pandey, Deepan Chakravarthy, V. Muthukrishnan, K. Karthikeyan and Alljo Paul A

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 contexts based on actual and simulated movement and landscape analyses; and (iii) Develop landscape management strategy integrating the emerging knowledge and existing tiger conservation plans.

Progress: Landscape-scale study was undertaken based on spatial layers such as physical features (slope, rivers, etc.) and man-made features (roads, land use, land cover, etc.) with the help of Arc GIS software. The human footprint was mapped out for the complete landscape to obtain landscape configuration, including connectivity options for the tiger. The focused study area was delineated involving Protected Areas and Biosphere Reserves of Nilgiri Area, and then districts within a 20-km buffer were considered. Out of all the Tiger Reserves, National Parks, Wildlife Sanctuaries, and Forest Divisions, Sathyamangalam Tiger Reserve was selected initially for pilot efforts. Efforts were made to survey the area using camera traps and interview with staff and local people to identify potential sites for capturing tigers for movement ecology study.

Outputs and Outcomes: For landscape configuration, the land use land cover layer was used in the FRAGSTAT software to get the different class statistics for the determination of the tiger movement and habitat suitability. The connectivity model of the Least cost path is in progress and will be added later. Landscape matrices calculated in FRAGSTAT quantify specific spatial characteristics of patches, classes of patches, or an entire landscape, which provides a much clear reflection of patterns within the landscape. The landscape matrices are calculated in FRAGSTAT 4.2 using the image representing the quality and quantity of land use land cover distribution over the landscape.

Contiguity index assessed the spatial connectedness, or contiguity, of cells within a grid-cell patch and provided an index on patch boundary configuration and thus patch shape. The following table illustrates the highest contiguity score for agricultural land as the

classes are regular or connected. This indicated that the landscape has a significant agriculture matrix, therefore the possibility of human-tiger interface activities was high over there.

So far, a sign survey of 569km over maximum Beats and Ranges of Sathyamangalam Tiger Reserve has given a spatial distribution of Scat and Pugmarks, which on analysis over the settlement, major roads and river shows high frequency of tiger's presence and occurrence over the major roads, rivers and few settlement areas.

Milestone: Efforts from camera traps and sign surveys have offered an initial list of 25 locations where trapping efforts would be made in the coming months. These locations will be considered for regular observation and tracing for the capture of the tiger for collaring. The camera trap capture has given evidence of the presence of both male-female and young ones. Further course of actions will be linked to intensive camera trapping efforts and GPS tracking of the tigers, and predictive modelling.

RESEARCH
ONGOING

ASSESSMENT OF CLIMATE CHANGE IMPACTS ON SOIL HEALTH THROUGH MICROBIAL AND PLANT COMMUNITIES IN ALPINE ECOSYSTEMS OF INDIAN HIMALAYAN REGION

Funding Source
UNDP and Ministry of Environment, Forest & Climate Change

Investigator
Dr Gautam Talukdar

Researcher
Pankaj Tiwari

Date of Initiation
January 2018

Date of Completion
November 2021

Objectives: The objectives of the project are to (i) Assess soil health by investigating changes in soil organic carbon, soil CO_2 efflux, and soil microbial enzymatic activity with respect to climate change; (ii) Understand variations in soil nutrient composition under experimental warming with emphasis on C: N ratio; and (iii) Evaluate climate change impacts on microbial and plant diversity, community composition, plant biomass, and phenology.

Progress: Experimental station in Bhojbasa, Gangotri National Park was established at 4,000 m. Fifteen Hexagonal open-top chambers were installed to simulate climate warming and understand the soil response to temperature rise. This will aid in long-term monitoring of climate change impacts on soil microbes, plants and related functional aspects.

During the year 2020-21, soil and ecosystem respiration measurements from the experimental site and elevation gradients, taken during the growing season of 2019, were analyzed. Field visits to repeat the respiration measurements from the station were carried out during September 2020. Soil samples were collected to evaluate the soil physicochemical properties.

Outputs and Outcomes: Preliminary finding suggests that climate warming will have no effects on soil CO_2 emissions from the alpine region. A publication was also brought out on 'Experimental warming increases ecosystem respiration by increasing above-ground respiration in alpine meadows of Western Himalaya.'

Milestone: The findings of the work have been published in a journal.

RESEARCH
ONGOING

MONITORING OF REINTRODUCED GAUR, *BOS GAURUS GAURUS* IN BANDHAVGARH TIGER RESERVE, MADHYA PRADESH, PHASE-II EXTENSION (2018-21)

Funding Source
Madhya Pradesh Forest Department

Date of Initiation
November 2018

Investigators
Dr Parag Nigam, Dr Bilal Habib, Dr Samrat Mondol and Field Director, Bandhavgarh Tiger Reserve

Date of Completion
November 2021

Researcher
Ritesh Vishwakarma

Objectives: The objective of the project is to (i) evaluate the habitat-use pattern of gaur and recently colonized elephants and Identify the suitable habitat of gaur in Madhya Pradesh state, (ii) assess resource competition of recovering gaur population with existing herbivore and colonized elephants, (iii) evaluate the genetic structure of recovering gaur population in BTR to formulate strategies for effective management, (iv) understand the mechanism of disease spread within and between gaur herds using social network analysis.

Progress: The habitat use pattern of gaur and wild elephants were assessed using their occurrence locations in BTR. The second-order habitat use (selection of home ranges within a geographic range) resource selection functions were used to estimate the overall habitat use pattern of gaur and wild elephants. A multispectral SENTINEL-2 layer of the high resolution of 30m satellite imaginary from the Earth Explorer USGS portal was used to generate the land use land cover map of the study area. The overall habitat was classified into 11 different vegetation classes *viz*. (i) Agriculture, (ii) Bamboo Mixed Forest, (iii) Grassland, (iv) Sal Forest, (v) Open Mixed Forest, (vi) Riverine Forest, (vii) Habitation, (viii) Plantation, (ix) Rocky outcrop, (x) Scrublands, and (xi) Water bodies, further to this the availability and overall habitat use were estimated using ARCGIS ver.10.8. The overlap between habitat niches of both species was estimated using Pianka's Index.

To study the food resource overlap between gaur and wild elephant, the food plants and parts eaten by gaur and the wild elephant was obtained from the scan sampling technique used for studying the behavioural patterns of gaur and wild elephant. Instantaneous scan samples were recorded at five-minute intervals. During the scans, whenever an individual was observed feeding, the plant species and plant parts eaten by the individual were recorded. A checklist of plant species eaten by gaur and wild elephants was prepared. Based on this information, the percentage overlap of food plants eaten between gaur and wild elephants was calculated by using Bernoulli (binary) distribution.

Outputs and Outcomes: The habitat use study shows that the gaur largely used Open Mixed Forest followed by Sal Forest and Bamboo Mixed Forest, whereas Grassland and Scrubland were used according to its availability within their entire used home range of different herds. Similarly, the wild elephants largely used sal forest followed by Open Mixed Forest and Bamboo Mixed Forest, whereas agricultural land and habitation were used according to its availability within their entire used home range of different herds. The compositional analysis of available habitat and used habitat were estimated as simplified matrix ranked overall habitat use for gaur in Bandhavgarh and ranked overall habitat use for wild elephant. The overlap of habitat-niche between gaur and wild elephant in the different types of LULC and Habitat classes were estimated in Bandhavgarh Tiger Reserves, which indicated that both the species were of utmost similar in resource utilization of available habitat in BTR. The food plants eaten by gaur and wild elephants were classified into five categories such as trees, shrubs, herbs, grasses and climbers. During the study period, a total of 112 species of food plants belonging to 39 families were recorded in the gaur diet. The 112 species of food plants recorded comprised of 42 tree species, 17 shrub species, 12 herb species, 35 grass species and 6 climber species. And a total of 77 species of food plants belonging to 25 families were

recorded in the wild elephant's diets. The 77 species of food plants recorded comprised of 38 tree species, 7 shrub species, 12 herb species, 18 grass species and 2 climber species.

The habitat uses and resource competition study between gaur and the wild elephant was carried out during the study period. In Bandhavgarh Tiger Reserve, the mixed forest is the dominant vegetation type constituting 28.8% following agricultural land 20%, Sal forest 15.5% and Bamboo forest 13.8% of the total area but the use of Sal forest was highest followed by open mixed forest in both the species. The habitat use study also revealed that the colonized/immigrant population (n=48) of wild elephants in Bandhavgarh has shown overlapping gaur use area (161.72 sq. km). Gaur and wild elephants have high food, habitat use and space niche overlap in Bandhavgarh; this attributed for both the species to feeding on common trees, grasses and climber and sharing common habitat with limited available resources.

Milestone: Numerous studies revealed that elephants demonstrated to modify the ecosystem mostly through the suppression and reduction of woody plants. This suppression and reduction can indirectly affect vegetation cover, potentially affecting both wild elephants and increasing population of gaur and could affect the occupancy of gaur in BTR, which may lead to reduce in gaur use area in the park and undoubtedly resource selection may act as a vital reason to competition for the resources available (space, habitat and food) for both the species in near future. The increase in competition may divert the movement of species outside the park and which may lead to a conflict of both the species with humans or frequent use of human dominant landscape. Hence, the present results call the study of conflict and movement ecology of both the species in the current scenario to understand the driving force of movement and use of corridors of the species outside the park.

The present study successfully documented the effects of colonization of megaherbivore on other niche-conspecifics and impacts on their stable population and resource use. The study is the first of its kind on wild elephant colonization and its effects in India. Additionally, the genetic structure of recovering gaur population and interaction study of recovering gaur population with the recently colonized elephants would also be carried out in the present study.

RESEARCH
ONGOING

GENETIC CONNECTIVITY AT LANDSCAPE SCALES FOR LARGE CARNIVORE POPULATIONS IN TIGER HABITATS

Funding Source
National Tiger Conservation Authority

Date of Initiation
January 2016

Investigators
Dr YV Jhala, Shri Qamar Qureshi and Dr Vishnupriya Kolipakam

Date of Completion
December 2021

Researcher
Shweta Singh

Objectives: The objectives of the project were to (i) carry out genetic identification of leopard, *Panthera pardus*, dholes, *Cuon alpinus* and sloth bear, *Melursus ursinus* in the study area, from their faecal DNA extracts; (ii) investigate the meta-population structure of large carnivores in the country using micro-satellite loci genotypic data; (iii) investigate the level of genetic structuring between local populations and across the country, and (iv) identify any ESU's or isolated populations that merit special conservation attention.

Progress: During the year, data from 317 leopard individuals, 396 dhole individuals and 147 sloth bear individuals, from across the tiger bearing habitats was analysed to understand the genetic diversity and population structure of these species.

The results reveal that leopard populations shared a common gene pool and had poor genetic structuring at the country scale. Whatever structuring was seen could likely be explained by the geographical distance between landscapes (isolation by distance). Leopards entered into India from the western corridor and therefore would have colonised western Central India and Terai first. The population structuring would also depend on founding and vicariant events and subsequent gene flow between populations. Therefore, it seems clear that the Indian habitat matrix was more permeable to leopard geneflow compared to that of tigers. An important point to note is that protected areas centred around tiger conservation have served as source populations for leopards as well and allowed them to colonise surrounding human-dominated landscapes at lower densities.

compared to tigers, suggesting that tigers were the most conservation investment dependent species compared to the other large carnivores. If conservation strategies of maintaining gene flow in tigers were implemented through corridors then genetic connectivity for all the other carnivores would be ensured. The results reinforce the need for restoration and protection of existing and delineated tiger corridors across all source populations. Often, it is argued that it would be much easier to move individual tigers between populations than to maintain natural corridors so that genetic diversity is maintained and inbreeding avoided. This easier route to meta-population management of tigers would compromise the need and umbrella role of natural tiger corridors for other species. Also, animals that disperse naturally and survive natural perils are better

Unlike leopards, dhole populations from the Northeast and Terai separate from the rest of the populations. The nuclear microsatellite data supports such a hypothesis. However, as suggested for leopards if samples from Myanmar, Thailand and Malaysia were included along with Indian samples in a single analysis, a holistic picture regarding colonization events into India could be obtained.

A weak genetic structuring was observed in sloth bears across all landscapes, and this is in consonance with a landscape-wide study focussed in central India, where a weak genetic differentiation between populations was found. Central India encompassed the entire diversity present in the sampled sloth bear populations. The continuous and rapid decline in forest extent and quality can become a big threat to forest-dependent species like sloth bears. Further analysis to understand effective population size and phylogeography would help in determining the efforts required to sustain sloth bears in the landscape, and also to mitigate any process of structuring within the landscapes.

Outputs and Outcomes: All the three large carnivores showed less genetic structuring adapted and fit, thereby ensuring the evolutionary potential of future generations. Such selection cannot be achieved by artificial management which should only be used as a last resort.

Milestones: The study reports the first information on country-level information on the genetic structure of large carnivores.

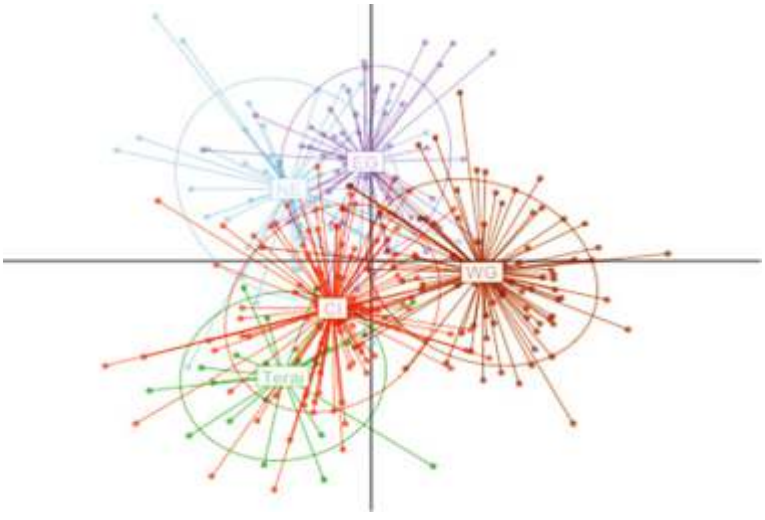


Figure 1: *Discriminant analysis of principal components of 317 leopard individuals from five landscapes (Terai, CI= Central India, NE= Northeast, EG= Eastern Ghats, WG= Western Ghats).*

RESEARCH
ONGOING

META-POPULATION DYNAMICS OF TIGERS IN THE TERAI-ARC LANDSCAPE, INDIA

Funding Source
WCT-Panthera, DST-GOI

Date of Initiation
November 2014

Investigators
Dr Samrat Mondol, Dr Bivash Pandav and Dr Gautam Talukdar

Date of Completion
December 2021

Researcher
Suvankar Biswas

Objectives: The project has the following objectives (i) To know the extent to which tigers occupies unprotected areas within this landscape; (ii) To understand the source and sink populations? (iii) To understand Population connectivity, by estimating rates and direction of tiger dispersals at metapopulation scale; and (iv) To understand landscape features, if any, affect connectivity in this landscape.

Progress: In this study, a combination of field, molecular and remote sensing GIS tools have been used to understand the source and sink dynamics and the landscape features which regulate such dynamics of tigers in this human-modified landscape. 13,000 km^2 of potential tiger habitat have been surveyed of Uttarakhand, Uttar Pradesh and Bihar and collected large carnivore faecal samples.

Outputs and Outcomes: So far, 1608 samples have been analyzed and identified 743 samples as tiger positive. Genotyped data were generated from 677 tiger samples using 13 microsatellite markers, and 190 tiger samples have been excluded because of low amplification success. Five hundred fifty-three tiger samples were analyzed further for unique individual identification. The rest did not qualify the minimum cut-off amplification success and identified 219 individual tigers, which covers 34% of the total tiger population in this landscape. All the 13 microsatellite loci were found to be polymorphic, with a mean number of alleles of 14.76±2.83. Spatial genetic analyses identified three subpopulations of tiger in this landscape, and the result also suggests twelve out of 13 existing corridors are functional, the Gola river corridor needs immediate attention, Kilpura-Khatima-Surai corridor is non-functional. GIS analyses identified distance from the forest harms tiger dispersal in this landscape.

Results also identified bottlenecks within nine functional corridors, which are critical for tiger dispersal. Most of them are heavily affected by various anthropogenic activities and fall in outside protected areas. The future of tiger conservation in this human-dominated landscape will depend on careful management, especially of critical corridors and maintaining source-sink dynamics at a metapopulation scale.

Milestone: Fine genetic and GIS analyses identified Rajaji, Corbett, Pilibhit, Dudhwa, Valmiki TRs, Lansdowne, Ramnagar and Haldwani Forest Departments as source and Haridwar, Najibabad, Terai west, Terai central, Pilibhit Social and South Kheri FDs, west-Sohagibarwa WLS and Amangarh TR as sink populations of tiger in this fragmented landscape. Results also identified corridors like Kosi river, Gola river, Kilpura – Khatima - Surai, Lagga Bagga – Shuklaphanta - Tatarganj, Kishanpur - Dudhwa, Dudhwa - Katerniaghat and the additionally specific area between Rajaji TR and Najibabad FD, Lansdowne FD and Najibabad SFD, Haldwani FD and Pilibhit SFD, Pilibhit TR and Pilibhit SFD, Pilibhit TR and Kishanpur WLS, West-Sohagibarwa WLS and East-Sohagibarwa WLS as critical corridors of functional tiger movement. Proper management of all these source and sink populations and the vital corridors that connect these populations is crucial for the long-term persistence of tigers in this fragmented landscape as most of the non-protected areas are heavily affected by immense anthropogenic activities.

RESEARCH
ONGOING

INTENSIVE MONITORING AND STUDY OF DISPERSAL OF TIGERS IN KANHA TIGER RESERVE (PHASE IV)

Funding Source
National Tiger Conservation Authority

Date of Initiation
June 2009

Investigators
Dr Y.V. Jhala and Shri Qamar Qureshi

Date of Completion
December 2021

Researchers
Neha Awasthi, Jayanta Kumar Bora and Shravana Goswami

Objectives: The project objectives are to (i) monitor the population of tigers in Kanha Tiger Reserve, and to (a) estimate the tiger population within selected areas of the reserve, and (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: The research team set up remotely triggered cameras, with heat and motion sensors, at 646 locations in forest and grassland habitats using 2 km^2 grids to estimate tiger abundance. Cameras were run for 25 days each year at each location, resulting in ~16,000 camera trap nights. 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 to estimate prey density. The total transects survey effort comprised 1200 km of walk. An area of 200 km^2 was camera trapped for the entire year to understand tiger movement and turnover rates. Each month, cameras were moved to different locations within the grid to have multiple spatial locations of captures for estimating home ranges.

Outputs and Outcomes: The team obtained ~2500 images of 118 tigers (83 were adults and 35 cubs). Among the adults, 39 were males, 42 were found to be females, and two remained unidentified. Analysis of the line transect based data revealed chital had the highest density amongst all ungulate species, followed by sambar and gaur.

Milestone: The team has completed two years of intensive continuous monitoring exercise in a 200 km^2 core area with a high density of tigers. The team obtained a fine-scale habitat use pattern of 31 tigers from this dataset. The team showed how tigers limit leopard spatial demographics through a publication in Scientific Reports. Using radio telemetry, the team assessed the land tenure pattern of three wild dogs' packs in reserve. Additionally, the team studied habitat use, suitability and activity pattern of the rare rusty-spotted cat and published an article in a peer-reviewed international scientific journal.

RESEARCH
ONGOING

ECOLOGICAL RESPONSES OF FLORA AND FAUNA TO CLIMATE CHANGE IN TRANS-HIMALAYAN LANDSCAPE WITH SPECIAL REFERENCE TO VULNERABILITY AND ADAPTATIONS

Funding Source
NATCOM, MoEFCC, New Delhi

Date of Initiation
July 2018

Investigators
Dr B.S. Adhikari and Dr S. Lyngdoh

Date of Completion
December 2021

Researcher
Kalzang Targe

Objective: The project aims to understand the nature of vulnerability to climate change adaptation by the local pastoral communities, livelihood and natural resource dependence *vis-a-vis* vulnerability.

Progress: The traditional pattern of resource utilization in terms of uprooting and collection of shrubs and herbs, intensive livestock grazing by migratory livestock and, to a lesser extent local livestock, and dung collection is probably going beyond sustainable limits in Ladakh. The study was designed considering these factors to help and focused on doing experimental studies to know the response, cause, and mitigation strategies to sustain the changing climate and the vulnerability and adaptations. Semi-structured interviews were conducted on the migratory pattern and socio-economic status amongst agro-pastoralists and Amchies in the Trans-Himalayan region of Spiti and Ladakh.

The ecological responses vis-a-vis resource use pattern, productivity and biodiversity, and impacts on livelihood security of traditional herding practices and ethno medicinal practice in the trans-Himalayan region, *i.e.* Spiti valley. Ethno-medicinal practice/ Amchies System in Pin valley - past and present status of Amchies, plant parts used prominent health issues, threats, and anthropogenic pressure on rare and endangered medicinal and aromatic plants were collected and analyzed. The economic dependency of local herders was on livestock, mainly Pashmina goat, Sheep and Yak. Though, they face a conflict between livestock and wild animals, specifically with the hybrid dog, Kypshang, in Ladakh.

The present study provides valuable information related to threats to the Medicinal and Aromatic Plants' rich habitats and urgent needs of conservation for the future dependency of Amchies on it. The study recommends the promotion and conservation of Amchi system in Pin Valley. The study also suggests an effective way to conserve this system to integrate and involve women in the traditional health care system. Certain alpine meadows or alpine pasture lands are replaced by glacial moraines that have unique floristic elements. The Livelihood Vulnerability Index indicates that the rate changes even within the group living in the same landscape or adopting similar grazing patterns, livelihood practices etc. Moreover, the study supports that the vulnerability to climate change does not exist in isolation from the communities' wider biophysical and socio-economic attributes.

RESEARCH
ONGOING

PROTECTING AND INVESTING IN NATURAL CAPITAL IN ASIA AND THE PACIFIC UNDER THE KNOWLEDGE AND SUPPORT TECHNICAL ASSISTANCE (KSTA)-9461

Funding Source
Asian Development Bank (ADB)

Date of Initiation
January 2019

Investigators
Dr Bilal Habib and Dr Malvika Onial

Date of Completion
March 2022

Researcher
Sharmistha Singh

Objectives: The objectives of the project are to (i) Highlight the many benefits of green infrastructure to a human society based on the principles that protect and enhance nature and natural processes; (ii) Integrate principles of green growth, and concepts of smart planning into the planning of linear developments in identified sectors; (iii) Optimizing the use of natural capital for the sustainability of natural resources; achieving greater acceptability of development goals in harmony with the natural environment and enhancing the quality of life of people; and (iv) Build capacity of stakeholders in the transportation sector through training, information sharing and highlighting best practices in the field of green linear infrastructure.

Progress: An audio-visual adaptation was produced and the manual 'Eco-friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife' was conceptualized. The ongoing COVID-19 resulted in the revision of the Advanced Payment Facility (APF) signed between ADB and WII. The following revised activities were envisaged through a consultative process: (i) Organization of a series of online seminars (webinars) on green linear infrastructure geared towards building the capacity of stakeholders in the transportation sector; (ii) Production of a long duration E-Learning Audio-Visual Product (AVP) for planning and implementing smart green road and rail transportation projects; (iii) Production of short duration E-Learning video clips for planning and implementing smart green road and rail transportation projects; and (iv) Production of short video clips on key Project components for online and social media platforms.

Outputs and Outcomes: The conceptualization of the Audio-Visual Product (AVP) is underway and includes script-writing through a consultative process and building a database of relevant visuals. The preparation for the WII-ADB webinar series 2021-22 is ongoing. All forms of digital media like 2D, 3D animation, infographics, videography, stop-gap motion with voice-overs would be used to make a stimulating film-highly immersive for the audience to understand the challenges of building infrastructure.

It was envisaged to produce a series of short e-learning videos to be featured online and packaged for use across social media channels and other online platforms to showcase the key components of the project. Four powerful and crisp video stories with on-screen subtitles (up to 1 minute) were prepared. A series of online seminars (webinars) on green linear infrastructure geared towards building capacity of stakeholders in the transportation sector was organised. To foster a global dialogue with leading experts in the field of green linear infrastructure for integrating principles of green growth, and concepts of smart planning into designing and planning of linear developments in identified sectors. The research team is learning to optimize and mainstream natural capital into linear infrastructure planning for the long-term sustainability of natural resources.

Milestone: The best practices from around the world in the field of green linear infrastructure were highlighted to help build the capacity of stakeholders in the transportation sector. The subject matter experts from diverse academic backgrounds were invited to bring their expertise and experience to the audience around the world on key areas for thematic discussions.

RESEARCH
ONGOING

UNDERSTANDING LARGE CARNIVORE CONFLICT ISSUES IN MAHARASHTRA FOR SUGGESTING CONFLICT REDUCTION MEASURES

Funding Source
Maharashtra Forest Department

Date of Initiation
September 2019

Investigators
Dr Bilal Habib and Dr Parag Nigam

Date of Completion
August 2023

Researchers
Advaita Ravindran and
R. Yashaswi Rao

Objectives: The project has the following objectives (i) *Development of Village-level database:* Preliminary data such as population status of humans and livestock, spatial characteristics like forest type, forest cover, location of the village with respect to forest, Land Use Land Cover and built-up linear infrastructure to be collated and synthesized. (ii) *Assess the present status of large carnivores and prey in the area:* Field data on population and trends of carnivores, natural prey and livestock would be collected. The issue of feral livestock and factors contributing to the abandonment of livestock would be investigated. (iii) *Assess the diet of large carnivores:* To assess the diet of large carnivores in human-dominated landscapes. (iv) *Assess villages' vulnerability to conflict:* Vulnerability of villages to the conflict would be assessed based on factors such as the location of villages to forests and corridors, the dependence of local livelihood on natural resources and past patterns of conflict. (v) *Suggest measures for mitigating conflict:* Site-specific conflict prevention, management, and mitigation measures with quantifiable outcomes would be suggested. (vi) *Develop early warning systems:* Early warning systems for animal detection and preventing potential conflict situations would be evolved. This would include identifying areas where carnivore coexistence is not possible at all and developing proactive measures to reduce conflict.

Progress: A baseline database of human-wildlife conflict incidents was developed for assessing Spatio-temporal trends. The data collection was initiated for instances of large carnivore conflict. The research team started gathering secondary data from Forest Department records to develop a database of Spatio-temporal trends in large carnivore conflict. Since existing records are not available in a readily usable format, the research team created a format for data collection and management. Three templates were developed, *viz.* human casualties (Fatalities/Injuries); Livestock losses; and Crop damage. The templates were shared with the Forest Department as well.

Secondary data was collected from Forest Department records. Historical data (Last ten years) of significant carnivore conflict were collected from Brahmapuri Forest Division, Chandrapur Forest Division, Central Chanda Forest Division and Tadoba Andhari Tiger Reserve.

Outputs and Outcomes: The wild prey abundance was estimated. Distance sampling exercise using line transects was conducted in Protected Areas in the region (including Tadoba Andhari Tiger Reserve, Navegaon Nagzira Tiger Reserve, Melghat Tiger Reserve, Tipeshwar Wildlife Sanctuary, and Umred-Karhandla Wildlife Sanctuary) as well as outside Protected Areas (including Brahmapuri Forest Division and Pandharkawada Forest Division) to estimate the population of wild prey species (Nilgai, Chital, Sambar deer, Peafowl, Wild pig, etc.)

Diet analysis of large carnivores was done in human-dominated landscapes. Scat samples of various species like tigers, leopards, dholes and sloth bears have been collected from the region to develop an understanding of the dietary habits of these species.

Milestone: Current large carnivore population was estimated. Camera-trapping exercise was carried out in the Protected Areas in the region as well as outside Protected Areas (including Brahmapuri Forest Division) with a motive of population estimation for species with individual markers (tigers and leopards).

RESEARCH
ONGOING

AN INTEGRATED APPROACH FOR CONSERVATION OF TAKIN, *BUDORCAS TAXICOLOR* IN NORTH EAST INDIA: LINKING SPECIES ECOLOGY AND TRADITIONAL ECOLOGICAL KNOWLEDGE

Funding Source
Ministry of Environment, Forest & Climate Change

Date of Initiation
September 2019

Date of Completion
September 2023

Investigator
Dr Gopi GV

Researchers
Gaurav Rai and Sirumai Khushiyali Kri

Objectives: This study aims to assess the current status of Takin across select districts and threats to their conservation and to identify areas/ habitats important for the long-term conservation of this species.

Progress: Much of the planned and proposed work has been affected by the COVID pandemic related lockdown. Reconnaissance surveys have been conducted until February 2020. A detailed literature review was carried out. The research team integrated climate, topography, vegetation, and human disturbance information to assess Mishmi Takin's distribution and provide landscape-level planning to safeguard the potential Takin suitable areas in the Eastern Himalayan region in the state of Arunachal Pradesh in India under climate change. The specific objectives were to (i) characterize the potential suitable distribution range of Takin and detect the most important areas for conservation, (ii) project changes in the species' range under predicted future climate change and (iii) identify the climate refugia areas that overlap between predicted current and future suitable habitat.

Outputs and Outcomes: Research permissions have been obtained from the Arunachal Pradesh forest department, Government of India for collaring and reconnaissance survey in Lohit, Lower Dibang and Dibang valley has been conducted. Due to lockdown, the fieldwork couldn't be carried out as envisioned.

Milestone: Intensive sign surveys, capture of three individuals satellite tracking to study the movement ecology, intensive camera trapping and socio-ecological surveys to document traditional ecological knowledge and their significance to takin conservation will be carried out in future.

RESEARCH
ONGOING

KAILASH SACRED LANDSCAPE CONSERVATION AND DEVELOPMENT INITIATIVE – PHASE II

Funding Source
ICIMOD, Nepal through GBPNISHED, Almora

Date of Initiation
December 2018

Date of Completion
November 2023

Investigators
Dr B.S. Adhikari and Dr G.S. Rawat

Objective: The objective of the project is to develop a document on the Orchids of Gori Valley.

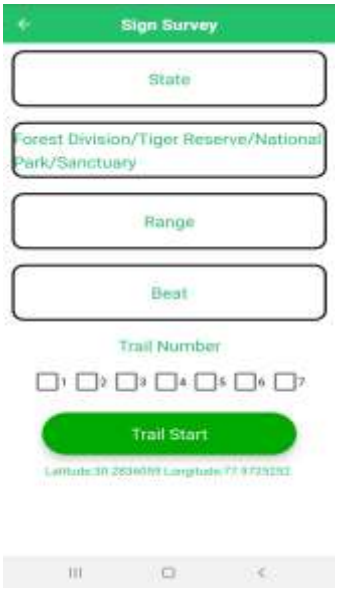
Progress and Outcomes: The Gori valley is located on the eastern flank of Kumaon in the state of Uttarakhand. It is sandwiched between Eastern Ramganga and Eastern Dhauli rivers. In the north, it is bound by the Tibetan Autonomous Region (TAR) of PR China. The valley represents three geological sub-

divisions, *i.e.* Lesser, Greater and Trans-Himalaya. The maximum epiphytic orchids are mainly concentrated in the lower part of the valley, which happens to be around the human settlement areas.

The epiphytic orchids are mainly distributed between Jauljibi and Madhkot. However, in this stretch, some localities are very rich, *e.g.* Lumti, Ghosigad and Baram. Amazingly enough, few sites show the unique beauty of 27 species of epiphytic orchids on a single host tree. This valley supports as many as 127 species of orchids out of 232 species reported from Uttarakhand. Two endemic orchids *Eria occidentalis* and *Flickingeria hesperis*, were also reported from this valley.

Milestone: The handbook, which is to be published, contains all the orchids reported from Gori Valley, has 50% of orchids of the state are found in this valley alone. Hence, it can be regarded as one of the orchid hotspots in the Western Himalayas.

RESEARCH
ONGOING



ESTABLISHMENT OF A WEB PORTAL FOR DISSEMINATION OF RESEARCH FINDINGS AS A DECISION SUPPORT SYSTEM FOR POLICY MAKERS AND WILDLIFE MANAGERS IN MAHARASHTRA

Funding Source
Maharashtra Forest Department

Date of Initiation
December 2019

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

Date of Completion
November 2024

Researcher
Aman Dhamanda

Objectives: The objectives of the project are to (i) Development of a system where a data dissemination portal will be established to make research findings available in a more usable form to managers and policymakers in the state of Maharashtra, through (a) Establishment of a web-GIS platform to host geospatial outputs (maps) from research projects, (b) Hosting of technical reports from research projects for wider dissemination, and (c) Development of mobile data collection field app.

Progress: The research team has migrated the website mahadata.wii.gov.in from an older PHP, HTML, CSS, JS, and SQL database to a bifurcated dual stack FrontEnd and BackEnd with well-maintained code structure which is easily to update. The team used ReactJS library to create the front-end which can receive dynamic data from backend and even send data to the backend for saving in the database after validation to protect the website from Cross Site Scripting and Cross Site Request Forgery. The research team has also used Axios, Material UI and Open Layrers libraries in the frontend. In the backend we have used Python Django Rest Framework to receive data from frontend and store it into the database after validation. This is also compatible with Geoserver which is used to host GIS data. PostgreSQL is used to store data received by frontend through backend

(Django rest) as a middleman to get safe data. Geoserver is used to store our spatial data and send spatial data to frontend. The research team has implemented user registration and login functionality via protected routes for secure access of hosted content (reports and maps). The Admin Interface has been improved with advanced features. The research team has also added email services for unauthorised users to request access to protected content.

A mobile field data collection app has been developed to collected species and habitat data both inside and outside protected areas. So far functionalities like sign survey and line transect have been added. In the frontend it is using React.js on mobile and Vue.js on web platform. It is using Node.js in the backend with a MongoDB database.

Outputs and Outcomes: The research team has successfully setup a web-portal called *mahadata.wii.gov.in* which is hosting technical reports of research projects in Maharashtra and also GIS data generated from such research projects. Here the content is protected against unauthorised access using a password-based login system for the Forest Department. User without access (the general public) can also request access through an online data request form.

The mobile field data collection app that has been developed has the following functionalities: a) Registration Page, b) Login Page, c) OTP Verification, d) Home Page, e) Profile Page, f) List of Observation, g) Detail Page of Observation, and h) Field form.

Milestones: Website upgraded with new technology, (ii) New functionalities incorporated into the website, and (iii) New mobile field data collection app developed.

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

Date of Initiation
February 2020

Investigators
Dr Bilal Habib, Dr Parag Nigam, Dr Samrat Mondol and Shri Jayaramegowda R

Date of Completion
February 2024

Researchers
Rucha Ghanekar and Kumar Ankit

Objectives: (i) *Population estimation:* Population density, abundance and demographic structure of leopards in the landscape will be carried out. Capture-recapture sampling method and spatially explicit CR approaches will be used to achieve this objective. This exercise will be carried on an annual basis using camera traps. (ii) *Food habits of leopards:* Scat analysis is an indirect, non-invasive and unbiased technique for recording the frequency of occurrence of prey in the diet of large carnivores and hence it is most widely used. (iii) *Genetic database of leopards:* This database can help us identify serial offenders in conflict cases and identify their family lineages. Further, intensive genetic data generated from faecal samples will also provide sex ratio and population dynamics. (iv) *Spatio-temporal use and movement:* The study will also highlight the Spatio-temporal pattern of the leopards

in the Junnar Forest Division. The movement ecology will highlight the pattern of landscape use by the leopards and will try to identify parameters that govern the movement of the animals. (v) *Characterizing conflict sites:* Data on locations of the conflict sites will be collected to characterize the sites of the conflict within the landscape. (vi) *Socio-economic survey:* Village Surveys will be conducted to evaluate the dependency of local people on forest resources and the magnitude of the conflict. All the events of depredation will be evaluated with respect of forest type, cover distance from village etc. to evaluate the potential areas of conflict concerning the distribution of predators in the Junnar Division

Progress: *Understanding the magnitude of human-wildlife conflict for effective mitigation:* (i) As the project initiated last year, the aim was to understand the magnitude of the human-wildlife conflict in Junnar Forest Division for different objectives and study design. The research team collected conflict records of the last two decades from the Junnar Forest Division. (ii) The records suggest a total of 4648 incidents of livestock depredation and human injury/death attributed to large carnivores were reported at JFD in two decades. Leopard (n=4495) was the main carnivore species reported in the depredation cases, along with occasional cases of wolves (n=99), hyenas (n=22) and unidentified wild animals (n=32). Also, an abrupt surge of conflict incidences was recorded after the year 2014.

Mapping of Spatio-temporal human-leopard conflict hot spots: (i) As a part of one of the objective 'characterizing conflict sites', the team has mapped the human-leopard conflict hotspots of the two decades (1999-2018). Using the conflict records, the research team identified different clusters of conflict hotspots using the tool optimized hotspot analysis. (ii) Further, the research team also analyzed the data of two decades to identify different categories of the conflict. The team used the tool emerging hotspot analysis, which identified three categories of the conflict in the study area. It will be effective in the management

Image: *Landscape of Junnar Forest Division*

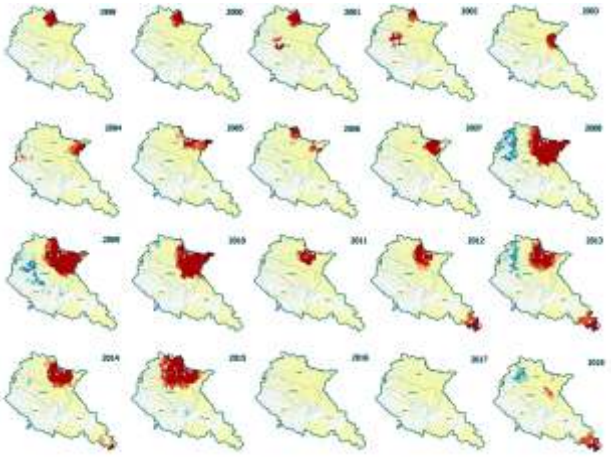


Figure 1: *Year-wise maps for optimized hot spot analysis in Junnar Forest Division, Maharashtra, India*

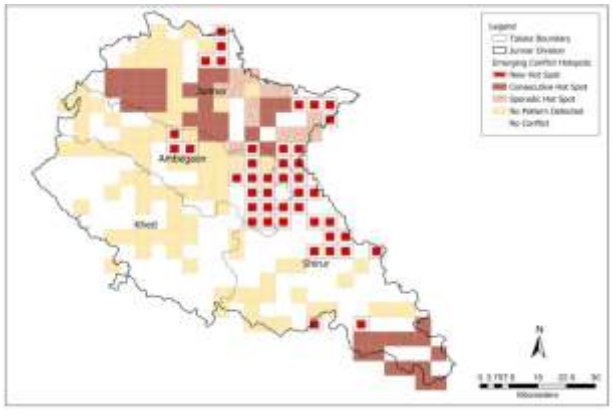


Figure 2: *Emerging hotspot analysis shows new, consecutive, sporadic hot spots from the data of two decades*

approaches and mitigation implications based on the conflict hotspot categories.

Camera trapping exercise for population estimation of leopards: (i) As per one of the objectives of the projects, the team conducted a camera trap exercise in 100 km^2 in Shirur taluka of the forest division. Based on our emerging hotspot analysis results, the area is also in one of the new conflict hotspot regions. (ii) The team captured a leopard, hyena, rusty-spotted cat, jackals, and wild pig through the camera trap exercise. The detailed analysis is currently in progress. (iii) Preliminary interactions with villagers at various locations have provided insights to design in-depth interviews.

Outputs and Outcomes: The project researcher presented the findings titled "Not so sweet! A case study of sugarcoated human leopard conflict in Junnar Forest Division, Pune Maharashtra" in the 15th Internal Annual Research Seminar-2019.

RESEARCH
ONGOING

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

Funding Source
Maharashtra Forest Department

Investigators
Dr Bilal Habib, Dr RS Gowekar, Shri Praveen NR, Shri Ramanujam RM, Shri MS Reddy and Dr Parag Nigam

Researcher
Aishwarya Bhandari, Jaydeep Patil, Indranil Bhowmick, Shreya Ray, Nilanjan Basu, A. Krishnan, Lynette Gomes and Nilanjan Chatterjee

Date of Initiation
February 2019

Date of Completion
January 2029

Objectives: The project has the following objectives (i) Long-term monitoring of tigers, co-predator and prey in tiger bearing areas of Vidarbha, Maharashtra; (ii) Identify potential areas in the State of Maharashtra for conservation translocation to reduce Human-Wildlife conflict; (iii) Understand the role of Wild dogs in Navegaon-Nagzira Tiger Reserve on tiger recovery; (iv) Understand Ecology of Ratel in Melghat Tiger Reserve; (v) Understand the movement of selected Tiger Females and their subsequent generations.

Progress: Estimation of abundance and density of prey species using distance sampling across tiger landscape in Vidarbha Landscape, Maharashtra. 327 forest personnel (Guards and Foresters) were trained in 7 organised workshops to conduct transect surveys

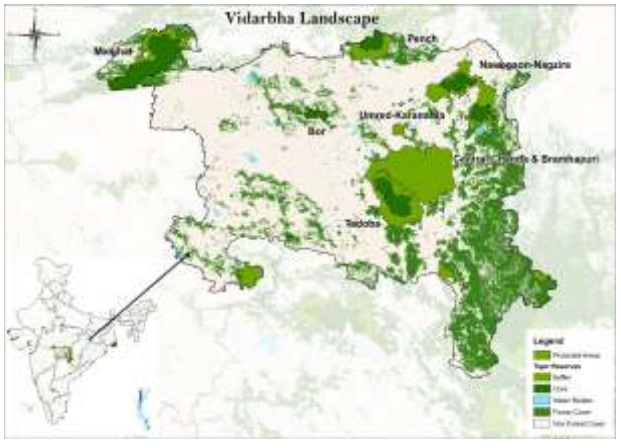


Figure 1: *Map showing forest cover and study areas in Eastern Vidharbha Landscape, Maharashtra, India*

simultaneously across Melghat Tiger Reserve. A total of 131 participants were trained during the workshop at Bor Tiger reserve. A total of 222 attendees (guards, rangers and ACFs) were trained during these workshops in NNTR. A total of 91 Forest staff in Umred - Karandla Wildlife Sanctuary and 122 forest staff in Brahmapuri Wildlife sanctuary have been trained in camera trapping and line transect. Transect surveys were conducted by field staff of MTR from 12-26 December 2019, by NNTR field staff on 16-27 December 2019 by TATR field personnel between 17-23 February 2020.

Outputs and Outcomes: A camera trapping exercise was conducted in 2 blocks covering 618 grids out of 960 grids in MTR from 13 March to 4 June 2020 to estimate the density and demography of tigers and co-predators across tiger landscape in Vidarbha Landscape, Maharashtra. A specially trained team of 70 Forest Guards and Foresters placed 1,236 camera traps to carry out the above exercise throughout Sipna, Gugamal and Melghat Wildlife Divisions of MTR. Camera traps have been deployed in 90 grids of 2 km^2 in Umred-Paoni-Karhandla Wildlife Sanctuary; and 79 grids in Bor Tiger Reserve following a two sq km grid. Camera traps have been deployed in 251 grids of 2 km^2 grids in Nagzira-Navegaon Tiger reserve. Cameras were placed in 431 grids in Tadoba-Andhari Tiger Reserve following a two sq km grid. In Brahmapuri Forest Division, 400 camera traps were deployed following the two sq km sampling grid. The data collected from the camera trapping exercise is currently being processed.

Milestone: Capacity building of forest staffs (guards, rangers and ACF) across forest divisions and Tiger Reserves of Vidharbha landscape, Maharashtra, India. Phase-IV Training report of forest personnel was conducted in Eastern Vidharbha Landscape, Maharashtra, India.

AUGMENTATION AND RECOVERY OF TIGER POPULATION IN SATKOSIA TIGER RESERVE, ODISHA

Funding Source
Odisha Forest Department and National Tiger Conservation Authority

Date of Initiation
March 2018

Investigators
Dr K. Ramesh and Dr S.K. Gupta

Date of Completion
March 2023

Researchers
Gatikrishna Behera and Vaishali Vasudeva

Objectives: The objectives of the project are to (i) undertake post-release monitoring of tiger populations, including assessment of population growth, movement pattern, behaviour, genetic structure and physiological profile; (ii) estimate the population size of tiger, co-predator and prey species, and model the habitat correlates with understanding the species-habitat relationship and supporting the ongoing Phase IV monitoring activity; (iii) map landscape composition and configuration, and estimate patch properties, connectivity and landscape permeability within and across the landscape; and (iv) quantify human-wildlife interface issues and ecological correlates linked to economics and ecosystem services.

Progress: Post-release monitoring: Of the two translocated tigers, one was found dead. The other had to be captured and kept in captivity due to serious conflict with local people. However, daily activity and space use within the enclosure was studied and her interaction with the resident female tiger. Simultaneously, the movement of a resident female tiger was analysed with the help of camera traps.

Camera trapping: 357 single-sided camera traps were placed in 2 sq. km grid units in January-March 2020, covering the core and buffer area of Satkosia Wildlife Division, as well as the newly added area (Athamallik Forest Division, Athagarh Forest Division).

Line transect study was carried out during the post-monsoon (2019) session for herbivore/ prey-base assessment.

Collection of existing baseline data: Procurement of spatial and non-spatial data (tiger conservation plan/ working plans/ reports/ camera trap photos/ shapefiles) was done from GIS Lab-Angul and then prepared metadata file and consolidated spatial database.

Creation of spatial database: Creation of data in GIS domain in case the data was not already available or created in the past year. The team also modelled habitat variables such as soil properties and forest cover change using satellite data.

Integration of spatial data in android based application: The beat maps and grid layers were georeferenced and added to mobile applications to easily install camera traps in the field. Each beat in all ranges was provided with maps having administrative boundaries, topographic information and grid details.

Capacity building: Training of field level staff in GPS, GIS, map reading, camera trap installation and line transect data collection was done. The training sessions were organized at range level, division level and circle level.

Preparation of Prey Augmentation Proposal: A proposal for the augmentation of Sambar Population was drafted and submitted to Division Office for further necessary action.

Socio-economic Profiling of Villages: Baseline data were collected with the help of forest staff. Information was collected for 43 villages for their socio-economic status, livelihood opportunities, resource utilization, dependence on forest and attitude and perception towards conservation. The objective was to revise the micro- village plans and continue with village relocation on a priority basis.

Outputs and Outcomes: Community engagement and village relocation have become a priority action in the present tiger recovery effort. Two villages located near the core have agreed to relocate. While grassland development and prey augmentation efforts are being taken up, protection increases as the tiger reserve boundary have been reorganized. The continuous training and capacity building workshops have built confidence among the frontline staff in monitoring tigers, installing camera traps and handling telemetry

instruments. Efforts are being made to systematically collect and document scientific information regularly on prey, co-predators, tigers, and habitat variables. The entire tiger reserve is being camera trapped systematically for the first time, overcoming the logistic problems. It will result in essential insights regarding species and prey distribution.

Milestones: Systematic camera trapping of the entire tiger reserve has been taken up with a systematic monitoring protocol. The socio-economic survey was completed in one division. Village relocation has moved forward, with two more villages giving their consent to relocate. The internal project review meeting was organised for adaptive management and advancing project objectives.

RESEARCH
ONGOING

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

Funding Source
National Tiger Conservation Authority and West Bengal Forest Department

Investigator
Dr K. Ramesh

Researchers
Orvill Jude Nazareth, Shekhar Sarkar and Shikha Jasrrotia

Date of Initiation
April 2018

Date of Completion
March 2023

Objectives: The objectives of the project are to (i) undertake post-release monitoring of prey and tiger populations, including assessment of population growth, movement pattern, behaviour, genetic structure and physiological profile; (ii) estimate the population size of tiger, co-predator and prey species, and model the habitat correlates with understanding the species-habitat relationship and supporting the ongoing Phase IV monitoring activity; (iii) map landscape composition and configuration, and estimate patch properties, connectivity and landscape permeability within and across the landscape; and (iv) quantify human-wildlife interface issues and ecological correlates linked to economics and ecosystem services.

Progress: At the landscape level, a database containing spatial data, *viz.*, boundary vectors, Topography raster and their products, Hydrological data, Disturbance data, Climate, Socio-economic data, ecological data and sampling grids were created. At the reserve level, the layers on protection and management were included in the spatial database. Data was compiled and collected from the field, and online portals and these data sets will be annually updated and maintained with the forest department and WII. Beat booklets were prepared to contain data on administrative and management information. Administrative layers included range-office, beat-office, guest house, SSB camp, motorable road, compartment boundary, beat boundary, tourist spots, railway line, watchtowers, check-posts, transect lines, and waterholes in 2 km^2 grids of drainage network and land cover types of dense, medium and sparse vegetation. This included information about the beat and was created at the beat level for individual beats, ranges, and separate copies were compiled for the ADFOs, DFOs, and the Field Director and WII.

Camera traps were deployed as planned, considering the crucial areas where tiger movement was anticipated from the previous years. 2km^2 grids were used to sample the entire reserve. Camera traps were also deployed opportunistically at sites where animal kills were reported. Phase I & IV monitoring exercises were conducted for BTR, coordinated with the forest department. The one-day training was organized in each range attended by all the team leaders and staff undertaking the data collection during the exercise. Transect sampling was done in the early morning, at 6 am, while the sign survey exercise started at 8 am. Datasheets were checked and verified by WII team

members and ADFOs at the end of the day. An exercise for estimating herbivore densities for the other divisions in northern West Bengal was also planned. The one-day training was also conducted in these divisions. It was attended by CCF Wildlife north circle, DFOs and ADFOs of respective divisions. The information and data collected so far have been harmonized and placed in both digital and print formats with the forest department and WII research team. An album of species captured in BTR through camera traps from 2 years' records has been compiled along with information and key identification points for use in the field. In addition to this, a separate profile of individual leopards captured in the exercises, identified by the rosette patterns on their bodies, has been developed. Both these documents will be updated annually based on the future camera trapping exercises and to help in management and protection purposes by the forest department.

Outputs and Outcomes: A list of a total of 83 data layers was prepared for the spatial database. Shapefiles of national, state, district, village, protected areas, BTR ranges, BTR beats, and BTR compartments were obtained from online sources and the forest department. The Shapefiles of range office beat offices, watchtowers, check posts, road network and waterholes were updated from the field. Cameras were deployed in the focus grid comprising 98 grids throughout the sampling duration. The non-focus grids were covered in 5 blocks. Intensive sign surveys were carried out in these areas to supplement the camera trap data. There was no evidence of the presence established through camera trap data collected to date. Observation from the kills determined that none of the kills was made by tigers, nor did camera traps deployed opportunistically at kill sites yield any images of tigers. Species-wise capture rates and occupancy analysis will be run on the data once all the information is collected. Ongoing efforts and other activities of prey augmentation and habitat recovery and security by undertaking village relocation and enhanced protection strategies would provide a strong foundation for tiger recovery here.

Phase-I and Phase-IV monitoring was conducted between 12-14 March 2020. The exercise was done over 79 transects, with a total effort of 472 km. Similarly, the sign survey was conducted over 759 km no evidence of tigers was reported from the study and data on prey and co-predators is in the analysis phase. Herbivore estimation exercise throughout northern West Bengal comprised 121 transects in total in a total area of 1,413 km^2. Division-wise data analysis is in progress.

Both the species albums and leopard profile have been completed. The species album comprises information of 31 species, including their images from the camera traps, a map with locations in BYR where species was captured, a description of the species and details of the species family was produced.

Milestone: Creating a catalogue of all spatial data available will be a useful tool for management and scientific planning. The results from the Phase-IV monitoring exercise are expected to yield better results than past exercises due to the increased effort and coverage. The coordinated effort to plan and conduct the herbivore estimation exercise throughout northern West Bengal Divisions was carried out successfully. Data on the recent exercise will help orient management actions in a scientifically planned manner and at the landscape level.

RESEARCH
ONGOING

E-BIRD TECHNOLOGY FOR TIGER CONSERVATION: DEVELOPMENT AND INTEGRATION OF UNMANNED AERIAL VEHICLES AS A SURVEILLANCE AND MONITORING TOOL FOR PROTECTION OF TIGER AND CAPACITY BUILDING OF FRONTLINE STAFF

Funding Source
National Tiger Conservation Authority

Investigators
Dr K. Ramesh (WII),
Dr Vaibhav C. Mathur; AIG (NTCA)
and Dr Christy Williams (WWF)

Researchers
Project Engineer: Shashank Sawan, Krishna Kumar T
Project Biologist: Tamali Mondal

Date of Initiation
June 2017

Date of Completion
May 2022

Objectives: The objectives of the project are to (i) Integrate Un-manned Aerial Vehicle (UAV or Drone) in Panna Tiger Reserve, Madhya Pradesh, based on pilot testing experience during 2013-14; (ii) Undertake need and feasibility analysis for integration of UAV in representative Tiger Reserves of the country concerning poaching risk and conflict management strategies; (iii) Map locations of poaching and conflict-prone areas in the tiger reserves, which would serve as a basis for technology integration; (iv) Experiment and implement UAV technology in a phased manner in the representative Tiger Reserves for day-time aerial surveillance in strategic locations, night patrolling, mapping and monitoring of encroachment or degradation, data collection from camera traps and tiger monitoring involving RFID technology; and (v) undertake capacity building of field staff for technology transfer and implementation of UAV technology as a part of the regular management strategy.

Progress: *Survey and data collection in Panna Tiger Reserve:* Panna is one of the major sites of this project. As per the needs, habitat mapping in selected sites was completed using an aerial survey. Data collection was also completed on tiger, vulture, crocodiles and tourism activities. Training of staff from all levels on UAV handling was conducted for a one-week program. Ken river stretch was monitored using UAV, and the data was processed to prepare the map. Data collection on crocodiles was also done using drones covering the whole river stretch and compared with the ground survey. Thirteen village sites that were relocated from inside the Panna Tiger Reserves were surveyed and mapped to monitor changes.

Need and feasibility assessment for UAV: The need and feasibility assessment were crucial to select priority sites based on the data. For this, a questionnaire survey format was circulated through NTCA to the respective tiger reserves. Detailed need and feasibility analyses for the integration of UAV have been completed in Panna, Kaziranga, Sathyamangalam, Corbett, Rajaji and Dudhwa Tiger Reserves. So far, the team has received details on need and feasibility from Bhadra, KMTR, Mudumalai, Sanjay, Nameri, Satpura and Satkosia Tiger Reserve. Five sets of questionnaires focusing on Poaching, Conflict, Forest Fire, Weed presence and Encroachment were completed in all Beats based on inputs from Range Officers and Beat Guards.

Experiment and Implement UAV technology: The project team developed one urban quad, one quad-copter, one fixed-wing and one delta-wing model and used them in-field activities. UAVs were used for various purposes in target sites and other sites where the local administration sought inputs.

Capacity building and Technology Transfer: Technology transfer was completed in Panna and Dudhwa Tiger Reserve. One plane and one quad-copter were given to both the reserves for monitoring and survey. Capacity building for UAV training has been conducted in Corbett and Sathyamangalam Tiger Reserve this year. Previously, the capacity building program was undertaken in Panna, Dudhwa and Kaziranga Tiger Reserve.

Outputs and Outcome: Of the 13 priority sites, data collection, survey and capacity building programs have been completed in five places. In Sathyamangalam Tiger Reserve (STR), 50 forest staff were trained in UAV technology through a capacity building program. Arial Survey on invasive species along with Moyar River stretch and development of the tribal village was conducted during fieldwork in STR. The team members also assisted the Sathyamangalam Forest Department in various field requirements, including dealing with problem animals and encroachment. A total of 25 beat officers were trained in Corbett Tiger Reserve. Hands-on training and an independent flight schedule helped the participants to gain the confidence to fly UAVs. Need and feasibility assessment were conducted beat wise. According to the collected data need for UAV is high in the areas which share a boundary with local villages. Collection of fuelwood and dry leaves are the main concerns of the forest officials. Map of need and feasibility assessment of UAV in other tiger reserves were prepared according to the data.

Milestones: One of the major objectives of the project was to develop a low-cost UAV model for the survey and wildlife monitoring, and accordingly, the team developed two customized UAVs successfully. Capacity building and technology transfer to staff was done in Panna, Corbett, Kaziranga, Dudhwa and Sathyamangalam Tiger reserves. Habitat and wildlife monitoring could be done, offering insights for field managers to upscale the UAV deployment. Need and feasibility assessment of UAV have been completed in 11 tiger reserves, which would rationalize the UAV deployment in the concerned reserves.

RESEARCH
ONGOING

PLANNING AND MANAGEMENT FOR AQUATIC SPECIES CONSERVATION AND MAINTENANCE OF ECOSYSTEM SERVICES IN THE GANGA RIVER BASIN FOR A CLEAN GANGA (NMCG-WII PHASE II)

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

Investigator
Dr Ruchi Badola

Researchers
70 research personnel

Date of Initiation
January 2020

Date of Completion
December 2025

Objectives: The project objectives are: (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 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. These objectives are being covered under three components: (i) Science-based aquatic species conservation and maintenance of ecosystem services in the Ganga River basin. (ii) Capacity building of the Forest Department and other stakeholders in managing aquatic and wetland resources. (iii) Develop community-based aquatic species conservation and outreach programmes for the Ganga River basin.

Progress: Under the project's first component, pre and post-monsoon surveys were carried out in the ten tributaries of the Ganga River, viz. Yamuna, Chambal, Ramganga, Gomti, Ghaghra, Gandak, Kosi, Son, Ajay and Rupnarayn was carried out from November 2020 onwards, where five teams comprising of 15 Researchers and 17 Ganga Praharis covered 5,152 km of the rivers. During the national lockdown, an online training workshop on "Sampling Guidelines for collecting abiotic samples (water and sediment) for monitoring of toxic contaminants" was conducted on 17 May 2020 for Ganga Praharis. These trained Ganga Praharis collected water and sediment samples in June 2020 at 17 locations along the Ganga River. Laboratory analysis for the same is ongoing. An online course, 'Basics of Rescue and Rehabilitation of Freshwater Macro-fauna in Ganga Basin' with special reference to Chelonians and Crocodilians was conducted between 5 June to 4 July 2020. In all, 1,774 participants from five countries (India, Nepal, Canada, United States and the United Kingdom) and 29 Indian states participated. The fourth monitoring committee meeting was held on 4 Sep. 2020 through video conferencing. A training workshop to prepare the People's Biodiversity Register was organized for the Ganga Praharis (n=67) of Bihar state in Bhagalpur district in association with the Bihar Forest Department and Bihar Biodiversity Board on 16 January 2021. The training was followed by the data collection by trained Ganga Praharis, under the guidance of NMCG-WII project team, in all 38 districts of the Bihar state from 17-20 January 2021. The team prepared a book on "Framework for Ecological Monitoring of Ramsar sites and Wetlands of India". It was released on World Wetlands Day 2021.

Under the second component, 14 online training workshops were organized. These workshops were attended by about 1,000 participants from various stakeholder groups. The research team conducted training workshops for youth on "Conservation of Biodiversity and Wetland" and "Tourist Guides" in Bijnor, during 21-26 September 2020. Seventy-one youth from the local communities were trained in these workshops. Online Painting, Slogan writing, Essay writing, and Photography competitions were organized for the school students on World Turtle Day, Environment Day, and Nature Conservation Day. More than two thousand children participated and were sensitized. On World Wetland Day, 2 February 2021, various activities were organized along the Ganga river, including practical sessions on water quality monitoring and the identification of water birds. In coordination with the forest department, Dudhwa Tiger Reserve and Ganga Praharis installed safety signage boards at Dudhwa Tiger Reserve, Uttar Pradesh. The National level spearhead training programme for District Project Officers & Project Assistants of Nehru Yuva Kendra Sangathan on 'Biodiversity Conservation of Ganga River Basin' was organised from 5 January 2021 at the Wildlife Institute of India, Dehradun. Thirty-nine DPOs and four Project Assistants attended the workshop. A webinar on 'Wetland Conservation and Approaches' was organised on 3 February 2021. Shri Rajiv Ranjan Mishra, DG, NMCG, addressed more than 100 participants during the workshop.

Under the third component, Cadre of 1,290 Ganga Praharis created in Phase-I was adopted into Phase-II, and an additional 599 Ganga Praharis in the tributaries have been added. The Ganga Praharis have a presence in 55 districts across eight Ganga basin states. The cadre of 107 Ganga Prahari mentors created in Phase-I have been adopted into Phase-II. Hon'ble Minister Jal Shakti, Shri Gajendra Singh Shekhawat interacted with Ganga Praharis on 21 April 2020 in the presence of the Secretary, Ministry of Jal Shakti, DG, NMCG. 31 Ganga Praharis received a letter of appreciation from the Hon'ble Minister for their outstanding efforts in Ganga and biodiversity conservation. As part of the "Bal Ganga Prahari Winter Vacation Programmes" were organized in December 2020 and January 2021 at WII. A total of 23 students from different schools of Dehradun participated in the event. A total of 68 training programmes were conducted through which 1,261 Ganga Praharis were trained in sewing & stitching; Ladoo Prasad; Incense stick making; Jute bag making; Value addition to local crops, especially millets; Health & wellness; Eco-tourism guide; Nursery development & vermicomposting; Handicraft; Fruit processing & value addition; Basic computer science; Electrician & LED bulb making; and Mat & basket weaving. Seven hundred fifty-four start-ups by trained Ganga Praharis realized Hon'ble Prime Minister's "Vocal for Local" campaign to achieve the goals of 'Aatmanirbhar Bharat.' Two SHGs, "Ganga Prahari Swayam Sahayata

Samuh" at Matli, Uttarkashi and Ganga Bhogpur, Pauri Garhwal, Uttarakhand formalized with bank linkages. Jalaj Dolphin Safari was initiated at six sites across the Ganga River on Dolphin Day, i.e. 5 October 2020. Thirty-three boats manned by 66 Ganga Praharis are involved in Dolphin Safari. Two Dolphin safaris from Muzaffarnagar district, Uttar Pradesh, are registered under Societies Registration Act, 1980. They prepared and presented activities and interventions to promote Biodiversity & Wetland Conservation in the Ganga basin about the Arth Ganga concept during the Fourth expert group meeting about the Arth Ganga on 23 December 2020. The shooting of 'Rag Rag Mein Ganga' took place at livelihood centre, Nizampur, Muzzafarnagar, on 13 February 2021. A total of 30 participants, including Ganga Praharis and women from villages Katia, Nizampur, Deval and Rawali, participated in the shoot. 'Ganga ki Baat', the second series of nine episodes was broadcast by All India Radio, Dehradun. The research team developed eleven short educational movies on the aquatic diversity of the Ganga river for the National Museum of Natural history. Ganga Praharis rescued individuals of eleven species, including the Gangetic dolphin, otter and turtles.

Awareness campaign-cum-exhibitions were conducted on special occasions, such as International Wetland day, World Environment Day, and Wildlife Week to spread the biodiversity conservation message. The information of Ganga's biodiversity at Dehradun was exhibited during Uttarakhand State Geo-informatics Meet on 10 February 2020. More than 200 school children participated in the World Wetland Day celebration at Surajpur Wetland and Asan Barrage. The team organized an online slogan/poem writing competition, "Kavya Ganga", for school students of three age groups. Over 80 entries were received from all over the country. An online training session on "Youth Participation in Namami Gange Program" was conducted at the regional level training workshop with Nehru Yuva Kendra Sangathan in Lucknow. A total of 41 participants attended the session. Painting on walls in villages was done in Uttarkashi, Uttarakhand, Bijnor, Uttar Pradesh and Hooghly, West Bengal to create awareness about the biodiversity of Ganga and its importance.

Milestones: The book "Rowing Down the Ganges", which showcases the glorious journey of the Ganga river from its origin in Guamukh to Sunderbans, was released through video conferencing by the Hon'ble Prime Minister Shri Narendra Modi on 29 September 2020. In association with NMCG, a Ganga museum, "Ganga Avlokan", was established at Chandi Ghat, Haridwar, dedicated to Ganga River, its biodiversity, landscape and vibrant culture. The Hon'ble Prime Minister Shri Narendra Modi inaugurated the facility on 29 September 2020.

A storybook on turtles and their role cleaning the rivers 'Bin Vetan ke Kare Safai' and a book "Framework for Ecological Monitoring of Ramsar sites and Wetlands of India" was released by the Hon'ble Minister Jal Shakti Minister, Shri Gajendra Singh Shekhawat on the occasion of World Turtle Day 2020 and World Wetlands Day 2021, respectively.

RESEARCH
ONGOING

HABITAT IMPROVEMENT AND CONSERVATION BREEDING OF THE GREAT INDIAN BUSTARD: AN INTEGRATED APPROACH

Funding Source
National Compensatory Afforestation Fund Management and Planning Council (NCAC); co-funded by Rajasthan State Pollution Control Board (RSPCB) for Project "Conserving Great Indian Bustard landscapes through Scientific Understanding and Participatory Planning"

Investigators
Dr Y.V. Jhala, Prof. Qamar Qureshi and Dr Sutirtha Dutta

Researchers
Dr Shravan Singh Rathore, Dr Tushna Karkaria, Bipin C.M., Vineet Singh, Srinivas Yellapu, Pravesh Sakhlani, Mohib Uddin, Devendradutt Pandey, Sourav Supakar, Tanya Gupta, Hrishika Sharma, Hemalata Joshi, Vishal Varma and Indranil Paul

Date of Initiation
2016

Date of Completion
2023

Objectives: The project has the following objectives: (i) Conservation breeding: Develop and run conservation breeding centre to secure captive populations of Great Indian Bustard (GIB) & (if needed) Lesser Florican (LF) and subsequent reintroduction/ supplementation into restored habitats; (ii) Applied research: Undertake targeted research to (a) prioritize conservation areas, (b) characterize threats, (c) monitor populations & habitats, (d) assess local communities' livelihood concerns, and (e) understand species' genetics to inform conservation. (iii) Capacity building and awareness - to improve protection, sensitize stakeholders & raise conservation awareness; and (iv) Pilot habitat management: Demonstrate best practices for habitat improvement through pilot/ experimental surgical interventions that can be replicated by State Forest Departments.

Progress: Conservation breeding: The Conservation Breeding Centre at Sam, Jaisalmer is fully operational and adequately equipped to provide husbandry and veterinary care for GIB. Six GIB chicks were hatched in the centre from wild-collected and artificially incubated eggs. There are 10 birds from the previous batch that are being hand-reared. The scientific husbandry approach for rearing captive GIB is being developed by a team of specially trained technicians with technical inputs of the collaborating International Fund for Houbara Conservation (IFHC). Conservation breeding of LF was commenced near Ajmer in Rajasthan with two LF chicks from wild-collected artificially incubated eggs. A site visit to Sorsan was carried out and preliminary facility designs were developed and shared with Rajasthan Forest Department and CPWD. The routine conservation breeding activities at these facilities were executed despite the COVID pandemic crisis.

Applied research: Three GIB females were tagged in Desert National Park and Pokhran areas of Thar. These birds were captured using nylon noose traps at nests and water guzzlers. The birds were fitted with solar-powered GSM/ GPRS backpack PTTs using elastic harness material. These tags are equipped with GPS and/ or acceleration sensors and data is transmitted via a cellular network. There was no apparent anomaly in their behaviour or any mortality post tagging. Two LF males were tagged near Ajmer during August 2020. The birds were trapped with the help of nylon noose traps at lekking sites. A survey to assess the status of migratory birds and key wildlife in the Bikaner Parliamentary constituency was carried out in Feb–March 2021 at the request of the Hon'ble Minister of State for Heavy Industries & Public and Parliamentary Affairs, Govt. of India, and an interim report was prepared.

Bird carcass surveys were carried out to assess bird mortalities caused due to wind turbines and associated power lines in Thar, Jaisalmer. Additionally, surveys were conducted to examine bird crossing rates and the use of wind turbine areas by birds and mammals. Behavioural observations to understand the activity, foraging and breeding behaviour of GIB were conducted in Thar during April-July 2020. Molecular analysis of GIB biological samples is currently ongoing to understand the genetic diversity and relatedness of the founder captive stock, and relatedness between two (sub) populations in Thar.

Capacity Building and Awareness: Technical inputs were provided to several power agencies, EIA consultants, ERM consultants, INDUS Enviro - Environmental, Health, Safety, and Social (EHSS), project funders, all concerned regulatory bodies and diverter developers to implement power-line mitigation measures in priority/ potential GIB areas across the species' range, following government regulations, through physical & online meetings. Evidence-based recommendations on legal issues about GIB conservation were shared in the Hon. Supreme Court, Rajasthan High Court (Jodhpur) & National Green Tribunal (NGT) Principal Bench, Delhi. A meeting was organized in Jaisalmer on 22-23 February to discuss various aspects for formulating an action plan for GIB conservation regarding the Hon'ble NGT case in OA No 385 of 2019, as mandated by MoEFCC. Before the meeting, a review of the priority GIB area was carried out. Scientific recommendations on habitat management based on on-site visits were shared with the Bellary circle of Karnataka Forest Department for conservation of GIB. Training of Field staff of Desert National Park in survey techniques was conducted online during November 2020. The final report of the GIB conservation project funded by the Rajasthan State Pollution Control Board was prepared and disseminated to various stakeholders.

Pilot Habitat Management: Trapping of nest predators such as foxes and monitor lizards are being carried out in the enclosures of Desert National Park from June 2020 onwards. The captured predators were relocated at a considerable distance outside the enclosures. Insect and faecal samples of GIB collected from GIB habitat in Kutch, Gujarat were analysed for pesticide presence. A total of thirteen and eleven types of organophosphate pesticides were found in insect and faecal samples respectively. Though the concentration of these pesticides was within the permissible limit of LD50 concentration, the continuous exposure of such contaminated feed to birds can be detrimental in near future. Locust samples were collected from the GIB habitat in Thar during July 2020 and are being analysed in the lab. As and when information on pesticide spraying in critical GIB breeding enclosures was reported, pesticide sprayed locusts were collected and removed to reduce their detrimental effect on GIB during June - July 2020. Mapping of grasslands in the country is being carried out to find suitable GIB and Florican habitats for conservation planning. Bird diverters designed based on our technical inputs to

local vendors for manufacturing indigenous low-cost bird diverters were procured and distributed to Suzlon energy Ltd. for installation. These diverters were installed according to the design provided by the project team on the 33KV line near Mokla during July 2020. Total 105 diverters were installed in this pilot step to examine their field longevity and efficacy. To this end, long-term studies are ongoing, since it requires many years and birds crossing/ collision events to detect the field life and effectiveness of these products in reducing crossings and/ or collisions. Repairing and maintenance of the boundary fence of critical enclosures in the Desert National Park have been carried out to minimize the access to livestock and nest predators, thereby aiding the frontline staff in protecting key GIB habitats during the breeding season.

Outputs and Outcomes: The pilot conservation breeding facility at Sam is operational and has successfully incubated, hatched and reared 16 GIB chicks (June 2019 – March 2021). The birds hatched in 2019 have achieved expected growth and development, and a few are showing behavioural signs of sexual maturity. The facility has an in-house food production system for birds (invertebrate, vertebrate and crops), and is capable of running routine husbandry, veterinary interventions, surgeries and treatments for birds. The two LF chicks hatched in September 2020 are healthy and have achieved expected growth, development and adult weight. The tagged GIB and LF are providing fine-scale information on movement patterns and ecological needs that are being used to refine conservation strategies and threat mitigation plans. The tagged female GIB in Desert National Park, whose eggs were collected for conservation breeding, relayed and recruited chicks in the wild, thereby doubling the total recruitment. Out of the two tagged LF, one moved to Ramvasa, Ujjain, Madhya Pradesh and another moved to Sillod, Aurangabad, Maharashtra for wintering. A large-scale survey in Bikaner for desert wildlife has been completed.

Milestone: The GIB Conservation Breeding Program is well placed in achieving the target of founder population in another two years, earlier than expected. An important finding was that female GIB was able to lay eggs multiple times within a season, indicating the negligible impact of egg collection for conservation breeding on the viability of the in-situ population. The techniques and learnings from the early stages of the GIB conservation breeding program were successfully implemented with modifications for the LF pilot captive breeding venture in Rajasthan. The Hon'ble Supreme Court and NGT-Principal Bench orders on GIB conservation and implementation of threat mitigation measures cited the recommendations provided by the project team, and the implementation of these orders would greatly benefit the species' long-term conservation.

RESEARCH
ONGOING

RESOURCE SELECTION BY BLACK KITES, *MILVUS MIGRANS*

Funding Source
Raptor Research and Conservation Foundation

Investigators
Dr Y.V. Jhala and Shri Qamar Qureshi

Researchers
Urvi Gupta and Nishant Kumar

Date of Initiation
December 2012

Date of Completion
October 2022

Objectives: The objectives of the project are to (i) monitor population density and breeding success of kites along a gradient of urbanization; (ii) understand resource partitioning between the two subspecies of kites found within Delhi in terms of (a) Food, (b) Habitat, and (c) Activity; (iii) understand the mechanism and outcome of trade-off in kites' behavioural bottleneck (i.e. conflicting interests) of

nesting/ roosting/ foraging in proximity to humans; and (iv) understand kite behaviour using camera traps.

Progress: Understanding the linkages between human and animal behaviour is of critical importance, especially in light of the ongoing pandemic. Lockdowns likely alter many of the extrinsic factors that normally limit raptor populations. These environmental changes are in turn expected to influence demographic factors that ultimately determine raptor population levels and distributions by mediating behavioural and physiological responses. The COVID-19 pandemic period allowed us to address fundamental and applied research objectives in a quasi-experimental and well-replicated manner. It will thus be possible to separate the effects of human disturbance and anthropogenic landscape modifications.

Continuous monitoring of black kites *Milvus migrans* since December 2012 has provided us with a large-high-quality dataset before, during, and after COVID-19 lockdowns that can be used for analyses to identify drivers of particular response types. Such findings can identify conservation challenges and boost raptor conservation.

A total of 50 nests were monitored in 12 sampling units during the nesting season of 2021. In all, 80 chick wings were tagged during the reporting period.

Outputs and Outcomes: The following publications on 'Raptor research during the COVID-19 pandemic provides invaluable opportunities for conservation biology', 'GPS-telemetry unveils the regular high-elevation crossing of the Himalayas by a migratory raptor: implications for the definition of a Central Asian Flyway' and 'Cities, why do certain birds thrive there?' were brought out during the reporting period.

Milestone: Work was presented at 15 conferences and webinars. High-quality data of kite breeding success and associated factors, before and during the ongoing pandemic were obtained. The migratory routes of black-eared kites in the Indian subcontinent using telemetry were unveiled.

Scientific Reports Top 100 in Ecology collection (2021): Collection features top 100 most downloaded ecology papers published in 2020 in the journal Scientific Reports. Altmetric score was 82 as calculated by the journal on 8 June 2021. This article was in the 96 percentile (ranked 11,162nd) of the 3,19,629 tracked articles of a similar age in all journals and the 99 percentile (ranked 1st) of the ten tracked articles of a similar age in Scientific Reports.

Black Kite Project team at Delhi
(Photo credits: Navneet Kumar, Prince Kumar)

RESEARCH
ONGOING

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

Investigators
Dr K. Sivakumar and Dr J.A. Johnson

Project Scientist
Dr Anant Pande

Researchers
Swapnali Gole, Sameha Pathan, Sohni Dudhat, Rukmini Shekar, Chinmaya Ghanekar, Madhu Magesh, Sagar Rajpurkar, Shivani Patel, Gem Christian, Sharad Bayyana, Sohom Seal, Sumit Prajapati, Himani Saini, Prachi Hatkar, Swanti Sharma, Vabesh Tripura, Srabani Bose, Esha Gokhale, Rashmi Semwal, Srinivas Yellapu, Ankit Pacha, Sweta Iyer and Ankita Anand

Date of Initiation
September 2015

Date of Completion
March 2023

Objectives: The objectives of the project are to (i) Assess dugong population status through advanced census techniques and determine its abundance and distribution, identify critical habitats, classify threats and develop site-specific monitoring plan to reduce hunting and incidental entanglements; (ii) Characterize the critical dugong habitats, reduce direct and indirect threats, control modifications in and around the habitat and improve habitat quality through management interventions and participatory approaches; (iii) Raise awareness on the species and encourage the participation of the local communities; include other stakeholders like fisheries department and religious heads in conservation efforts; enhance Dugong conservation program by spreading awareness on a national scale; and (iv) Enhance the capacity of the State Forest Department staff and develop/ implement smart patrolling tools to improve protection enforcement; train forest staff and local communities in underwater surveys for long-term habitat monitoring.

Progress and Outcomes: Sea cow, *Dugong dugon*, occurs in Andaman and Nicobar Islands, Gulf of Mannar, Palk Bay, and Gulf of Kutch in India. Several reasons have been attributed to their population decline, some of which include seagrass habitat loss and degradation, boat traffic, gill netting, disease, chemical pollutants, consumptive use and poaching. Therefore, recovering dugongs entails targeted, multidisciplinary research that flows into management actions and advocacy for policy changes. Therefore, the dugong recovery program aims at (a) assessing and monitoring Dugong population and habitat status; (b) implementing site-specific management actions to recover populations and restore critical habitats; (c) incentivizing participatory conservation efforts involving local stakeholders; and (d) improving the capacity of enforcement and management agencies to promote integrated protection and management of Dugong and associated species.

So far, more than 80,000 schoolchildren and fisherfolks have participated in awareness programs and taken part in the conservation of dugongs and their habitats in three Range States. Because of these awareness programs few fishermen, who could successfully rescue and release more than 35 dugongs entangled in their fishing nets in Tamil Nadu, Andamans and Gujarat were honoured with incentives. A total of 800 Forest Officers and Front line staff of the Forest Department, Fisheries Department, Marine Police and Coast Guard have been oriented towards conservation of dugong and marine biodiversity in India. Of these, 90 frontline enforcement staff has been trained in underwater biodiversity monitoring with scuba diving.

As part of the 'Incentive for Conservation Programme', examinations have been conducted among school-going children of fishermen community and selected 600 'Dugong Ambassadors' from these three dugong range States/UT. Education of these 'Ambassadors' has been supported with 'Dugong Scholarship' i.e. Rs. 500/- month for two years. Land-based pollutions are one of the threats to seagrass habitat in India, therefore, a study to understand the impact of pollutions on nutrient contents of seagrass has been initiated. A study on ecosystem services of dugong habitats has also been conducted in Tamil Nadu and Andaman. Management Plan of Gulf of Mannar National Park regarding dugong conservation has been developed and submitted to the Government of

Tamil Nadu. Efforts are also underway to identify and manage the critical dugong habitats outside Protected Areas; assess the populations of dugongs using various census techniques and establishment of marine mammal rescue and rehabilitation facilities in all three states.

A 'Friends of Dugong' network has been established at the three field sites to report dugong sightings, strandings, illegal activities and assist in conducting outreach programs. Further, dugong conservation awareness and orientation workshops were conducted for the Indian Coast Guard, Marine Police and other line agencies in all three regions. To reach out to the scientific community, forest managers and the public at large, several presentations were given on diverse platforms to apprise about Dugong Recovery program activities.

This multi-faceted approach to conserve dugong in India has helped to reach out to over 7,500 stakeholders including local communities. Over 400 research surveys have added crucial datasets to understand seagrass health status and mass boat surveys to locate and map dugong habitats has been a landmark initiative. Multiple such surveys over the next field season will help us to address the threats to dugong populations and mitigate them within a stipulated time frame. Boats and drones were used to successfully monitor the dugongs in Andamans, Gulf of Kutch, Gulf of Mannar and Palk Bay. Frontline staff of forest departments has been trained towards the usage of drones for monitoring sea animals and illegal activities inside the PAs.

Further, the CAMPA-Dugong Team based on lessons learned from the project could draft the 'National marine mammal stranding management plan' and the 'National marine turtle conservation action plan' on behalf of MoEFCC. Dugong Scholarships to the school going children of fishermen have received the attention of international communities as they helped in the conservation of dugongs in the field. The first 'World Dugong Day' was celebrated on 28 May 2020 and reached out to more than one million people across the world.

RESEARCH
ONGOING

LONG-TERM MONITORING OF ANTARCTIC WILDLIFE AND THEIR HABITATS IN ANTARCTICA

Funding Sources
National Centre for Polar & Ocean Research (NCPOR), Goa, Ministry of Earth Sciences & WII Grants-in-aid

Date of Initiation
September 2013

Date of Completion
September 2023

Investigators
Dr K. Sivakumar, Dr S. Sathyakumar, Dr S. Mondal, Dr Anant Pande

Researcher
Shashank Arya

Objectives: The main aim of this programme is long-term monitoring of selected fauna that are indicators of Antarctic and Southern Ocean ecosystems in connection with climate change and therefore, strengthen the biological database of the NCAOR. The objectives of this programme are to (i) Monitor indicator species such as penguins and birds in the Indian sector of operation in Antarctica using satellite telemetry; (ii) Understand the movement of avifauna in and around the Indian sector of operation in Antarctica; (iii) Assess habitat use by the tagged individuals and determine key habitats for the species; and (iv) Monitor any changes in the movement patterns over years correlated with climate change.

Progress and Outcomes: Wildlife Institute of India has been participating in Indian Scientific Expeditions to Antarctica periodically since the year 1994-95. So far, WII has participated in nine Indian expeditions (14th, 15th, 16th, 28th, 29th, 33rd, 34th 35th, 37th and 39th) to the ice continent. Eight scientists and two researchers have been on these expeditions conducting research during the voyages from South Africa and at both MAITRI and BHARATI stations. WII has established baseline data and standardized a monitoring protocol for seabirds and marine mammals of Antarctica. WII has also initiated long-term nest monitoring of breeding Antarctic seabirds, their behaviour and population genetics at Indian areas of operation to detect changes concerning climate change.

Antarctica serves as the world's laboratory for climate change research. WII's Antarctica program would help develop the understanding of the effects of climatic factors on marine ecosystems which can be replicated in the Indian marine environment. So far, over 3,000 km of voyage route from Africa to Antarctica has been sampled for seabirds revealing the presence of a minimum of 45 species of seabirds. Analysis showed higher average bird counts at the marginal ice zone near the sea-pack-ice interface in the late summers. The average biomass of pelagic seabirds peaked at the south of the Sub-tropical convergence shows that the sea-pack-ice interface seems to be better habitat for high prey species abundances. Latitudinal distribution patterns of birds indicate that fronts and sea ice play key roles in influencing seabird assemblages in the southern ocean.

Milestone: Fifteen islands at Larsemann hills were found o have nesting sites of Snow petrel, South polar skua and Wilson's storm petrel. A potential Adélie penguin breeding colony has also been located east of Larsemann Hills.

RESEARCH
ONGOING

MONITORING OF REINTRODUCED GAUR *BOS GAURUS GAURUS* IN BANDHAVGARH TIGER RESERVE, MADHYA PRADESH, PHASE II–EXTENSION (2018–21)

Funding Source
Madhya Pradesh Forest Department

Date of Initiation
November 2018

Investigator
Dr Parag Nigam

Date of Completion
November 2021

Co-Investigators
Dr Bilal Habib, Dr Samrat Mondol (WII), and The Field Director, Bandhavgarh Tiger Reserve

Researcher
Ritesh Vishwakarma

Objectives: The objective of the project is to (i) evaluate the habitat-use pattern of gaur and recently colonized elephants and Identify the suitable habitat of gaur in Madhya Pradesh state, (ii) assess resource competition of recovering gaur population with existing herbivore and colonized elephants, (iii) evaluate genetic structure of recovering gaur population in BTR to formulate strategies for effective management, (iv) understand mechanism of disease spread within and between gaur herds using social network analysis.

Progress: The habitat use pattern of gaur and wild elephants were assessed using their occurrence locations in BTR. Second order habitat use (selection of home ranges within a geographic range) resource selection function (Johnson, 1990) were used to estimate the overall habitat use pattern of gaur and wild elephant. A multi spectral SENTINEL-2 layer of high resolution of 30m satellite imaginary from the Earth Explorer USGS portal was used to generate the land use land cover map of the study area. The overall habitat was classified into 11 different vegetation classes *viz*. 1) Agriculture, 2) Bamboo Mixed Forest, 3) Grassland, 4) Sal Forest, 5) Open Mixed Forest, 6) Riverine Forest, 7) Habitation, 8) Plantation, 9) Rocky outcrop, 10) Scrublands and 11) Water bodies, further to this the availability and overall habitat use were estimated using ARCGIS ver.10.8. The overlap between habitat niche of both the species were estimated using Pianka's Index (Pianka, 1973).

To study the food resource overlap between gaur and wild elephant, the food plants and parts eaten by gaur and wild elephant was obtained from the scan sampling technique (Altman 1974) used for studying the behavioural patterns of gaur and wild elephant (Objective 4). Instantaneous scan samples were recorded at five-minute intervals and during the scans whenever an individual was observed feeding, the

plant species and plant parts eaten by the individual was recorded. A check list of plant species eaten by gaur and wild elephants was prepared. Based on this information, the percentage overlap of food plants eaten between gaur and wild elephants was calculated by using Bernoulli (binary) distribution (Pledger and Gaene 2009).

Outputs and Outcomes: The habitat use study shows that, the Gaur largely used Open Mixed Forest followed by Sal Forest and Bamboo Mixed Forest. Whereas Grassland and Scrubland were used according to its availability within their entire used home range of different herds. Similarly the wild elephants largely used Sal Forest followed by Open Mixed Forest and Bamboo Mixed Forest. Whereas agricultural land and habitation were used according to its availability within their entire used home range of different herds. The compositional analysis of available habitat and used habitat were estimated as simplified matrix ranked overall habitat use for gaur in Bandhavgarh in the following order: Sal Forest > Open Mixed Forest > Grassland > Bamboo Mixed Forest > Rocky Outcrop > Agriculture Land > Plantation > Scrubland > Habitation > Riverine Forest > Water Bodies (χ^2 = 85.1, df = 10, P < 0.003). and ranked overall habitat use for wild elephant was: Sal Forest > Open Mixed Forest > Grassland > Bamboo Mixed Forest > Agriculture > Scrubland > Rocky Outcrop > Plantation > Habitation > Riverine Forest > Water Bodies. (χ^2 = 75.1, df = 10, P < 0.001). The overlap of habitat-niche between gaur and wild elephant in the different types of LULC and Habitat classes were estimated Oij= 0.94 (94%), p=0.003 in Bandhavgarh Tiger Reserves, (Nov 2019–Nov 2020), which indicates that the both the species are utmost similar in resource utilization of available habitat in BTR

The food plants eaten by gaur and wild elephant were classified into five categories such as trees, shrubs, herbs, grasses and climbers. During the study period a total of 112 species of food plants belonging to 39 families were recorded in gaur diet. The 112 species of food plants recorded comprised of 42 tree species, 17 shrub species, 12 herb species, 35 grass species and 6 climber species. And a total of 77 species of food plants belonging to 25 families were recorded in wild elephant's diet. The 77 species of food plants recorded comprised of 38 tree species, 7 shrub species, 12 herb species, 18 grass species and 2 climber species.

Milestone: The habitat uses and resource competition study between gaur and wild elephant was carried out during the study period. In Bandhavgarh Tiger Reserve, the mixed forest is the dominant vegetation type constituting 28.8% following Agricultural land 20 %, Sal forest 15.5 % and Bamboo forest 13.8% of the total area but the use of Sal forest was highest followed by open mixed forest in both the species. The habitat use study also revealed that the colonized/immigrant population (n=48) of wild elephants in Bandhavgarh has shown overlapping gaur use area (161.72 sq. km). Gaur and wild elephant have high food, habitat use and space niche overlap in Bandhavgarh; this attributed for both the species to feeding on common trees, grasses and climber and sharing common habitat with limited available resources. Numerous studies revealed that elephants demonstrated to modify the ecosystem mostly through the suppression and reduction of woody plants. This suppression and reduction can indirectly effect in vegetation cover, potentially affecting both wild elephants and increasing population of gaur and could affect the occupancy of gaur in BTR, which may lead to reduce in gaur use area in the park and undoubtedly resource selection may act as a vital reason to competition for the resources available (Space, Habitat and Food) for both the species in near future. The increase in competition may divert (innate behaviour of the species to avoid conflict with each other) the movement of either species outside the park and which may lead conflict of both the species with human or frequent use of human dominant landscape. Hence the present results call the study of conflict and movement ecology of both the species in current scenario to understand the driving force of movement and use of corridors of the species outside the park.

The present study successfully documented the effects of colonization of mega herbivore on other niche-conspecifics and impacts on their stable population and resource use. The study is first of its kind on wild elephant colonization and its effects in India. Additionally, genetic structure of recovering gaur population and interaction study of recovering gaur population with the recently colonized elephants would also be carried out in the present study.

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 & Climate Change

Investigators
Dr G. Talukdar, Dr K.Sivakumar, Dr R. Suresh Kumar and Dr Anju Baroth

Researchers
Malyasri Bhattacharya and Ankit Zode

Date of Initiation
January 2020

Date of Completion
January 2023

Objectives: The objectives of the project are to (i) Study movement ecology using satellite telemetry; (ii) Niche modelling of selected species of the 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: A literature review has been carried out for nine species of vultures from India. Research permissions have been granted from the Himachal state forest department and MoEFCC. Climatic niche modelling for nine species of vultures has been carried out. The survey has been conducted to locate nesting and roosting sites of White-rumped vultures. Preliminary undercover surveys have been carried out in the pharmacies and veterinary clinics along with seven villages in the area for the prevalence of potentially toxic non-steroidal anti-inflammatory drugs (NSAID) in the area.

Outputs and Outcomes: Five wild White-rumped vultures, Gyps bengalensis have been tagged from Kangra, Himachal Pradesh, India. The vultures were fitted with E-Obs Solar GPS-GSM tags weighing 55g as a backpack harness. Maps of climatic niche for the nine species of vultures are available based on the GBIF dataset using data from Shared Socio-Economic Pathways (SSEP) which is based on CMIP6; an updated set of future bioclimatic variables.

Milestone: Two capacity building workshops with Himachal Pradesh Forest Department have been conducted to promote safety guideline protocol during bird mortality along with a bird identification workshop.

RESEARCH
ONGOING

MANAGEMENT EFFECTIVENESS EVALUATION (MEE) OF 210 NATIONAL PARKS AND WILDLIFE SANCTUARIES, 2020-2021

Funding Source
Ministry of Environment, Forest and Climate Change

Investigators
Dr Gautam Talukdar and Dr Monali Sen

Researchers
Dr Nasim Ahmed Ansari and Deepali Bansal

Date of Initiation
March 2020

Date of Completion
March 2023

Objectives: The project has the objective of evaluating the effectiveness of management of 210 National Parks and Wildlife Sanctuaries in India.

Progress: Updation of MEE Framework: With the inputs of Independent Regional Expert Committees and MoEFCC, the MEE Framework has been revised partially including the addition of questions on Climate Change, ESZ, cross-sectoral and intersectoral linkages and rationalization of some questions.

Finalisation of 20 independent Regional Expert Committees (MEE Team): Twenty independent Regional Expert Committees (RECs) have been constituted to evaluate 210 National Parks and Wildlife Sanctuaries during 2021-21.

Field visits were initiated for the evaluation of protected areas.

Outputs and Outcomes: Technical Manual was prepared to facilitate MEE Process. The mobile and web applications were used for online reporting. A series of workshops and meetings were conducted.

Milestone: The Hon'ble MoEFCC released the MEE Report of 146 protected areas evaluated during 2018-19 and also launched the MEE Framework for Coastal and Marine PAs.

CONSERVATION MANAGEMENT OF ELEPHANTS IN CHHATTISGARH: CAPACITY BUILDING INITIATIVE ON THE DISPERSAL AND RANGING PATTERNS OF ELEPHANTS FOR EFFECTIVE MANAGEMENT OF HUMAN-ELEPHANT INTERACTIONS

RESEARCH
ONGOING

Funding Source
Chhattisgarh Forest Department

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

Researcher
Ankit Kumar

Date of Initiation
July 2017

Date of Completion
December 2022

Objectives: The main objectives of the project include (i) Assessment of home range, dispersal and movement patterns of elephants; (ii) To assess habitat selection by elephants; (iii) To assess Spatio-temporal dynamics of human-elephant conflict and identify locations that are predisposed to high intensity of conflict; (iv) Development of early-warning systems; (v) To assess the efficacy of conflict mitigation methods; and (vi) Enhancing the capacity of frontline staff in managing human-elephant conflict.

Progress: During the reporting period, three elephants were GPS-satellite collared, which included a bull tusker, Ganesh was collared in Dharamjaigarh Forest Division during July 2019, a bull Makhna, Behradev was recollared in Surajpur Forest Division during December 2019 and a bull tusker, Pratham that was directly collared by Chhattisgarh Forest Department based on technical inputs by WII. Further, the faecal samples collected from Chhattisgarh for genetic analysis to provide preliminary details about the genetic structure of the elephant population were processed. The genetic diversity, as well as details on the social structure of elephants in Chhattisgarh in the light of elephant dispersals into the state, has been provided. Fine-scale monitoring of crop-raiding behaviour by elephants in Surajpur district which began in 2018 continued from 2019 to 2020 as well. The patterns of crop losses caused by individual elephants *vis-a-vis* were closely monitored and quantified. Crops selected by elephants, pheno-phase of crops damaged, seasonal trends in crop losses and trampling-related losses have also been quantified. In addition to these activities, the capacity building workshops aimed at the frontline staff and village volunteers were carried out.

Outputs and Outcomes: Fine-scale habitat use, movement patterns of collared elephants and the implications for management have been elaborated in the report. Preliminary genetic analysis suggests that there are at least more than two lineages of elephants that operate in Chhattisgarh. This is probably due to the dispersal of elephants from more than one site. Further, although there may be different elephant groups based on their spatial sorting in northern Chhattisgarh, the genetic analysis points towards high relatedness among the elephants. The assessment suggests that feeding losses far exceed trampling losses and crop cultivation in northern Chhattisgarh is seasonal as is crop-raiding by elephants. Sugarcane and paddy were the most damaged crops in the landscape. A total of 19 capacity building training programs were envisaged in the project. A total number of 10 training programs were conducted in the seven Forest Divisions during the period 2019-2021. Of the total 19 training programs, 18 were done in the field and one was done via video-conferencing. A total of 541 forest department staff and 192 village volunteers engaged in HEC management participated in the workshops.

Milestone: Based on the capacity building initiatives that WII had taken up in Chhattisgarh from the year 2017 onwards, for the first time, the Chhattisgarh Forest Department with active technical support from WII collared an adult bull elephant in Dharamjaigarh Forest Division. The satellite telemetry data of collared elephants continued to provide critical insights on how elephants disperse through the mosaic landscape and also on the patterns of interstate movement, particularly between Chhattisgarh and Odisha. This study thus makes it adequately clear the elephant home ranges assessed in Chhattisgarh are large and spread into two or more states. Thus, management decisions taken by one state can have a bearing on the human-elephant conflict in the neighbouring states. Also, the genetic assessment of elephant lineages suggests that there are at least two or more lineages probably hinting at multiple recolonizations of elephants from different areas of the east-central region into Chhattisgarh. This finding was important as it calls for a pan east-central landscape-scale genetic assessment to identify areas from where elephants probably get displaced frequently.

RESEARCH
ONGOING

TAXONOMIC AND ECOLOGICAL STUDIES ON ARACHNIDS OF TRANS AND WESTERN HIMALAYA, INDIA

Funding Source
Ministry of Environment, Forest & Climate Change

Investigator
Dr V.P. Uniyal

Researcher
Irina Das Sarkar

Date of Initiation
January 2019

Date of Completion
March 2022

Objectives: The project has the following objectives (i) Detailed taxonomic studies and systematic assessment of spider diversity along altitudinal gradient across Western Himalaya, India; (ii) Establishment of a geospatial and genetic digital database of Spiders; and (iii) To develop a team of para-taxonomists engaging local communities through local-level capacity building among students, teachers and NGOs in long-term monitoring through training programmes and publications.

Progress: Field Work has been started. A detailed review of the state of taxonomic knowledge of spiders was done at the national level. A detailed review of the state of Araneae documentation for Himachal Pradesh with identified gaps to bridge with further research was done. Preliminary level (family and genus) assessment of spider diversity was done in two Protected Areas and their respective buffer regions in Himachal Pradesh *i.e.* Bandli Wildlife Sanctuary (District Mandi) and Great Himalaya National Park Conservation Area (District Kullu).

Digital Elevation Map of the state of Himachal Pradesh covering all districts and the entire elevational gradient of the state. Reconnaissance sampling points in three representative districts Mandi, Kullu and Lahaul-Spiti, covering an ecologically sound elevational gradient to carry out the systematic sampling.

Bilingual posters for dissemination of knowledge regarding the ecological and agricultural importance of spiders were prepared to aid scientific curiosity to sustain long-term monitoring. Sampling protocols and strategies were developed to assess ecological heterogeneity and health of the study area, to aid in long-term ecological monitoring through assessment of changes in Araneae communities. Awareness and sensitization workshops in middle-school, high-school, and forest department levels were organised for arachnological cognizance and biodiversity knowledge dissemination in the eco-zone of GHNPCA. Preliminary identification and field training of para-taxonomists was done to aid in the long-term independent collection of Araneae samples from GHNPCA.

RESEARCH
ONGOING

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

Funding Source
Karnataka Forest Department, Government of Karnataka

Investigators
Dr Y.V. Jhala, Shri Qamar Qureshi, Dr Vishnupriya Kolipakam, Dr Lallianpuii Kawlni and Sanath Krishna Muliya

Researchers
Dr Manjari Roy, Kirnalee Patel and Basavaraj Mulage

Date of Initiation
January 2020

Date of Completion
January 2023

Objectives: The objectives of the project are to (i) develop a 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 and ungulates of semi-arid grassland-scrub-agro-systems of Karnataka at the 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; and (v) build capacity of forest staff in species identification and monitoring, modern tools and technology (MSTrIPES, Telemetry) and capture & restraint.

Progress: Project personnel and requisite manpower were hired for carrying out the fieldwork. Orientation and training of researchers on various field techniques, including hands-on training on the "Polygon Search" method for population assessment, radio-telemetry through ground tracking, and camera trap deployment (including Advanced REM base techniques) were conducted. Base camp was established at Munirabad Forest Department Residential Complex, Munirabad and Koppal. Socio-ecological surveys and camera trap deployment were initiated to identify potential animal movement and capture sites for radio telemetry.

Outputs and Outcomes: Permission to carry out fieldwork on demographic and population estimation study of major carnivores, capture and telemetry and disease studies for the entire Ballery circle was secured in March 2021. Fieldwork to carry out the same has been initiated since July 2021.

Milestone: The base camp was established at Munirabad Forest Department Residential Complex, Munirabad and Koppal for further study.

RESEARCH INITIATED

MONITORING FRESHWATER FISH POPULATION IN SELECTED INDIAN LANDSCAPES WITH REFERENCE TO THE CHANGING CLIMATIC VARIABLES

Funding Source
Ministry of Environment, Forest & Climate Change

Researchers
Eliza Khwairakpam and Bhawna Dhawan

Investigators
Dr J.A. Johnson, Dr K. Sivakumar, WII, Dr Anuradha Bhat, IISER, Kolkata, Dr Prasanta Nanda, Govt. Arts & Science College, Itanagar and Dr Vidyadhar Atkore, SACON, Coimbatore

Date of Initiation
April 2020

Date of Completion
March 2024

Objectives: The objectives of the project are to (i) document the patterns of fish diversity (richness & relative abundance) in selected landscapes; (ii) investigate factors influencing fish diversity at local (reach) & regional (sub-basin) scales; (iii) understand the ecology of key indicator species in terms of their population structure and responses to changing environmental variables; and (iv) develop an Index of Biological Integrity for long-term monitoring purpose.

Progress: All the required equipment related to the fish monitoring programme have been procured. The PI has participated online meeting organized by the Ministry of Environment, Forest & Climate Change (MoEFCC) on 2 May 2020 and made a presentation on fish monitoring theme objectives, methodology and project deliverables to the MoEFCC's expert members. As proposed in the project proposal, a consultative online meeting (through zoom) among the Co-PIs of Fish Consortium was organized on 10 July 2020. In the meeting, the objectives of the LTEO project and the mode of operation of the project were discussed. Followed by field sampling design, methodology and sampling frequencies were deliberated. Initially, the standard methodology for monitoring the fish population in the selected landscape was prepared for field-testing. Project investigator and co-investigator of Western Himalaya landscape project made a preliminary field visit in the upper reaches of Western Himalaya, specifically Mandakini river basin during 22-24 October 2020 for exploring the possibility of setting permanent monitoring the LTEO sites.

Outputs and Outcomes: LTEO sites in the Western Himalaya, Eastern Himalaya and Western Ghats landscapes were finalized. Field survey methods and datasets related to the freshwater monitoring programmes were developed.

RESEARCH
INITIATED

MOVEMENT IN SPACE AND TIME: ECOLOGY OF RED FOX IN TAWANG UPPER VALLEY, EASTERN HIMALAYA, INDIA

Funding Source
National Mission on Himalayan Studies (NMHS)

Investigator
Dr Bilal Habib

Researcher
Hussain Saifee Reshamwala

Date of Initiation
July 2020

Date of Completion
July 2023

Objectives: The objectives of the project are to (i) study the spatial ecology of red fox by radio-collaring and studying home range, activity and movement pattern; (ii) study the foraging behavior of red foxes across seasons; and (iii) study the spatio-temporal habitat use and the diet of the red fox in human-dominated landscapes with the increasing human population.

Progress: Due to the pandemic of COVID-19 there were delays in obtaining necessary permissions from the concerned departments. However, with literature review a protocol for diet analysis of red fox has been finalized and the field work will be started. Suitable collars have arrived (Litetrack 150 iridium). Field work for capturing red fox was initiated from 10 July 2021 in the upper valley region of Tawang district, Arunachal Pradesh.

Outputs and Outcomes: Based on published literature, the red fox is essentially an omnivore. There is a great variation in its diet across different geographical locations and it also includes invertebrates like earthworms, beetles, crabs, crickets and other insects. Rodents, lagomorphs, birds, fishes, a large number of fruits and carrion consumption are also reported. From almost all the available literature it was noted that rodents and lagomorphs are the major prey for red fox. Being opportunistic, the red fox also frequently predated on farm animals like rabbit, chicken, pigeon and young ones of goat and sheep. Preying on these domestic animals has an advantage as it is less energy consuming, but may be risky if humans encounter. Similarly, carrion consumption would be consistent with optimal foraging theory where the only energy consumption is locating carcasses. Anthropogenic food resources, including agricultural products, unmanaged waste and kitchen offal, are also getting increasing recognition in the diet of animal populations. Increased amount of indigestible items like plastic, paper and other human derived material signifies presence of humans.

Scat analysis is the most widely used method for red fox diet studies. Being non-invasive and economical, this method also offers a greater number of samples. It can also be used to cover larger landscapes and can be replicated easily temporally and spatially. The advantage of understanding the feeding habits of the red fox through the stomach contents is that the chances of missing anything that is ingested and might be completely digested and absent in the scats

is out ruled. However, in studies pertaining to analysis of stomach contents the greatest disadvantage is perhaps the killing of the red foxes. The available literature postulates that red fox can exploit almost every food source that it encounters. It is the temporal and spatial availability of resources that determine the quantity and quality of the food items. Consumption of food resources like dates, grapes, apricot and other fruits corresponds to high caloric requirement fulfilled by these sugar rich foods. Anthropogenic food subsidies are also playing an important role in determining red fox's diet and its occurrence. According to the optimal foraging theory, the cost benefit analysis and the risks involved in hunting are a trade-off that predators calculate while choosing its prey. In case of smaller mammals like red fox, the temporal availability of food resources determined its foraging pattern and in particular the life cycle their primary prey like rodent and lagomorph.

RESEARCH
INITIATED

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 2022

Investigator
Dr Y.V. Jhala

Objectives: The project objectives are to (i) Identify the source population of wild buffalo for reintroduction in Kanha Tiger Reserve; (ii) Identify potential reintroduction sites in Kanha; and (iii) Identify the management strategies required to safeguard and recover wild buffalo populations.

Progress: Maximum entropy (MaxEnt) model based on environmental covariates (human pressure, ruggedness, distance from grasslands, distance from forests, aridity, and precipitation of the driest quarter) was used to assess suitable habitat of wild water buffalo in Kanha. Presence locations (n=4,072) were obtained from wild water buffalo's entire geographic range across India and Nepal as presence data to train MaxEnt models. Based on the MaxEnt model and the habitat requirement of the species, the research team sampled 24 grasslands for vegetation composition and biomass. The line-point intercept method was used to assess herbaceous vegetation cover and composition and clipped quadrates (1mX1m) to estimate fresh biomass in potential grassland habitats. Vegetation composition was estimated by a sampling of 25-30 lines of each grasslands, and 541 quadrats were clipped to record fresh weights of herbaceous plant species to estimate biomass.

The genetic composition of central Indian buffalo is being compared with those found in the northeast using mitochondrial and nuclear microsatellite markers. Based on the results of this analysis, the founder population for Kanha Tiger Reserve will be determined.

Outputs and Outcomes: According to the MaxEnt prediction, suitable habitats of wild water buffalo in

Kanha occur within and close to grassland habitats with low human pressure and flat terrain. Grasslands in the south-western part of Banjar valley and some pockets in the Bhaisanghat range in the Halon valley, Indri and Sondhar grasslands were predicted suitable by the MaxEnt model. Amongst these species composition and biomass was most suitable in grasslands of the Bhaisanghat range and Banjar valley were found to be the most suitable habitat for wild buffalo.

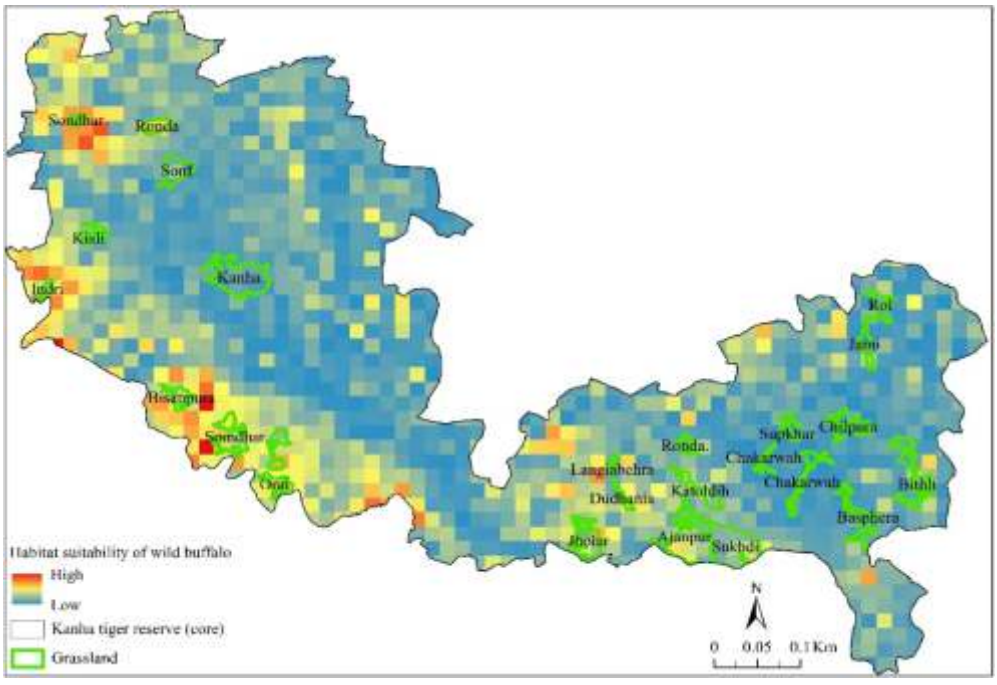


Figure 1: *Habitat suitability map for wild buffalo in Kanha Tiger Reserve*

Milestone: Preliminary results based on suitable habitat conditions and fresh biomass load suggests habitats in Kanha are for wild buffalo reintroduction. The ideal site for the soft release of wild water buffalo was found to be in the Bhaisanghat range. Genetic work is under progress and will be of assistance in determining the feasibility of using the North-Eastern population for a reintroduction program or the possibility of using them to supplement the limited availability of animals from central India for the founding population in Kanha.

RESEARCH INITIATED

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

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 and Surojit Moitra

Date of Initiation
October 2020

Date of Completion
October 2023

Objectives: The objectives of the project are to (i) assess the population status of mountain ungulate communities in representative sub-tropical and temperate Himalayas of Arunachal Pradesh; and (ii) understand the abundance, habitat relationship, genetic and health status of threatened mountain ungulates of serow and goral.

Progress: The work was initiated in February 2021, where initially the low-land forest of the Pakke Tiger Reserve was targeted. For the robust and accurate population assessment of mountain ungulates in such sub-tropical and temperate Himalayan terrain, Random Encounter Model and Distance sampling using camera trap were used. Centroids were

generated in randomly selected grids of 1x1 km^2 for deployment and all these cameras were deployed on the closest proximity to the centroids generated based on the accessibility of the points. Cuddeback digital blue series camera traps with black flash were used. Each camera was placed both in lapse mode (for a minimum of 8 days) and motion trigger burst mode (for a minimum of 25 days) to test if the manual trigger is missing animals at a long distance because of the dense terrain. In all, 52 cameras were deployed out of which 48 cameras were active for the least targeted days. The rest of the four cameras were disturbed or displaced by elephants on the site. Along with this intensive camera trapping exercise, browse availability and 10x10m Vegetation plots were also surveyed in front and around the camera to get a better understanding of the species-habitat relationship. Also, parallel to this approximately 100 fresh faecal samples were collected for genetic and disease-based studies.

Outputs and Outcomes: Abundance estimation and habitat utilisation of species are critical for the conservation of any species. The forests of northeastern India are challenging due to the low abundance of ungulates, dense undergrowth and logistic feasibility. In this study, the research team attempted to use camera trap-based methods (distance sampling and random encounter models) to estimate abundance and habitat use. The density of barking deer was found to be the highest (4.01±1.41). The area covered in sampling in the same area, through other methods like line transect is 75-95% less, in comparison to Camera trap based distance sampling, in a much smaller period. The precision in estimates did not differ between methods. The team found that ungulates segregate based on habitat. Hog deer, wild pig and barking deer being similar in size occur in different habitats, *i.e.*, grasslands and woodlands. While wild pig and barking deer are of similar size and use similar habitats, on account of being an omnivore, they are able to partition their niches. This study provides crucial information on abundances and habitat use, which can be used for focussed conservation efforts for ungulates occurring in low densities

(Pictures are of Pakke tiger reserve)

RESEARCH INITIATED

WILDLIFE SURVEYS IN THE STATE OF HARYANA

Funding Source
Haryana Forest Department

Date of Initiation
November 2020

Investigator
Dr Bilal Habib

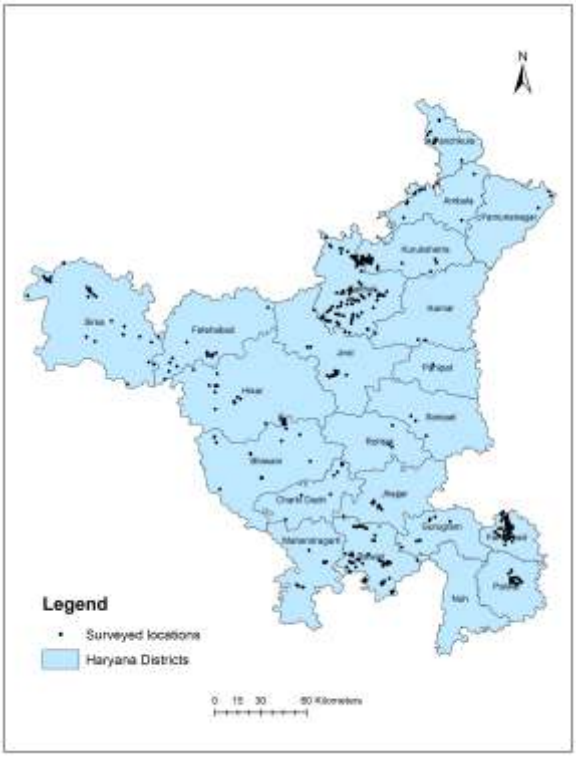
Date of Completion
October 2021

Researchers
Dr. Athar Noor, Nidhi Goyal, Ankita Sharma and Neha Yadav

Objectives: The objectives of the project are to: (i) estimate carnivore population using Camera trap at select sites of Haryana; (ii) estimate ungulate or major prey populations across the Haryana state; and (iii) estimate population of Rhesus macaque, Macaca mulatta outside the protected areas using the mobile app "Wildlife Census Haryana".

Progress: A detailed survey protocol was prepared for the frontline staff for conducting the state-wide wildlife surveys. This protocol will enable the field staff in executing the surveys and enhance their capacities in learning about the techniques used to surveys the wildlife of the state. A series of training programs or workshops for building their capacity were conducted in four forests and wildlife circles of Haryana namely, Panchkula (North Circle), Hisar (West Circle), Rohtak (Central Circle), Gurugram (South Circle).

Since, one of the objectives was to obtain population



estimate of Rhesus macaque, mobile app "Wildlife Census Haryana" based survey was conducted by using citizen science approach whereby state citizens and people with interest in wildlife were engaged in the macaque counts. The general public was informed through print media (National Daily Newspaper) using appropriate poster advertisements and instructions. The survey was conducted during 28-30 April 2021. Each day had two time slots during which counting were done *viz*. 05:30–10:00 AM in the morning and 05:00–07:00 PM in the evening. Each observation was recorded with information on group size and composition along with GPS location.

It is to note that this whole exercise of rhesus macaque counting in Haryana state was conducted during the COVID19 pandemic associated lockdown period. Thus, people were requested in the posters and advertisements to stay at their homes and count

the animals from open spaces of their homes such as rooftops, balconies or terraces only. Therefore, it was assumed that all people followed this condition and recorded data from their homes. Hence, it was assumed that all the findings are in close proximity to human settlements and largely provide inference of these human-dominated areas only and do not provide information on the forested areas or PAs.

Outputs and Outcomes: Survey for the rhesus macaque population was done successfully using the mobile application and a total of 175 troops were identified across all the districts (22) of Haryana. Data on macaque counts was obtained from 20 districts. No information was collected from Panipat and Nuh-Mewat districts. The total population estimate of Rhesus macaque was estimated to be 6776.55±41.58 (SE) for the whole of Haryana state with the confidence interval of 95% (6.2). The troop size range was estimated from 1 to a maximum troop size of up to 197 individuals. The adult male to adult female sex ratio was 1:2 and ~64% of the adult females had young with them.

Milestone: It was the first macaque count study for the state of Haryana. Moreover, it was the first time that such kind of mobile app was used for surveying wildlife of any state specially to cover wildlife outside the protected areas network where it is a challenge to estimate the wildlife population.

RESEARCH INITIATED

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 and Dr. S.P. Goyal

Date of Completion
May 2022

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

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 functionality of corridor of villages of Sawantwadi and Dodamarg talukas of Sindhudurg district for linking Syadhari landscape in the northern with the central Western Ghats based on genetic approaches; and (iii) identify and delineate areas if needed for the creation of ESA for retaining the functionality of corridor between northern and central Western Ghats.

Progress: The current project aims to understand the status of a functional wildlife corridor in Dodamarg and Sawantwadi taluka of Sindhudurg district, which will further help delineate the villages under an eco-sensitive zone. Therefore, three different approaches are planned to be used to achieve the aim of the project. The first involves the use of camera traps to assess the presence of mammalian fauna in different villages. The second approach will be habitat quantification at the village level to determine the quality of habitat. The third approach will be the genetic analysis of the fecal matter to identify the species and assess the connectivity with other source populations. The fieldwork was carried out from February to June 2021, which involves camera trapping at 102 sites, including 32 villages. Apart from that, 143 samples related to 11 samples were also collected from the field. An herbarium of tree, shrub, and ground layer was also prepared, which would be

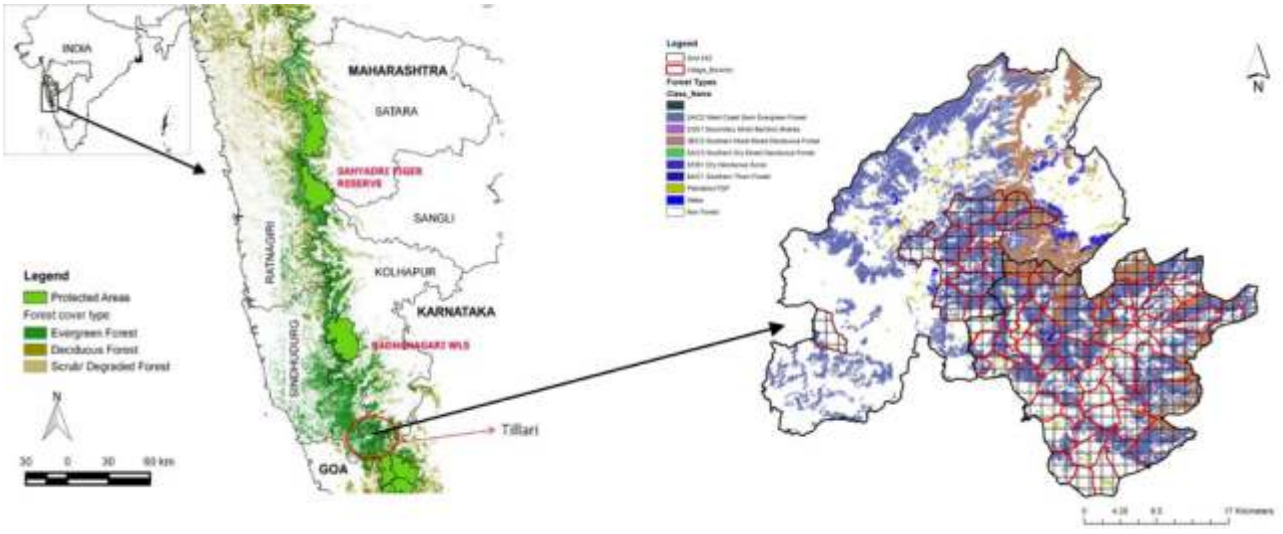


Figure 1: *Map of study area along with grids laid for camera trapping for determining the wildlife status.*

helpful in vegetation identification during habitat quantification. Further, we also collected secondary data from the forest department to understand distribution and drivers of human-elephant conflict.

Outputs and Outcomes: Camera trapping to assess occupancy of tigers, elephants, and other wildlife species: Camera traps were used to determine the occupancy of the above-stated species in the study area. The study area of the current project includes 74 villages of Dodamarg and Sawantwadi talukas of the Sindhudurg district of Maharashtra. Each village was treated as a sampling unit for camera trapping and further divided into grids of 2 km^2, ensuring systematic coverage of the study area. Depending upon the availability of forest area, the team covered 2-6 grids in 32 villages from March 2021 to June 2021. In each grid, camera traps were placed from 20-30 days and function for 24 hours. A total of 102 grids of 32 villages, out of which 30 were from Dodamarg taluka, and two were from Sawantwadi taluka, were sampled using the camera traps. Camera trapping results in capturing large carnivores like leopard, dhole, and ungulates prey species, including gaur, sambar, barking deer, wild pig, four-horned antelope, and mouse deer. Small mammals captured include Ruddy mongoose, small Indian civet, rusty-spotted cat, palm civet, and Indian porcupine. The most frequently caught species were sambar followed by gaur, while leopard, dhole, and pangolin were among the least captured species. Elephant dung was found in villages, namely Hewale, Bombarde, and Ghatiawade, indicating their limited distribution. Villages near the Tillari conservation reserve such as Hewale, Pal, Terwan medhe, and Patye have good tree cover and species diversity compared to other villages. Few villages Aayi, Zare, Girode, and Usap have significantly less forest cover.

Moreover, to assess habitat use of the captured species, a circular plot of a 10-meter radius was laid at each camera trap location. Potential variables such as tree numbers, shrub cover, canopy cover, and ground cover could affect the fine-scale habitat use of the captured species collected from circular plots. A total of 102 circular plots were laid around the deployed camera traps during the fieldwork. We searched grids intensively for the collection of the sample for genetic analysis. A total of 143 samples were found in the searched grids. Further analysis of the camera trapping and fecal matter data is in process.

Figure 2: *Leopard caught at one of the camera trap location.*

Genetic Characterization: The research team has optimized protocols to identify the species of origin from the geo-referenced faecal samples collected as indirect signs using DNA based molecular approaches. This will based on sequencing amplicons of multiple

genes (e.g. cytochrome b, COI etc.) suitable for determining species identity. Using this information as records of species presence, the team will build robust occupancy models for species of interest based on a 'double sampling' approach i.e. camera trap and faecal sample. Additionally, the team will use the sequence data for genetic characterization of the species in terms of genetic variability and phylogeography compared to data from different landscapes available with public databases (e.g. GenBank) and our repository. The team has also planned to use nuclear microsatellite markers to assess genetic diversity and the extent of genetic continuity of select species with a considerable sample size (n>30). Data on genetic characteristics of populations inhabiting human-dominated landscapes in India is scarce, and further insight into such statistics would help to devise a sound conservation strategy for the target species.

Habitat Characterization: The team downloaded the Remote Sensing satellite images and other socio-economic data for habitat characterization such as terrain features, land use land cover, watershed, and others used in GIS for assessing the likely impacts on habitat. The natural color composite of remote sensing data indicates relatively better habitats around Tilari Dam and in villages of Dodamarg Taluka, which are linking to the Western Ghat habitat of Goa. However, the satellite image evinced degradation and habitat loss around the southern part of village Mangali and Viridi. The team is in the process of data analysis for other areas.

Milestone: It is expected to come with potential areas of conservation importance for retaining the linkage between north to central Western Ghats through this project.

RESEARCH INITIATED

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

Funding Source
National Mission on Himalayan Studies

Investigator
Dr Bilal Habib

Researchers
Hussain Reshamwala
and Dr Ankita Bhattacharya

Date of Initiation
December 2020

Date of Completion
December 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.

Progress: A secondary literature review regarding Himalayan wolf, Pallas's cat, and Himalayan marmot

Pallas' Cat
(*Otocolobus manul*)

Himalayan Marmot
(*Marmota himalayana*)

Himalayan Wolf
(*Canis lupus*)

has been done prior to the main field work. Analysis, preparation and submission of full length paper based on one of the study species and objectives have been done. Methodology for field work has been prepared. Field work could not be initiated till now due to the prevalent Covid-19 pandemic.

Outputs and Outcomes: Current and future distribution scenarios of the Himalayan wolf has been prepared with respect to climate change showing trend and status of the species. The home range and movement pattern will be analyzed after collaring of all the species. Life history traits, feeding ecology and behavioral patterns will also be analyzed. The study will be done in a participatory approach where the different stakeholders and local people will be involved. This will help generate conservation awareness as well as capacity building for future monitoring. This will also generate livelihood incentives for the local communities where they can be trained for species specific monitoring protocols and maintaining a document of ecological information in future. Key beneficiaries would be MoEFCC, Government Agencies, Infrastructure Developmental Agencies, Research Institutions & Universities, State Forest Departments, Public groups & local communities.

Milestone: The study would provide predictive models for climate change based on information of life history & ecological traits of the sensitive & habitat specialist species. The study would predict areas of high animal movement and human conflict zones, help monitoring the selected mammal species in the IHR which in turn would help in their recovery protocols, capacity building of the local and forest staff which would be a valuable spatial database for future management plans.

RESEARCH INITIATED

ASSESSMENT OF DISEASE PREVALENCE IN UNGULATES IN PROTECTED AREAS OF NORTH EAST INDIA

Funding Source
Ministry of Environment, Forest and Climate Change

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

Researchers
Kangkshya Priya Gogoi and Roopali Singh

Date of Initiation
December 2020

Date of Completion
December 2023

Objectives: The objectives of the project are to (i) assess the prevalence of infectious diseases in selected areas of Mizoram with special reference to pathogens (virus, bacteria and other pathogens) that cause mortality of wild Ungulates in in the recent past; and (ii) assess the prevalence of transmissible diseases in domestic counterparts in and around the PAs.

Progress: Gastrointestinal parasite analysis was done for two fringe villages of Dampa Tiger reserve- Teirei Village and Damparengpui Village and wild samples from Dampa Tiger Reserve (DTR). Total 203 samples (44 wild and 159 domestic and livestock) were analysed. 25 wild samples could not be analyzed as the scats were aged. Samples were collected in 70% ethanol and were subjected to egg concentration techniques - faecal floatation and sedimentation techniques. Stratified systematic camera trap sampling was conducted in the North-eastern part of DTR from February to mid-May 2021. Total 40 camera traps were placed to assess the mammalian assemblage, density, occupancy and relative abundance of prey species in DTR. Total 46 existing transects were walked covering a total distance of 79 km for collecting faecal samples and recoding human disturbance signs. Subsequently, a questionnaire survey was carried out in the villages located in buffer area to gather information on their interaction with ungulates and their perception.

Outputs and Outcomes: Microscopic examination of faecal samples revealed the presence of *Hymenolepis spp*., *Ascaris spp*., *Stronglye spp.*, *Trichuris Spp.*, *Coccidia spp*. from wild samples and *Taenia spp*., *Toxocara canis*, *Stronglye spp*., *Ascaris spp*. and *Trichuris spp* from the domestic and livestock samples. All these are

transmissible between domestic and wildlife and are also zoonotic. The research team recorded a total of 23 species of mammals. Of which 15 belong to order Carnivora, 5 Artiodactyla, 5 Primates, 3 Rodentia and 1 Scadentia. Also, out of 23 species, 16 species are of high global conservation significance, categorized as endangered (3), vulnerable (9) and near threatened (4) in the IUCN Red List. The density of ungulates in DTR was found to be relatively lower than the densities of ungulates in other protected areas of northeast India. Occupancy of Barking deer, Sambar, Wild pig, Serow and Gaur was estimated. Interaction with the local people from villages through questionnaire revealed that 79.78% of the respondents prefer wild meat over the meat of domestic animals. Of which 68.97% prefer wild ungulate meat. 90% of the people have a positive attitude towards ungulate conservation.

Milestone: The results show that their perception of conservation has been shaped by the age of the respondents and the benefits brought by DTR in terms of road construction and providing a substitute for firewood.

RESEARCH INITIATED

BRINGING BACK THE CHEETAH TO INDIA

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

Date of Initiation
2020

Date of Completion
2025

Investigators
Dr Y.V. Jhala, Shri Qamar Qureshi, Dr Sutirtha Dutta and Inspector General, NTCA

Researchers
Bipin C.M., Harshini Y. Jhala, Parul Sen, Moulik Sarkar, Sultan Bhadana and Kathan Bandhopadhyay

Objectives: The objective of the project is to establish viable cheetah populations in India. The project aims to establish multiple breeding populations of cheetahs at selected sites in partnership with NTCA, MoEFCC and State Forest Departments (Rajasthan and Madhya Pradesh initially). This would include reassessing the priority potential sites identified by Ranjitsinh & Jhala (2010) and assessing new sites that meet the criteria of inviolate space, prey availability, historical occurrence and local community acceptance. Based on the site assessment, making/ refining site-specific recommendations in terms of the potential of the site for cheetah release; the long-term strategy, commitment; and refinement of costs involved in attempting a successful establishment of viable cheetah populations in India. Simultaneously/ subsequently (i) sourcing and transport of cheetah to India; (ii) soft or hard release at appropriate sites; (iii) monitoring and research of the introduced individuals, populations and ecosystems; (iv) management of the release sites for (a) habitat, (b) prey, (c) protection, (d) potential livestock-cheetah conflict, (e) community participation and livelihoods, (f) managed metapopulation

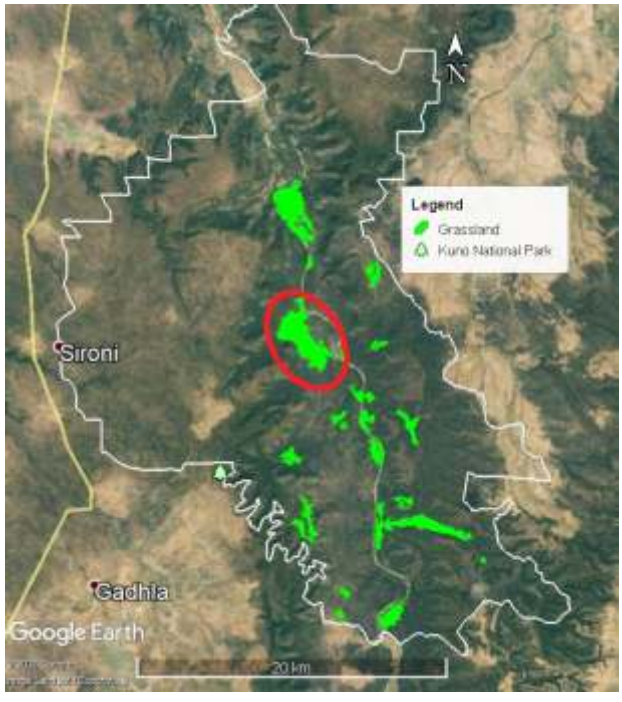


Figure 1: *Map of the holding/soft release enclosure site (red circle) in Kuno National Park*

within India and supplementation from sources for genetic diversity and demographic process.

Progress: As proposed by the State Governments of Rajasthan and Madhya Pradesh and, on the directions of the Hon'ble Supreme Court-appointed expert committee on Cheetah introduction and NTCA, a preliminary assessment was carried out at (i) Mukundara Hills Tiger Reserve (TR), (ii) Shergarh Wildlife Sanctuary (WLS) in Rajasthan, and (iii) Gandhi Sagar WLS, (iv) Kuno National Park (NP), (v) Madhav NP, and (vi) Nauradehi WLS in Madhya Pradesh for potential cheetah release sites in November-December 2020. Based on this assessment, site-specific recommendations were detailed viz. in-depth surveys for prey, habitat, and anthropogenic pressures at some of these sites as well as management actions that are required to prepare them for the introduction of the cheetah. Cheetah introduction at these sites would be contingent on completion of these tasks mentioned herein and can be achieved at some sites as early as late 2021.

Researchers were deputed to Kuno NP and Nauradehi WLS for an assessment of ungulate and carnivore abundance. To assess prey base at Kuno and Nauradehi, foot line transect based distance sampling and camera trap-based Random Encounter Model (REM)/ distance sampling were used. For carnivore abundance estimation, sampling was conducted using a camera trap-based Spatially Explicit Capture-Recapture (SECR) framework. The field data collection is in progress with 39 transects sampled twice, 31 camera traps deployed using (REM)/ distance sampling design in Kuno and 10 transects sampled and 24 camera traps deployed in Nauradehi. A total of 88 camera trap locations were deployed in the SECR framework for estimating leopard and hyena populations in Kuno. The location and design of the initial holding and soft release enclosures for cheetahs in Kuno was finalized in consultation with the international cheetah experts, the Cheetah Expert Committee members, the NTCA and Madhya Pradesh State Department Officials.

Outputs and Outcomes: A technical report on the assessment of cheetah introduction sites and proposed actions with site-specific recommendations was submitted to NTCA and Cheetah Expert Committee. Kuno National Park is currently ready for the reintroduction of a cheetah with minimal actions required. In Mukundra Hills Tiger Reserve, there is excellent habitat recovery within the Predator

Figure 2: *Field sampling in Kuno National Park*

Enclosure. The habitat has a mosaic of grasslands, savannah, dry deciduous forests and riverine evergreen patches with good water availability forming an ideal habitat for the cheetah and can immediately be used to bring cheetah into India and allow these animals to acclimatize before their release at other select sites as well as be used to produce cheetah for reinforcements of reintroduced populations.

Nauradehi Wildlife Sanctuary and Gandhi Sagar Wildlife Sanctuary require substantial management interventions and investment, whereas Madhav National Park and Shergarh Wildlife Sanctuary were not considered as a priority for achieving the holistic objectives of cheetah reintroduction, but would serve to restore both sites and achieve the objectives of biodiversity conservation and eco-tourism. For the long-term viability of a cheetah population in India, in addition to Kuno-Sheopur-Shivpuri forests covering an area of ~6800 km^2, a large inter-state cheetah conservation complex ~2500 km^2 including Gandhi Sagar with territorial reserve forest areas of Mandsaur and Neemuch in Madhya Pradesh with parts of the territorial Chittorgarh Division, Bhainsrodgarh Wildlife Sanctuary and parts of Mukundara Hills Tiger Reserve in Rajasthan is proposed and would benefit immensely through the cheetah program.

Milestone: For the first time in India, the only large carnivore-cheetah to go extinct in the country's recent history is being brought back to (i) recolonize its historical range, (ii) perform its ecological role in the restoration of the savannah-woodland system, and (iii) serve as a flagship and umbrella species for the conservation of underrepresented and badly neglected grassland/open forest ecosystems.

RESEARCH
INITIATED

BASIC STUDY DESIGN OF BIODIVERSITY ASSESSMENT FOR HIMACHAL PRADESH

Funding Source
JICA Assisted Project IHPFEM & L

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

Researchers
Urjit Bhatt, Nidhi Singh, Himani Karki, Meghma Ghosh, Amar Paul Singh and Saurav Chaudhary

Date of Initiation
January 2021

Date of Completion
January 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 a 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 indicator for long-term monitoring.

Progress: The baseline component-wise biodiversity assessment survey was conducted in Simbalbara National Park (SNP).

Mammals: Camera trapping and line transect methods were employed to determine the diversity of mammalian fauna of the Park. Line transects ranging in length from 800 meters to one kilometre were laid and replicated at regular intervals. Aside from the aforementioned methods, signs of various species, including scat/pellets, pugmarks, scrape marks, etc. were also recorded and maintained.

Ornithology: Bird census was conducted early morning. 60-point count stations were laid along six transects (1,000 m each), each separated by at least 100 m across both habitat types, *i.e.* streamline and deciduous. Within a 40 m radius of each station, all birds were observed visually. The majority of the species were photographed and counted in determining abundance.

Vegetation & Plant Ecology: The vegetation was sampled in four beats (Garuk, Kaludev, Marusidh and Danda). Each species' density, frequency and total basal area were determined using standard methods. The Provenance value (PV) index was calculated for shrubs and herbs by adding the relative frequency and relative density values.

Ichthyofauna & Riverine Ecology: Fish were sampled using various traditional methods such as setting up fish traps, gill nets, cast nets and drag netting methods, with a minimum distance of 150 m between two sampling sites. Fish species were either identified on the spot or systematically preserved for further identification. A weekly fish market survey was also carried out.

Insect pollinators & Entomofauna: Six 1000 m long belt transects were laid in three forest habitats (dry deciduous, streamline moist, roadside disturbed), and one transect of each habitat was walked at three different time zones per day, except rainy days, to study butterflies. The species were observed in all three habitat types using the direct sampling method. The diversity of Odonates was studied in two distinct habitats: Streamline moist forest habitat (flowing water) and artificial water holes (man-made water resources for animals, stagnant water). Sweep netting was used to capture necessary samples, which were then released after examination.

Herpetofauna: Different stream patches in different locations were identified as the key locations for the amphibian survey. The National Park has five major streams with flowing water that were chosen for the amphibian surveys. Opportunistic encounters of reptiles were also carried out.

Outputs & Outcomes: The component-wise results are described below:

Mammals: The study confirmed the presence of 20 mammalian species belonging to 6 orders, 12 families and 19 genera, out of which 15 species (n=1,851, trap nights=887) were photo-captured through camera-trapping. The species through photographic evidence and direct sightings include Common Leopard, Sambar, Chital, Himalayan Goral, Indian Crested Porcupine, Himalayan Palm Civet, Small Indian Civet, Common Palm Civet, Himalayan Langur, Rhesus Macaque, Barking Deer, Wild Boar, Leopard Cat, Nilgai, Golden Jackal, Elephant, Yellow Throated Marten, Common Indian Field Mouse, House Mouse, and House Shrew. The findings indicate that SNP supports

a diversity of mammalian fauna of conservation concern, of which 4 (20%) are threatened species as per IUCN.

Ornithology: A total of 158 species belonging to 42 families were reported. Within the Streamline habitats, the most dominant family was Sylviinae. Diversity indices showed no significant difference for species occurring in both habitats.

Vegetation & Plant Ecology: The total vegetation indicated that the maximum herb species were present in the studied area, followed by trees, shrubs, climbers and ferns. Individual trees were more abundant in the Garuk beat, saplings in the Danda beat, and seedlings in the Kaludev beat.

Ichthyofauna & Riverine Ecology: A total of 15 fish species from 9 families were recorded. Cyprinidae was the most dominant family, followed by Danionidae, Channaidae and Bagridae. The River Yamuna was found to be the primary source of fish found in this fish market. Ten fish species belonging to five families were recorded.

Insect pollinators & Entomofauna: 81 species of butterflies were reported belonging to 6 families. Twenty-two species of odonates comprising 12 species of *Zygoptera* (damselflies) and ten species of *Anisoptera* (dragonflies) belonging to 7 families were reported during the study. Moreover, 21 species of *Scarabaeidae* beetles were also reported during the study. In *Scarabaeidae* fauna, elephant and cattle dung were observed, but there was no such significant difference.

Herpetofauna: The survey was carried out from 25 February - 20 May 2021. Throughout the time frame, numerous replicates of different selected sites were sampled for the presence of Herpetofauna in the Park. The study revealed the presence of 29 species of Herpetofauna belonging to 17 genera of 10 families and nine species of amphibians belonging to 7 genera of 3 families were encountered.

Milestone: Baseline data for various species at a landscape level will be provided. Protocols for biodiversity conservation as well as long-term ecosystem and social monitoring will be developed. Site-specific models/ patterns and information on human-wildlife conflict/RET/invasive species will be provided. At least one workshop will be held at each major site. Finally, a project report will be produced with specifics of maps, files, and relevant information to various site-specific needs.

RESEARCH INITIATED

UNDERSTANDING THE IMPACTS OF MINING AREAS OF WESTERN COALFIELDS LIMITED (WCL) AND CHANDRAPUR THERMAL POWER PLANT, CHANDRAPUR, FOR EFFECTIVE MANAGEMENT OF WILDLIFE

Funding Source
Western Coalfields Ltd. (WCL), Maharashtra State Power Generation Company Ltd. (MAHAGENCO)

Researchers
Akanksha Saxena, Sougata Sadhukhan, Saumyata Srivastava and Anees Akram Khan

Investigator
Dr Bilal Habib

Date of Initiation
February 2021

Date of Completion
February 2023

Objectives: The objective of the project are to (i) evaluate the pattern in the land use and land cover change in and around mining areas of Western Coalfields Limited and Chandrapur Thermal Power Plant; (ii) assess faunal diversity in and around the mining areas of Western Coalfields Limited and Chandrapur Thermal Power Plant; (iii) explore the issues related to habitat fragmentation, loss of structural and functional corridors due to ongoing and proposed mining areas of the Western Coalfields Limited and Chandrapur Thermal Power Plant; (iv) evaluate the issues of human-wildlife conflict

concerning mining areas of Western Coalfields Limited and Chandrapur Thermal Power Plant; (v) evaluate the effects of dust deposits on plants concerning mining areas of Western Coalfields Limited and Chandrapur Thermal Power Plant; (vi) Soundscape ecology- Study of the acoustics relationship between living organisms, humans, and their environment. To evaluate the effects of mining (Vibrations and Noise) on different wildlife species. Evaluate changes in forest sound concerning mining areas; (vii) Identify areas of connectivity concerning power transmission lines and suggest mitigation measures to reduce the electrocution of animals; and (viii) Develop a management plan for the conservation of wildlife around mining areas and coalfields of Western Coalfields Limited and Chandrapur Thermal Power Plant.

Progress: After the inception of the project, the research team compiled available literature on the impacts of mining on biodiversity. The team also accessed open source data on the mines in Chandrapur District, and used GIS to plot and conduct preliminary analysis of land use types near mines, and proximity to protected areas and animal corridors. Finally, the team narrowed down on the focal study areas according to the objectives of the study.

The team carried out change detection analysis of land use and land cover in and around mining areas and CSTP (Objective 2) on a GIS platform using Google Earth Engine. Field-work for ground truthing of land use land cover (for change detection analysis) and field verification of mines and CSTP is currently underway in Chandrapur district.

Outputs and Outcomes: The team selected 32 mines and the Chandrapur Super Thermal Power Plant (CSTP) in Chandrapur District for detailed study of the impacts of these activities on wildlife.

RESEARCH INITIATED

NICHE SELECTION AND MESOPREDATOR RELEASE IN HIGH ALTITUDE ECOSYSTEMS

Funding Source
Department of Science and Technology (DST), Government of India

Investigator
Dr Salvador Lyngdoh

Researcher
Priyanka Justa

Date of Initiation
February 2021

Date of Completion
February 2024

Objectives: The objectives of the project are to (i) determine resource utilisation by high altitude carnivores; and (ii) investigate levels of overlap and influence by high altitude carnivores in terms of mesopredator release or suppression.

Progress: The project has been initiated and preliminary field works have commenced in Pin Valley, Chandratal and KIbber Areas. Interview-based questionnaires have been conducted to understand predator presence and interactions. Camera trapping and scat collection have been undertaken in various parts of the landscape.

Outputs and Outcomes: This study is expected to deliver crucial information on resource and space use by snow leopards, wolves, feral dogs and foxes in cold deserts of Spiti and Ladakh along with their intra-guild interactions, data on which is limited in the Indian context.

It will provide important insights into the mesopredator release theory and the role of top predators in regulating an understudied, resource-scarce, sensitive trans- Himalayan ecosystem. It will also contribute to our understanding of the role played by anthropogenic subsidies and habitat fragmentation in facilitating mesopredator release in the high altitudes.

Impacts of commensal feral dogs on wild predators and their interplay will be scientifically documented.

Milestone: Initial ground surveys and rapid assessments of interactions have been done in Lahaul, Spiti and Kinnaur. Camera trapping has gathered data from three PAs in the High Altitude System.

RESEARCH INITIATED

ASSESSMENT OF MAMMALIAN DIVERSITY OF DHAULADHAR WILDLIFE SANCTUARY, HIMACHAL PRADESH

Funding Source
Himachal Pradesh Forest Department

Date of Initiation
March 2021

Investigator
Dr Salvador Lyngdoh

Date of Completion
March 2022

Researcher
Tushar Pradeep Parab

Objectives: The objectives of the project were to (i) assess the diversity of mammalian fauna in DWS; (ii) estimate density, encounter rates (ER) and relative abundance indices (RAI) of herbivores and carnivores in DWS; and (iii) develop a spatial database for the distribution of mammals and to produce species-wise distribution maps in DWS.

Progress: A field workshop was conducted for forest officials and field staff on various techniques (sign-survey, camera-trapping, trail transect, pellet, dung count, etc.) to monitor mammalian populations. In addition to wildlife techniques, the different instruments for monitoring populations of mammals have also been provided with hands-on instruction. Forest guards conducted a preliminary survey, *i.e.*, sign survey and transect (n= 5 & effort= 20 km) walks.

Outputs and Outcomes: A total of 20 km of transects and sign survey (n=5) covering two beats (Andrali Mallan & Bhujling) resulted in 4 mammalian species and five avian species. Of these four mammal species, one (black bear) was a carnivore, two (Himalayan goral and Himalayan tahr) were ungulates, and the remaining (Himalayan langur) was primate species. The sign survey recorded all four species through scrap mark, pugmark, latrine site, pellets, and a direct sighting of Himalayan tahr and Himalayan langur. An easy-to-use, scientifically accurate manual aimed at monitoring methods for high-altitude mammals, has been produced.

Milestone: The study will deliver baseline information on the diversity of mammalian fauna inhabiting DWS. The study will provide information on density, encounter rates (ER) and relative abundance index (RAI) of various herbivores and carnivores. The study will generate distribution maps for different mammalian species.

ACADEMIC & TRAINING ACTIVITIES

ACADEMIC PROGRAMME

XVII M.Sc. (Wildlife Science)

During the reporting period, the XVII M.Sc. students underwent II and III semesters of the course. Teaching inputs were given in both the classroom and field. The course commenced on 1 July 2019.

The students continued with their theory classes until 20 March. The theory classes had to be discontinued from this point due to the COVID pandemic and on the advisory issued by the institute, students subsequently left for their homes. The theory classes resumed in April through online teaching media and continued till July 2020. The coursework for the rest of Semester II of M.Sc. was completed online. The classroom examinations could not be conducted due to the lockdown restrictions. Therefore students were evaluated and graded based on written assignments, online *viva-voce* and written examination.

Semester III course work started remotely through online teaching mode. Most of the theory syllabus was covered online till mid-October. The students returned to Institute in mid-October to attend the regular classes of Semester III. The students also went on their Conservation and Management Practices Tour to Lansdowne Forest Division and Corbett National Park. All the students defended their dissertation proposals and appeared for their written and practical examinations in the last week of December. They left for the field in the first week of January 2021 and continued data collection from March till May 2021. Of the 20 students, six students carried out their dissertation studies in Uttarakhand, one in Uttar Pradesh, three students in the northeastern states of Arunachal Pradesh, Assam and Mizoram, two in Karnataka, two in Tamil Nadu and one student in each of the States of Odisha, Kerala, Rajasthan, Punjab, Madhya Pradesh and Maharashtra.

Master's Degree Course in Heritage Conservation and Management (2019-21)

WII-C2C introduced a 2-year residential Master's Course in Heritage Conservation and Management in July 2019, affiliated with Saurashtra University, Gujarat. Due to COVID-19, regular classes for the II Semester of M.Sc. in Heritage Conservation and Management (M.Sc. HCM) were suspended from 18 March 2020. However, lectures continued via the online mode during April-June, 2020 and July-December 2020. Semester exams were conducted through an Open-Book format, as per University Grants Commission (UGC) guideline and approved by Saurashtra University, from 5-15 August 2020. The exam was supplemented by an online *viva voce* examination during 20–26 August 2020. Online classes during the

semesters continued simultaneously.

The third semester was of three months duration (October to December 2020) and run online with elective based modules. It is comprised of 5 modules including 3 specialization courses. Approximately 70 hours of teaching was done with the help of about 25 faculty members from external institutions as well as WII. Following the Govt. of Uttarakhand guidelines, the students returned to the campus in December, but the online mode of teaching continued. In the last weeks of the third semester, the students prepared their dissertation proposals (part of 4th Sem.) which went through a two-stage review process. In stage one a committee reviewed the proposals and sent their feedback and in the second stage, the students presented their proposals to a panel of internal and external experts on 30 December 2020. All the feedback from the two stages will be incorporated by the students in their final proposal. The exam for the third semester was conducted at the campus on 2 January 2021. The semester ended with a 7-day, Natural and Cultural Heritage Tour to Rajasthan during 4-10 January 2021 intending to gain knowledge of current industry trends. Site locations chosen are similarly diverse ranging from the heart of Chennai City to Dampa Tiger Reserve at the borders of India which will make for an interesting and enlightening group of dissertations.

The dissertation topics are given below:

J. Bhaalasaraswathi, Transformation in funding and marketing practices in Indian museums: Pre, and Post COVID-19.

Vishnuvardhan, Genetic diversity and population genetic structure of snow leopard within Ladakh region of Trans-Himalayas, India: Implications for conservation and management.

Devashish Saurav, Storied Landscapes: A critical case study of the Bhotiya tribe of Uttarakhand.

Varsha S, Local economy as a driver of functional continuity: The living religious heritage asset of Sri Ranganathaswamy Temple, Srirangam.

Abhishek, Community resilience within and outside Protected Areas: A case study from Sariska Tiger Reserve.

Malsawmdawngliana, Does consumption of frogs impact the wild population of amphibians? A case study from Mizoram, India.

Roshme Borgohain, Assessing the impacts of the road network on wildlife corridors, and mitigation measures in Assam.

M.Sc. Thesis Submitted

Bageshwar Singh, **Floristic Inventorisation of Kanjli Wetland - A Ramsar Site in Punjab, India.** Forest Research Institute, Dehradun. Supervisor: Dr Amit Kumar.

Kamalika Bhattacharya, **Moth (Lepidoptera) assemblages along an altitudinal gradient in Singalila and Neora Valley National Park, Central Himalaya, an ecological and molecular approach emphasising on Noctuidae.** Saurashtra University, Rajkot, Gujarat. Supervisor: Dr V.P. Uniyal.

Kamna Pokhariya, **Assessment of above-ground carbon stock in the tropical dry deciduous forest of Panna Tiger Reserve, Central India.** Forest Research Institute (Deemed to be University), Dehradun. Supervisors: Dr Ramesh Chinnasamy, Dr Amit Kumar and Dr.K. Ramesh.

Kritesh Dey, **Studies on Assemblage of spiders (Arachnidae: Araneae) in different riparian zones of the river Ganga.** Forest Research Institute (Deemed to be) University, Dehradun. Supervisor: Dr V.P. Uniyal.

Pooja Rani Sinha, **Prediction of quality of water emphasizing on nutrient dynamics in Kosi watershed Uttarakhand.** Forest Research Institute (Deemed to be) University, Dehradun. Supervisor: Dr V.P Uniyal.

Priyanka Kashyap, **Soil nematode community structure along an elevational gradient in Bhagirathi Basin, Uttarakhand: A morphological and molecular approach.** Saurashtra University, Rajkot, Gujarat. Supervisor: Dr V.P. Uniyal.

Zankhna Patel, **Influence of Forest Cover on Fruit and Frugivore Richness and Abundance in Southern Western Ghats.** Wildlife Institute of India, Dehradun. Supervisors: Dr Amit Kumar and Dr Rohit Nainawadekar.

Dissertation

Anjitha Devarajan (2021). **Montane lizard in a mosaic landscape: Effect of tea plantations on Annamalai Spiny Lizard, Salea anamallayana.** Saurashtra University, Rajkot. Supervisor: Dr Abhijit Das.

Jithin Vijayan (2021). **Tadpoles with a trick: Overwintering ecology of tadpoles in a Himalayan stream, Uttarakhand.** Saurashtra University, Rajkot. Supervisor: Dr Abhijit Das.

Aditi Mishra (2020). **Monitoring the Blossoms: A Review of Shifts in Plant Phenology.** Environment Management, Forest Research Institute Deemed to be University, Dehradun.

Amritesh Kumar (2020). **Sensitivity of Indian Protected Areas to Climate Change: A Remote Sensing and GIS Approach.** Department of Geoinformatics, Central University of Jharkhand, Ranchi.

Ananya Das (2020). **Mapping the patterns of termite mounds in the Campus of Wildlife Institute of India, Dehradun.** University School of Environment Management, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi.

Aniket Prakash (2020). **Future impact of climate change on the ecosystem and the biodiversity of protected areas of India.** Central University of Jharkhand, Ranchi.

Deepali Bansal (2020). **Impacts of experimental warming on daytime and nighttime soil respiration in semi-natural grassland, Uttarakhand.** University School of Environment Management, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi.

Pooja Panthari (2020). **Carbon degrading soil microbial enzyme activity along an elevation gradient in subalpine and alpine habitat, Himalaya.** Department of Life Science, Beehive College of Advance Studies, Dehradun, Uttarakhand.

Internship

Aditi Mishra, Umika Chanana, Anindita Debnath, Tapasya Thapa, Panchali Hazarika and Avantika Adhruj are working on **preparing background information on all the natural World Heritage Sites in the Asia-Pacific region.**

Agnish Das, a student of M.Sc. Environment Science, FRI University, Dehradun had worked on the project, **"Plausible alternative futures of Island mangroves in the Asia-Pacific"**, with reference to Andaman Island, India.

Kritika Trigunayat, a PhD scholar from Rajasthan University, has been engaged as a Technical Associate

in the project on **'Identification and Prioritisation of potential World Heritage Sites in Madhya Pradesh.'** Her role involves a review of secondary literature, compiling information, undertaking field site assessments and supporting site-level workshop/surveys under the mandate of the project.

Nirmala Sharma, a student of M.Sc. Remote Sensing and GIS at SSJ Campus, Kumaun University, Almora is working on the project "Assessment of Cultural and Sacred Natural Sites of Kailash Scared Landscape", India, using Remote Sensing and GIS Tools.

Parul Singh Umrao, a student of B.Tech in Biotechnology from Graphic Era University, Uttarakhand has worked as an Intern for supporting the documentation, including collating relevant information and analysing preliminary field data, in the project on Identification and Prioritisation of potential World Heritage Sites in Madhya Pradesh.

STATUS OF DOCTORAL RESEARCH IN WII

Registered

Kumari Vandana, **Assessment of Pollinators in indigenous farming systems in Garhwal Himalaya, Uttarakhand.** Forest Research Institute (Deemed) University. Supervisor: Dr V.P Uniyal.

Uttaran Bandyopadhyay, **Diversity and distribution pattern of moths (Lepidoptera: Heterocera) with special emphasis on family Noctuidae in Askot Wildlife Sanctuary, Uttarakhand.** Saurashtra University, Rajkot, Gujarat. Supervisor: Dr V.P Uniyal.

Thesis Submitted

Hussain SR (August 2020). **Ecology of the Red Fox, *Vulpes vulpes* in the North-Western Trans-Himalayan landscape, India.** Supervisor: Dr Bilal Habib.

Kamalika Bhattacharya, **Moth (Lepidoptera) assemblages along an altitudinal gradient in Singalila and Neora Valley National Park, Central Himalaya, an ecological and molecular approach emphasising on Noctuidae.** Saurashtra University, Rajkot, Gujarat. Supervisor: Dr V.P Uniyal.

Kritesh Dey, **Studies on Assemblage of spiders (Arachnidae: Araneae) in different riparian zones of the river Ganga.** Forest Research Institute (Deemed to be) University, Dehradun. Supervisor: Dr V.P Uniyal.

Pooja Rani Sinha, **Prediction of Quality of Water Emphasizing on Nutrient Dynamics in Kosi Watershed, Uttarakhand.** Forest Research Institute (Deemed to be) University, Dehradun. Supervisor: Dr V.P Uniyal.

Priyanka Kashyap, **Soil nematode community structure along an elevational gradient in Bhagirathi Basin, Uttarakhand - a morphological and molecular approach.** Saurashtra University, Rajkot, Gujarat. Supervisor: Dr V.P Uniyal.

Salvador Lyngdoh (2020). **Spatial ecology and predation pattern of wolf in Spiti Valley, Himachal Pradesh.** Supervisor: Dr Bilal Habib.

Shivam Shrotriya (2020). **Status, distribution and foraging ecology of wolf in the north-western Himalayan landscape, India.** Supervisor: Dr Bilal Habib.

Awarded

Athar Noor (2021). **Status and Spatio-Temporal Ranging Behaviour of Leopard, *Panthera pardus* in Dachigam National Park, Srinagar, Jammu and Kashmir.** Supervisor: Dr Bilal Habib.

Meraj Anwar (2020). **Status of Tigers and its Associated Prey Species in Selected Corridors and Areas of Terai Arc Landscape.** Supervisor: Dr Bilal Habib.

Mona Chauhan (2020). **The community structure of Dung beetles in Kailash Sacred Landscape, Pithoragarh, Uttarakhand, India.** Saurashtra University, Rajkot, Gujarat. Supervisors: Dr V.P. Uniyal and Dr Kailash Chandra.

TRAINING PROGRAMMES

41st Post-Graduate Diploma Course in Advanced Wildlife Management Concluded, 1 September 2019 to 30 June 2020.

The 10-month P.G. Diploma Course in Advances Wildlife Management concluded on 30 June 2020 at this Institute in which 20 officer trainees of the rank of Deputy Conservator of Forests/ Assistant Conservator of Forests and equivalent levels have participated. During the reporting period Management Plan Field tour was conducted during 4-8 June 2020. This was the final tour and an extremely important field training exercise in the course that integrated the learning in the course for developing the Tiger Conservation Plan. The tour was undertaken to Rajaji Tiger Reserve and included a visit to Motichur, Shyampur and Laldhang ranges, Mohand, Chillawali, Dholkhand, Beribada and Haridwar ranges of Rajaji

Tiger Reserve, Uttarakhand and adjoining areas.

The restrictions due to the outbreak of the COVID-19 pandemic necessitated the use of online methods of pedagogy. The management plan field tour was carried out at the Institute with online inputs from in-house as well as external experts. The international integrated wildlife management tour could not be undertaken due to the same reason. The capacity development process of the officer trainees was periodically assessed through assignments, tests, quizzes and participation in group discussions and seminars. All the 20 trainee officers have completed the diploma course, with 15 of them receiving an honours diploma. The valedictory program for the course was organized on 30 June 2020 and presided over by Shri Jairaj, PCCF & HoFF, Uttarakhand. The following officer trainees bagged medals and awards:

Institute's Gold Medal for the 'Top Trainee' for receiving the highest aggregate marks in all modules was awarded to Ms Harini Venugopal, Rajasthan Cadre, while the Wildlife Preservation Society Silver Medal for the 'Second in Merit' went to Shri Arun Vignesh C.S., Assam Cadre. The Silver Medal for the `Best All Round Wildlifer' was awarded to Shri Manu Sathyan, Kerala Cadre. The NR Nair Memorial Silver Medal for `Best Management Plan' was received by Ms Harini Venugopal, whereas Dr Dileep Kumar H., Tamil Nadu cadre received the AK Chatterjee Silver Medal for 'Best Management Term Paper'. Shri Arun Vignesh C.S. was adjudged the 'Top Trainee in Wildlife Biology.' 'The Silver Medal for the Best Foreign Trainee' was presented to Md. Sharifuzzaman from Bangladesh.

CAPACITY BUILDING & PROFESSIONAL EXCHANGE

Organised by WII (Workshops, Seminars, Meetings, Webinars and Conferences)

Webinar on Disaster & World Heritage with focus on Pandemics, Dehradun, 22 May 2020.

COVID-19 has caused humanity to review its approach to pandemics with the unprecedented global disruption of political, social and economic life as experienced in the current scenario. UNESCO's World Heritage Convention (WHC) ratified by 193 States Parties is the largest collaboration among the countries of the world and has led the forward in matters of common concern among its members. Pandemics can have serious repercussions for the heritage sites affecting their outstanding universal Values. These unique protected areas and cultural spaces are also a critical source of dependence, sustenance and coping mechanism for the associated society, communities, species and natural systems.

In this context, WII-C2C, in partnership with national and international organisations, organized a webinar. This was streamed live on platforms like Zoom and YouTube, which was attended by over 400 participants, worldwide. The main objective was to understand the scale, impact, opportunities, responses and tools for conserving world heritage and mitigating threats in the time of the present danger.

Key experts in natural and cultural heritage, disaster and geospatial technology representing WHC, UNOOSA, ICCROM, DRONAH, MAXAR, MoEFCC and WII presented their views as resource persons/ speakers at the event.

Major recommendations called for deepening collaborations at various scales, mainstreaming Disaster Risk Reduction approaches, strategies for enhancing management capacities and livelihood support around World Heritage Sites, and the need to study the critical links between pandemics and natural sites concerning the animal origin of infectious diseases, the vulnerability of species and the underlying drivers of environmental stress.

Webinar on India-EU Experience Sharing on 'Adaptation Planning and Implementation', Dehradun, 30 June 2020.

A webinar was organised between the Government of India, the Indian States and officials from the EU and EU Member States on the important issue of adaptation to climate change and experience sharing. This was held under the EU-Strategic Partnership for Implementation of the Paris Agreement (SPIPA) project, which contributes to cooperation between the EU and India on climate action. The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, is the nodal partner ministry. The virtual meeting was structured as thematic discussions with a focus on exchanging best practices, lessons learnt as well as exchanges on opportunities and challenges. The first session of the webinar was open to the general public and the second session was a closed panel discussion among representatives from the States, WII and MoEFCC officials.

Two-day Webinar on Capacity Building of Zoo Personnel in Managing Rescue, Rehabilitation and Release of Aquatic Macro-fauna of Ganga Basin (WII-NMCG Phase II: Component 1-C), 13-14 July 2020.

A two-day webinar on "Capacity Building of Zoo Personnel in Managing Rescue, Rehabilitation and Release of Aquatic Macro-fauna of Ganga Basin" was organized by WII under the aegis of the National Mission for Clean Ganga. The webinar was organized for the zoo personnel working at Nawab Wajid Ali Shah Zoological Garden, Lucknow and Kanpur Zoo, Kanpur to sensitize zoo personnel and capacity enhancement on various aspects of rescue and rehabilitation of aquatic macro-fauna. The webinar was attended by 40 participants (14 from Nawab Wajid Ali Shah Zoological Garden, Lucknow and 26 from Kanpur Zoo, Kanpur).

Three-day Webinar Series on "Marine Mammal Conservation in India: Status, Challenges and Opportunities", Dehradun, 12-14 October 2020.

CAMPA- Dugong Recovery Program organized a 3-day webinar series on "Marine Mammal Conservation in India: Status, Challenges and Opportunities". The webinar series was organized online and broadcast live on the website and YouTube channel of Wildlife Institute of India. The event had talks from six distinguished scientists engaged in marine mammal conservation activities in India and abroad.

The event began with a brief introduction by Dr K. Sivakumar with a note on the role of the proposed Project Dolphin on marine mammal conservation in India emphasizing education, outreach and capacity building. Dr Dipani Sutaria talked about her work on

cetacean research and conservation in India, with a specific focus on Arabian Sea humpback whales and Indian Ocean humpback dolphins. Thiru A.S. Marimuthu talked about marine mammal conservation activities undertaken by the state forest department in the Gulf of Mannar. Dr Mridula Srinivasan discussed the opportunities to build a comprehensive marine mammal program in India. Dr Anant Pande talked about the various initiatives undertaken in the Dugong Recovery Program. A panel discussion on 'Marine mammal conservation in India: Perspective from a developing country and ways ahead' was organized on the last day. Several current issues were also discussed. The webinar was a huge success with the participation of over 600 attendees from across the country. Discussions in the webinar series underlined the need to expand and increase the resources for marine mammal research and conservation efforts in India.

Webinar on Snow Leopard Conservation, Dehradun, 23 October 2020.

Wildlife Institute of India organized an online webinar on Snow Leopard Conservation. A total of 447 participants attended the webinar. Dr S. Sathyakumar spoke about the snow leopard, its rarity and its endangered status. He discussed the co-existing snow leopards, the prey, threats to the species and their ecology and behaviour and how different countries are trying to save this species and also working

together with all stakeholders including NGO's to save the habitats and the people who are living in the snow leopard landscape. A question-answer session was also held at the end.

World Fish Migration Day Celebrated by WII, Rudraprayag, 23-24 October 2020.

Wildlife Institute of India celebrated a two-day event on World Fish Migration Day, 2020 in Rudraprayag, situated at Alaknanda and Mandakini rivers' confluence. A training workshop was conducted in coordination with Rudraprayag Forest Division, Government of Uttarakhand. The main objective of this training workshop was to sensitize the frontline staff of the Forest Department towards promoting the sustainable management of river valleys and fish conservation. A total of 40 participants, including forest officials, frontline staff and students, were trained on fish identification, monitoring aquatic habitat and riparian vegetation.

The event was inaugurated by Shri Vaibhav Kumar Singh, DFO, Rudraprayag Division followed by a talk on the importance of river ecology, wildlife and aquatic habitats by Dr K. Sivakumar. An interactive session on learning and identification of the major fish fauna of Rudraprayag was also conducted. The forest staff members were trained regarding habitat monitoring that included identification of suitable spawning and nursery grounds of migratory fishes. They were trained towards monitoring the water quality and identification of major fish fauna and benthic macro-invertebrates and also on identifying the suitable habitats such as riffles, runs and pools preferred by different fish species. This was followed by a demonstration of techniques that study the migratory movements of fish using telemetry equipment.

At the end of the event, the participants were able to identify local fish species with the help of a field guide provided by WII. The event helped raise the interest among the frontline forest staff on the importance of aquatic fauna, river health and riparian vegetation.

Two-day Online Training Workshop on Management Effectiveness Evaluation (MEE) of Protected Areas for Indian Forest Service (IFS) Officers, 5-6 November 2020.

The objective of the workshop was to build the capacity of IFS officers on the MEE process of Protected Areas being taken up in the country. It was organised by the Institute. Twenty four participants attended the online workshop. In the workshop, two-panel discussions were organized on the following topics: (i) Panel discussion on extending MEE exercise for other conservation areas, Community and

Conservation Reserves, Zoos and marine Protected Areas; and (ii) Panel discussion on improvement in the working of Forest Departments need for career development through training and improvements of skills.

Capacity Building Workshop for Nature/ Tourist Guides, Orchha, Madhya Pradesh, 8-9 November 2020.

WII-C2C conducted a capacity-building workshop in Orchha for 'Inventorisation and Prioritisation of Potential World Heritage Sites in Madhya Pradesh' for tourist guides in the State during November 2020. The workshop was attended by 30 participants. The participants were provided with an introduction to World Heritage concepts and an overview of World Heritage Sites in Madhya Pradesh. The focus of the workshop included sessions on World Heritage and Sustainable Tourism, Tourism Management, Tourism Policy and Strategy, Community-based Tourism Management, Cross-cultural sensitivity in World Heritage Sites. Specific sessions were also held on the Role of Tour Guides in World Heritage Preservation. Dynamics of Tour Guiding, Communication and Interpretation, etc.

French Ambassador to India Visited the Institute, Dehradun, 20 November 2020.

His Excellency, Mr Emmanuel Lenain, French Ambassador to India visited the Wildlife Institute of

India. The dialogue on potential collaborations between France and WII in Biodiversity and Protected Areas Management has been initiated during his visit.

GIS Day Celebrated at WII, Dehradun, 22 November 2020.

On Geography Awareness Week, the GIS day was celebrated in the Wildlife Institute of India campus as a one-day online workshop on RS-GIS and cartography. Seventy researchers of the Institute participated in the virtual workshop.

Dr Gautam Talukdar welcomed all the participants and spoke about the importance and purpose of celebrating GIS Day. The full-day program consisted of six different sessions on theories and applications of Remote Sensing and GIS. These sessions covered topics on WII's GIS lab, and data accessibility, a demonstration of GIS analytics tools on open-GIS platform, basic cartography skills, enhancing GIS outputs through graphic designing, Google Earth Engine, Basics of RS-GIS and its applications in conservation research and management carried out through the Institute, and available open-access RS-GIS datasets. In the afternoon session, fourteen researchers presented lightning talks on their RS-GIS based research works. Fun games like short quizzes and virtual treasure hunts were also organized for the participants to make the event more interactive and a map contest was declared open.

Two-day Webinar for Capacity Building of Zoo Personnel in Managing Rescue, Rehabilitation and Release of Aquatic Macro-fauna of Ganga Basin (WII-NMCG Phase II: Component 1-C), 23-24 November 2020.

A two-day webinar on "Capacity Building of Zoo Personnel in Managing Rescue, Rehabilitation and Release of Aquatic Macro-fauna of Ganga Basin" was organized by WII under the aegis of the National Mission for Clean Ganga. The webinar was organized for the zoo personnel working at Sanjay Gandhi Biological Park, Patna and Bhagwan Birsa Biological Park, Ranchi, to sensitize zoo personnel and capacity enhancement on various aspects of rescue and rehabilitation of aquatic macro-fauna. The webinar was attended by 35 participants (24 from Sanjay Gandhi Biological Park, Patna and 11 from Bhagwan Birsa Biological Park, Ranchi).

One-day workshop and RRT Training on Elephant Behaviour, Ecology and Conflict Management including Field Craft on Elephant Monitoring, Tracking and Rescue Operation, Dehradun, 11 December 2020.

A workshop was organised by WII under the GIZ grant agreement project. The objective of the workshop was to build the capacity of the frontline staff of Haridwar and Kotdwar Forest Divisions in Uttarakhand, who have to deal with the human-elephant interface on the regular basis. In all, 39 participants attended the workshop.

Capacity Building-cum-Consultation Workshop on Potential World Heritage Sites in Madhya Pradesh, Rishikesh, 7-8 January 2021.

WII-C2C conducted a Consultation Workshop on "Inventorization and Prioritization of Potential World Heritage Sites in Madhya Pradesh State" in Rishikesh. This was organized as a part of the project funded by the Madhya Pradesh Tourism Board, Bhopal. The workshop was attended by senior officials of the MP Tourism Board, MP Forest Department and Senior Professionals having sound knowledge and experience of Madhya Pradesh and its cultural and natural heritage. Invited members suggested and presented unique values of their sites.

A total of 22 participants including Principal Secretary (Tourism); MD & Addition MD, Madhya Pradesh Tourism Board; Principal Secretary, Forest (Madhya Pradesh); PCCF and CWLW, Madhya Pradesh Forest Department; Director, Wildlife Institute of India; and Field Directors posted at various Tiger Reserves and National Parks of Madhya Pradesh State. The panel discussion was also held to recommend potential sites for Tentative Listing.

Online Inception Workshop for Management Effectiveness Evaluation (MEE) of National Parks and Wildlife Sanctuaries in India, 2020-21, 11 January 2021.

The meeting was organised to discuss the operational modalities and planning of field trips for MEE of 210 PAs during 2020-2021. It was organized by the Institute in collaboration with MoEFCC. A total of 31 participants attended the workshop. The objectives of the workshop were to (i) Underlining MEE as an important assessment tool for Protected Area evaluation in India developed as per IUCN WCPA framework; (ii) Demonstration of MEE mobile-based App and Web-portal all the MEE faculty physically as well as to all the Chairpersons in online mode, and (iii) Discuss the operational modalities and planning of field trips for MEE of 210 PAs during 2020-21.

5th Ten days Orientation Workshop on Wildlife and Health Management for Veterinary Officers of Uttarakhand State, Dehradun, 11-20 January 2021.

Wildlife Institute of India is supporting the initiative taken by the Uttarakhand Forest Department in enhancing capacities of veterinary officers of Dept. of Animal Husbandry, Uttarakhand through the training program. The fifth 10-day orientation workshop was organized by WII.

The objective of the training is to provide an understanding of various wildlife health issues and sensitize the officer trainees on recent advancements

in the area of animal capture, wildlife forensics, captive care and managing animal in distress. The training involved a live demonstration of immobilization, biological sampling and health examination of leopard and demonstration of monkey sterilization procedures. The workshop was attended by 25 participants from Uttarakhand Animal Husbandry Department. Inputs were provided by senior experts in the workshop.

Rapid Response Teams Training on the Use of Modern Technologies and Tools for Human-Wildlife Conflict Mitigation including Field Craft on Leopard Monitoring, Tracking and Rescue Operation, 13 January 2021.

The training was organised by WII under the GIZ grant agreement project. The objective of the training was to improve the understanding and strengthen the skills of frontline staff on the use of modern technologies and tools for HWC mitigation, including fieldcraft on leopard monitoring, tracking, and rescue operation. A total of 17 participants attended the training.

Basic Training on Birds Species of Uttarakhand, Dehradun, 14-16 January 2021.

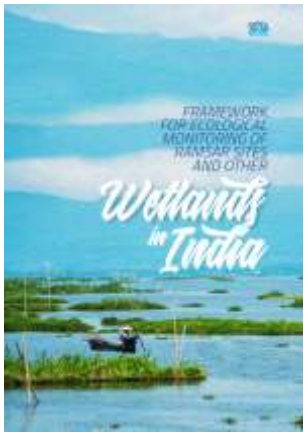
At the request of the research wing of Uttarakhand State Forest Department, Wildlife Institute of India conducted a three-day introductory training program on bird identification and data collection techniques for the newly recruited research personnel of the Forest Department. The objective of the training was to provide training on bird species of Uttarakhand to Research Assistants of Uttarakhand State Forest Department. It was organised by Wildlife Institute of India. The training program was held in person at WII. The classroom sessions included lectures on an overview of avian diversity in the Indian Sub-continent; Threatened birds of Uttarakhand; Basic tips for birdwatching and identification of birds; and Techniques for assessing bird populations. The participants were taken on a field trip to Asan Conservation Reserve to learn bird identification. Ten Research Assistants participated in the training.

Training of Rapid Response Teams on Human-Rhesus Macaque Conflict Management and Habitat Management in Uttarakhand, 28 January 2021.

The training was organised by WII under the GIZ grant agreement project. The objective of the training was to build the capacity of frontline staff in managing human-rhesus macaque conflict and to advance their skills regarding habitat management concerning threats due to invasive plants and forest fires. A total of 17 participants attended the training.

Release of Book to Commemorate World Wetlands Day, 2021, Dehradun, 2 February 2021.

On World Wetlands Day, a book on "Framework for Ecological Monitoring of Ramsar Sites and other Wetlands in India" was released virtually by Shri Gajendra Singh Shekhawat, Hon'ble Minister of Jal Shakti. The dignitaries present on occasion were Shri Ratan Lal Kataria, Hon'ble Minister of State for Jal Shakti and Social Justice & Empowerment, Government of India; Shri Pankaj Kumar, Secretary, Ministry of Jal Shakti; Shri Rajiv Ranjan Mishra, Director General, National Mission for Clean Ganga; and Dr Dhananjai Mohan, Director, Wildlife Institute of India.



The book is an output of the Wildlife Institute of India's and National Mission for Clean Ganga's joint initiative. This document will aid in the comprehensive monitoring of the wetlands through easy techniques and can be readily used by many stakeholders. It provides a robust framework that addresses ecosystem-level processes and functions to evaluate and prioritize wetlands for focused conservation action. The monitoring techniques provided in this document are in sync with the Ramsar guidelines and

can be used to assess the status of wetlands in India. The techniques proposed in this book are robust, replicable and strengthen the existing wetland monitoring framework to allow rapid identification of changes in wetlands for timely implementation of conservation and management actions. This document also aligns with the Ministry of Jal Shakti's water conservation initiative '*Jal Shakti Abhiyan*', which directs stakeholder participation in water management with scientific inputs from local research and academic institutions.

Meeting with Centre for Public Policy and Good Governance (CPPGG) for collaboration between WII and CPPGG, Dehradun, 3 February 2021.

The purpose of the meeting was to sign of Memorandum of Understanding (MoU) between Wildlife Institute of India and Centre for Public Policy and Good Governance (CPPGG), Government of Uttarakhand. It was organized by the Wildlife Institute of India and the Centre for Public Policy and Good Governance (CPPGG). A total of ten participants took

part in the meeting.

The Centre for Public Policy and Good Governance (CPPGG) has signed an MoU with the Wildlife Institute of India. This cooperation is a result of joint efforts between the two institutions to improve the policymaking, implementation, monitoring and evaluation by the Govt. of Uttarakhand.

The signing of Memorandum of Understanding (MoU) between Wildlife Institute of India and Centre for Public Policy and Good Governance (CPPGG), Govt. of Uttarakhand, Dehradun, 3 February 2021.

Dr Dhananjai Mohan, Director, Wildlife Institute of India has signed a Memorandum of Understanding (MoU) with Dr Manoj Kumar Pant, Additional CEO, Centre for Public Policy and Good Governance (CPPGG), Department of Planning, Government of Uttarakhand, for three years to establish mutually beneficial collaborations. The MoU was signed to improve the policymaking, implementation, monitoring and evaluation for the Government of Uttarakhand. The partnership will help in the

implementation of Global Sustainable Development Goals (SDGs) and to conduct several policy studies such as assessment of natural accounting, valuation of ecosystem services, mainstreaming biodiversity, climate change and disaster risk reduction, identification of natural and cultural heritage sites in the State of Uttarakhand.

Meeting with Chief Wildlife Wardens for Evaluation of 210 National Parks and Wildlife Sanctuaries through Management Effectiveness Evaluation (MEE) Process, 12 February 2021.

The objective of the meeting was to plan and discuss site visits for evaluation of PAs Along with a demonstration of the MEE web portal to all the MEE team members. The workshop was organized by WII, MoEFCC. A total of 72 participants attended the meeting.

Highlights of the first round of evaluation of all National Parks and Wildlife Sanctuaries in India were covered in 4 phases from 2006 to 2019 along with different aspects. It included the travelling and planning of second round of evaluation of 210 PAs were in-depth discussed with all the chairpersons of MEE teams. Demonstration of MEE weblink for sharing of MEE data was also facilitated by the institute for better understanding and ease of use by the respective chairpersons.

Meeting with Chief Wildlife Wardens to Evaluate 210 National Parks and Wildlife Sanctuaries through Management Effectiveness Evaluation (MEE) Process, Rishikesh, 12 February 2021.

A meeting was held under the chairmanship of Shri Soumitra Dasgupta, ADG-WL, MoEFCC; and co-chaired by Shri SP Yadav, Member-Secretary, National Tiger Conservation Authority; with all the MEE Regional Committee Chairpersons and Chief Wildlife Wardens. The objective of the meeting was to work out the details of the site visits and discuss various issues related to MEE cycle 2019-20 in Hotel Lemon Tree, Rishikesh.

Dr Dhananjai Mohan, Director, WII; Six chairmen; and

concerned WII faculty members of the Regional Committees attended the workshop physically. The rest of the participants joined the meeting online. The team-wise plan was chalked out in coordination with concerned CWLWs, aiming to complete the MEE cycle by 31 December 2021. ADG-WL, MoEFCC gave many valuable inputs regarding MEE & PA management to streamline the process. MS, NTCA indicated the start of the next MEE cycle for Tiger Reserves. A web portal has been created to submit the evaluation data on MEE and demonstrated in the meeting.

Training for Rapid and Primary Response Teams on Crowd management and Legal Aspects pertaining to Human-Wildlife Conflict Management, Dehradun, 15 February 2021.

The training was organised by WII under the GIZ grant agreement project. The objective of the training was to improve the understanding and strengthen skills of frontline staff on crowd management and legal aspects of Human-Wildlife Conflict. A total of 19 participants attended the training.

Workshop and Training on Human-Wildlife Conflict Management in Uttarakhand including Field Craft on Monitoring, Tracking, Capture and Post-Capture Management of Leopards and Bears, and Crowd Management, Dehradun, 17-18 February 2021.

The workshop and training were organised by WII under the GIZ grant agreement project. The objective of the training was to build the capacity of frontline staff from 12 forest divisions of Uttarakhand in managing conflict situations with leopard and black bear. A total of 40 participants attended the training.

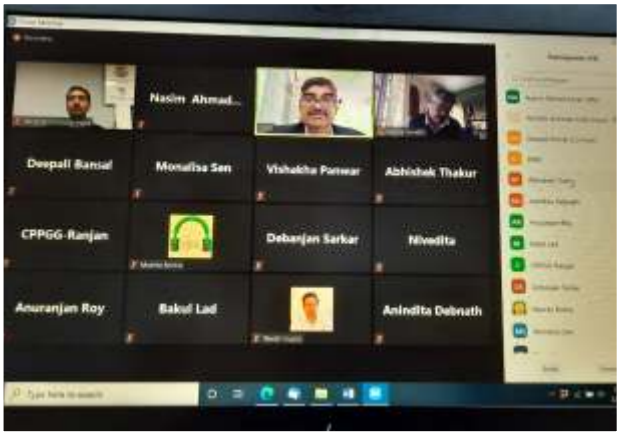
Capacity-building Workshop on Analysis of Outstanding Universal Value of GHNPCA, Himachal Pradesh, 19 February 2021.

A Capacity-building workshop on the Analysis of Outstanding Universal Values of the Great Himalayan National Park Conservation Area (GHNPCA) was organised for frontline staff of the site in Sai Ropa Range Headquarters, Himachal Pradesh. A total of 20 frontline staff of the site took part in the workshop which included sessions on World Heritage, Reporting and Monitoring, and hands-on exercise on OUV breakdown analysis for GHNPCA. The workshop was followed by a field visit to assess the OUV status of the site on the ground. The workshop helped to enhance the awareness of the frontline staff of the World Heritage attributes of the site and assess its current conservation status.

Two-day online Sensitization Workshop on Urban Biodiversity and Ecosystem Services, Dehradun, 22-23 February 2021.

The objective of the workshop was to aware personnel other than Forest services of various aspects related to urban biodiversity and ecosystem services. It was organized by WII and MoEFCC, Govt. of India. A total of 18 participants attended the workshop.

Government Officials, NGOs, Town Planners, Academicians, etc. of selected States participated, interacted and discussed the issues and challenges on urban biodiversity conservation, ecosystem services, management and financing, aiming to enrich the understanding of urban biodiversity and ecosystems services to the personnel of other than forest services.



Two-day Sensitization Workshop on 'Urban Biodiversity and Ecosystem Services' through Virtual Mode, Dehradun, 22-23 February 2021.

Wildlife Institute of India, with support from the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, organized a two-day sensitization workshop on 'Urban Biodiversity and Ecosystem Services' through virtual mode. The workshop's objective was to enrich the understanding of urban biodiversity and ecosystems services to personnel other than Forest services. Government Officials, NGOs, Town Planners, Academicians of Uttarakhand and the Madhya Pradesh States interacted and discussed the issues and challenges of urban biodiversity conservation, ecosystem services, management and financing.

Dr Dhananjai Mohan, Director, WII, delivered the opening remarks and highlighted the importance of urban biodiversity conservation. The resource persons gave valuable inputs and discussed various aspects like nature-based solutions to address climate change & biodiversity conservation; City Biodiversity Index; Citizen science initiative for ecological monitoring; Impacts of urban expansion on biodiversity & ecosystem services; and Role of administration & local bodies in the conservation of urban biodiversity etc. A total of 18 participants attended the workshop.

Training Program on Bird Conservation and Management, Dehradun, 15-17 March 2021.

The objective of the training was to provide training on bird conservation and management to the frontline forest staff of Pong Dam Ramsar site. It was jointly organised by Wildlife Institute of India and Himachal Pradesh Forest Department. Ten participants from Himachal Pradesh attended the training.

Five-day Course on Health Management of Captive Wild Animals, Dehradun, 15-19 March 2021.

Based on the request from Bihar Forest Department, the Wildlife Institute of India organized a five-day course for officials of the Bihar Forest Department. The target group included ten officials of the Bihar Forest Department, including nine field veterinary officers and one forest officer.

The course was aimed at sensitizing the participants on various aspects of *ex-situ* management and included deliberations on issues related to biodiversity conservation, species biology and behaviour; Husbandry & animal care; Wild animal nutrition; Mortality investigations; Reptile husbandry and care; Quarantine essentials; Population management; Wildlife forensics: and Outreach. Eminent scientists and resource persons provided the inputs.

Capacity Building Course on Wildlife Health Bridge for Veterinarians Working in PAs and Zoos, Sariska Tiger Reserve, Online Mode, 4 January 2021 to 12 March 2021 and Offline Mode, 21 March to 4 April 2021.

A capacity-building course titled Intervention in Wild Animal Health-2021 was jointly delivered by Wildlife Institute of India, Zoological Society of London (ZSL), University of Edinburgh (UoE), University of Melbourne and Royal Veterinary College. The course was primarily designed to enhance the knowledge and skills of veterinary professionals in health management, free-ranging wildlife and field investigations and diagnosis of emerging diseases. The course was delivered through online mode as well as an offline mode at Sariska Tiger Reserve. 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 learning

objectives included (i) Gaining critical awareness of the effects of interventions at the human-wildlife interface; (ii) Developing a systematic understanding of the planning of and field methods in disease outbreak investigation; (iii) Wildlife monitoring and biological management; (iv) Gaining a comprehensive understanding, including new insights into disease risk management in translocation programmes; and (v) Gaining a critical awareness of field methods to investigate the role of disease in the decline of species

The 10-week online course covered various aspects, including weekly sessions addressing the role of veterinarians in protected areas; introduction to animal population monitoring and distance sampling; census of free-living populations; the human-wildlife interface: community engagement and disease prevention; disease outbreak investigation; spatial analysis, pathological examination and surveillance; aquatic animal biology, ecology and disease investigation; wildlife crime and forensic investigation and best practice wild animal restraint and anaesthesia techniques.

Field course included the demonstration of various techniques for field monitoring of wildlife; Visual health monitoring of free-living animals; Sampling techniques for infectious disease screening; Pathological examination in the field; Scanning disease surveillance scenarios: People-park interface and its management; Communicating wildlife issues to communities: Wildlife forensics; Wildlife crime investigation; Physical and chemical restraint procedures; and the best practice of wild animal anaesthesia techniques and clinical examination in the field.

A total of 18 veterinary professionals representing ten from India, two from England and one each from France, South Africa, Scotland, Paraguay, Belgium and Australia attended the course.

Training Program on Bird Conservation and Management, Dehradun, 15-17 March 2021.

At the request of the DFO, Hamirpur Wildlife Division of Himachal Pradesh Forest Department WII conducted a three-day training program on bird conservation and management for the frontline staff of Pong Dam Bird Sanctuary. The training program was held in person at WII and there were a total of ten trainees. The program involved two days of classroom session, that had lectures on avifaunal diversity in the Indian Subcontinent; Wetlands of India and their conservation challenges; Energy infrastructure and its impacts on birds; Bird migration; Diversity of aquatic fauna and its importance in wetland health; Techniques for assessing bird populations; and Capture and tagging techniques for monitoring bird populations. The participants were taken on a field trip to Asan Conservation Reserve where the trainees were informed about the various management practices.

ATTENDED BY WII PERSONNEL

International Webinar on "Wildlife Resources of Oriental Region: Conservation Challenges", 3 July 2020.

Dr J.A. Johnson delivered an invited talk in this webinar. The webinar was organized by AMIST University, Malaysia. The objective of the webinar was to sensitize graduate and post-graduate students of AMIST University, Malaysia towards Wildlife Conservation.

Webinar series during wildlife week on 'Freshwater Resources of Indian: Conservation Challenges,' Dehradun, 2-8 October 2020.

Dr J.A. Johnson delivered a talk in this webinar series in WII. The objective of the webinar series was to sensitize students and researchers towards Wildlife Conservation.

Training Programme on Aquatic Ecosystem, Wildlife and Riparian Vegetation of Himalayan Streams, Rudraprayag, 23-24 October 2020.

'The training programme was organised on Aquatic Ecosystem, Wildlife and Riparian Vegetation of Himalayan Streams' for frontline forests staff of Rudraprayag Forest Division, Uttarakhand. The objective of the training programme was to provide knowledge to frontline staff towards monitoring biodiversity and its aquatic habitats.

Insights into Wildlife Conflicts, Rescue and Rehabilitation: Challenges and Opportunities for Conservation, Nagpur, 18-20 December 2020.

Dr Kafil Hussain participated in Wildcon- 2020 (Online International Conference) on "Insights into wildlife conflicts, rescue and rehabilitation: Challenges and opportunities for conservation". The objective of the

workshop was to showcase the current challenges and opportunities in wildlife health care and management. It was sponsored by the Association of Indian Zoo and Wildlife Veterinarians and organized by Wildlife Research & Training Centre, Gorewada Rescue Centre, Nagpur.

Conservation is versatile and involves a wide array of professionals from biologists to veterinarians and from engineers to administrators. Efforts to conserve the fast fading wildlife diversity have been undertaken at all levels of society, however, the need for professional collaboration and expertise sharing is essential. This conference is organized to bring expertise in the arena of wildlife under one roof and facilitate a consequential dialogue to streamline conservation efforts at each echelon of its organization.

STUDY TOUR AND VISITS

Visit to Bandh Baretha Wildlife Sanctuary for rationalization of boundaries, Bharatpur, Rajasthan, 7–9 December 2020.

A team of WII comprising Dr Gautam Talukdar, Dr Monali Sen, Dr Bhumesh S. Bhadouria and Ms Deepali Bansal visited Bharatpur. The visit was organised by WII in collaboration with Rajasthan Forest Department. The purpose of the visit was to submit the report for rationalization of the boundary of Bandh Baretha Wildlife Sanctuary, Bharatpur, Rajasthan to the Chief Wildlife Warden of Rajasthan. The report included the maps and details including recommendations for rationalization..

ACTIVITIES & PROFESSIONAL SUPPORT

SERVICES

RESEARCH
COMPLETED

MITIGATION MEASURES FOR DOUBLING OF THE TINAIGHAT-CASTLEROCK-CARANZOL SWR RAILWAY TRACK, KARNATAKA

Funding Source
South-Western Railways

Investigators
Dr Dhananjai Mohan, Dr Y.V. Jhala, Shri Qamar Qureshi, Dr Asha Rajvanshi, Dr S.P. Goyal, Dr Bilal Habib, Dr Malvika Onial, Dr Abhijit Das and Dr Navendu Page

Researchers
Akanksha Saxena, Bitupan Boruah, Zehidul Hussain, Lynette Gomes, Krishnendu Banerjee, Swati Nawani, Akash Agarwal and Kathan Bandyopadhyay

Date of Initiation
November 2020

Date of Completion
December 2020

Objectives: The objective is to avoid, minimize and remedy the adverse impacts of the proposed Tinaighat-Castlerock-Caranzol railway track doubling project on biodiversity values of the protected areas, reserve forests and maintain connectivity in the larger landscape through appropriate planning of mitigation measures.

Progress: With the above mentioned objective, an intensive field tour was conducted by the project team (19 November - 5 December 2020) to assess the length of the existing and proposed railway track to suggest site-specific mitigation measures. To assess the status and presence of wildlife across different taxa, the research team surveyed the study area by setting up camera traps and conducting sign surveys along the railway tracks. The team also used rail mortality data from the Karnataka Forest Department and any opportunistic sighting or sign encountered during the survey to identify such areas. Visual encounter surveys, opportunistic surveys, stratified plot sampling, and collection of opportunistic rail kill data to assess the herpetofaunal diversity and identify critical zones for mitigation. The team also surveyed the entire length of the existing alignment accompanied by a railway engineer to assess the proposed rail alignment, and review the crossing and drainage structures proposed by the railways in terms of suitability for animal crossing. The scope of constructing additional mitigation structures based on topography, probability of animal movement and engineering constraints was discussed on field.

Outputs and Outcomes: Camera trapping spanning 660 trap nights yielded 156 captures of 17 mammal species along the railway track. The team recorded 203 animal signs through sign surveys of 175 habitat plots near the railway track. The study revealed that perennial and seasonal streams, and ephemeral water bodies were crucial habitats for herpetofauna. Camera trap data indicated that tunnels along the railway track are being used as natural passages by animals for their movement across the landscape. Hotspots of animal activity were visualized by overlapping all animal signs, sightings, photo-captures and mortality data using kernel density analysis on GIS-platform. These were then combined with the hotspots identified in the IISc reports, and potential multi-taxa animal crossing zones were thus delineated.

Mitigation measures for the proposed railway track evolved through a multi-step simultaneous process. The team first evaluated the existing and proposed drainage and crossing structures on field, assessed the possibility of making the structures more suitable for wildlife movement and constructing additional non-drainage crossing structures, and finally overlapped potential multi-taxa crossing zones to finalise the location and dimensions of the crossing structures.

Consequently a mitigation plan consisting of multiple measures was made, including major bridges (2), animal overpasses (4), tunnels (6), animal underpasses (3), RCC box and slab culverts (47) and level crossings (6). This unique set of mitigation measures is enhanced by taxa-specific measures such as provision of canopy bridges for arboreal species (to be provided at every kilometre along the track), and measures to dissuade presence of reptiles on the tracks to avoid mortality.

Milestone: A total of 47 species of herpetofauna was recorded during the survey. This number is expected to be higher since the study was conducted within a short period during the non-breeding season.

RESEARCH
COMPLETED

MITIGATION MEASURES FOR THE NAGBHID–ITWARI RAILWAY GAUGE-CONVERSION PROJECT PASSING THROUGH ECO-SENSITIVE ZONE AND CORRIDORS OF UMRED-PAUNI-KARHANDLA WILDLIFE SANCTUARY

Funding Source
Maharashtra Rail Infrastructure Development Corporation Limited (MRIDC or MAHARAIL)

Date of Initiation
January 2021

Date of Completion
February 2021

Investigators
Dr Bilal Habib, Dr Gopi GV and Dr Parag Nigam

Researchers
Dr Ujjwal Kumar and Akanksha Saxena

Objectives: The objective of the study was to suggest mitigation measures for the proposed broad gauge railway line passing through the Eco-Sensitive Zone and corridors of the Umred-Pauni-Karhandla Wildlife Sanctuary in the central Indian tiger landscape.

Progress: A team from WII undertook a field survey of the proposed alignment during 4-7 February 2021. The entire alignment of the proposed railway track was surveyed and sensitive locations of animal presence and movement were identified using structural corridor maps of the landscape, GPS tracks of radio-collared tigers and species presence ascertained by signs and sightings. Track design specifications in these zones were assessed *viz*. the location, presence of natural drainage structure and height of track embankment. Subsequently, three main segments of the proposed railway alignment were identified that were important from the mitigation point-of-view, in that they were passing through the eco-sensitive zone of the Umred-Pauni-Karhandla Wildlife Sanctuary and were also cutting through important movement zones on the Tadoba-Navegaon-Nagzira corridor. These were identified based on tracks locations of the radio-collared tiger individuals monitored during September 2015 - January 2019, in addition to the viability of corridors for connectivity in the landscape.

Outputs and Outcomes: Each 20 m segment of the proposed alignment was categorised according to the formation height of the railway track at that point. The research team then focused on railway track segments falling within areas important with respect to animal presence and movement, and presence of corridor. Site-based mitigation measures were then decided based on height of the proposed railway track formation, presence of existing structures and presence of structural and functional animal movement corridors and eco-sensitive zones.

Consequently, a mitigation plan for the three priority segments was suggested – two underpasses (total length 1,300 m) in segment-I, and two underpasses (total length 650 m) in segment-III. For segment-II, two alternatives were suggested - three underpasses (total length 1,600 m) or one underpass measuring 3,700 m (with an additional height of 4 m above the existing rail formation height). The mitigation plan also included fencing all along the railway track, modification in existing drainage culverts to promote wildlife movement.

Milestone: Three main segments of the proposed railway alignment were identified that were important from the mitigation point-of-view, in that they were passing through the eco-sensitive zone of the Umred-Pauni-Karhandla Wildlife Sanctuary.

RESEARCH
ONGOING

TO DEVELOP THEMATIC MAPS FOR KOCHI AND DEVELOP POLICY RECOMMENDATIONS FOR THE CITY AUTHORITIES UNDER THE INTEGRATED SUB-NATIONAL ACTION FOR BIODIVERSITY: SUPPORTING IMPLEMENTATION OF NATIONAL BIODIVERSITY STRATEGY AND ACTIONS PLANS (NBSAP) THROUGH THE MAINSTREAMING OF BIODIVERSITY OBJECTIVES ACROSS CITY-REGIONS (INTERACT-BIO)

Funding Source
CLEI South Asia

Date of Initiation
March 2020

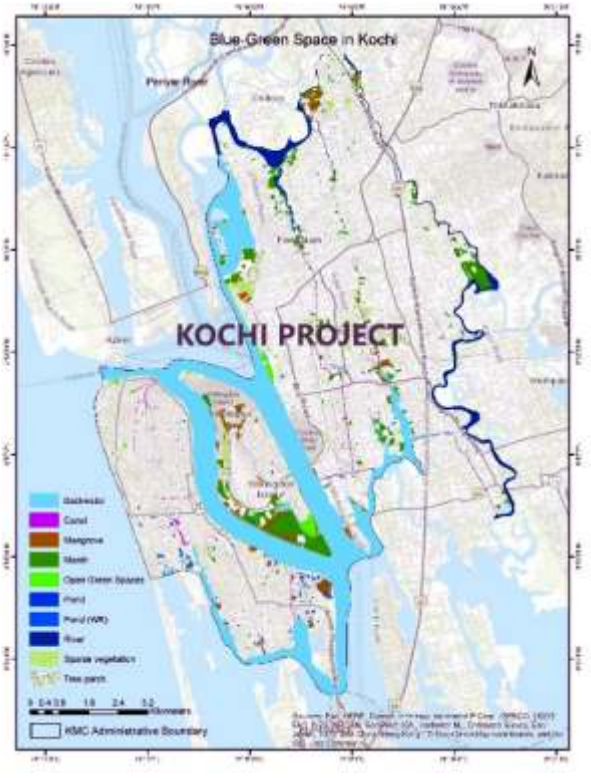
Investigator
Dr Gautam Talukdar

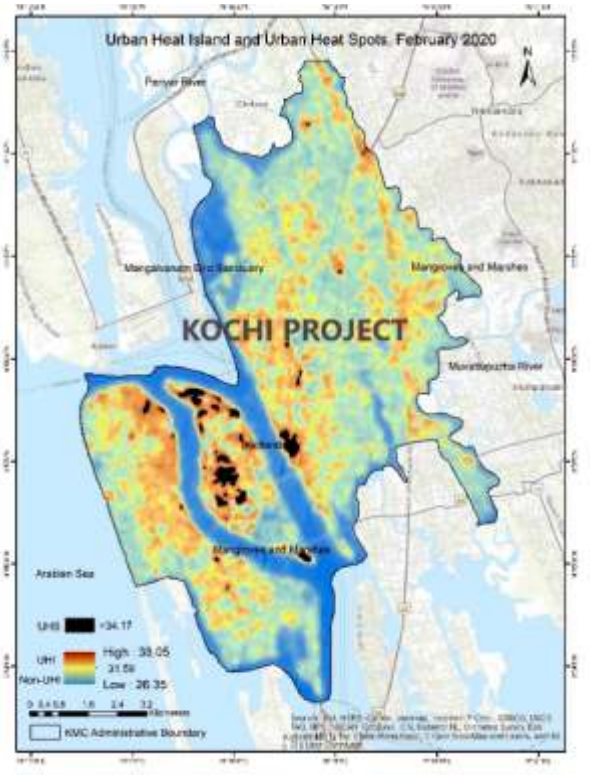
Date of Completion
July 2021

Researcher
Sneha Pandey

Objectives: The objective of the project is to develop thematic maps for Kochi and develop policy recommendations for the city authorities.

Progress: Thematic maps have been prepared as a part of this project. In March 2021, a field visit was conducted in Kochi for data collection and validation of maps: The Urban Heat Island and Urban Heat Spots have been mapped for the same month.





Outputs and Outcomes: The research team prepared maps of blue-green spaces and habitats of threatened biodiversity. The team prepared maps of Land Surface Temperature in Kochi for different years (2021, 2020, 2019, 2018 and 2017). A list of the threatened biodiversity in the Kochi city region was also prepared. The team developed policy recommendations for city authorities of Kochi for integrated urban planning.

Milestones: Through this project, the research team mapped wards, where nature-based solutions can be adopted to mitigate the Urban Heat Island effect.

CELL

Information Technology and Geo-informatics 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. A large number of desktop computers configured with MS Windows, Linux and specialized analytical software for data processing are made available in the dedicated laboratories.

The computer facility is provided by a wide array of hardware setups connected to the Local Area Network (LAN). There are Intel Xeon servers with Storage Area Network (SAN) and Network Attached Storage (NAS) system 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, Auditorium, Board Room and Porta Cabin. The Institute has dedicated and unshared 350 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 software for landscape-level analysis. A dedicated team provides support and training in IT and Geoinformatics. A module on Remote Sensing, GIS and Landscape Ecology 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.

Online Facility for Workshop/ Webinar/ Meeting/ Lectures: The 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 on the users' office desktops of the Institute using online communication software.

Upgradation of Internet Facility: The internet connection of the Institute has been upgraded from 200 to 350 Mbps by BSNL, the existing internet service provider, without any extra cost.

Implementation of Security Suite for WII network: Seqrite Endpoint Security –total software for 400 users with three years license has been implemented to protect all the computer systems on Institute's Campus Wide Network from threats and attacks of virus, trojan, spyware and ransomware.

Expansion of Data Storage System: Network Area Storage (NAS) of 240 TB capacity (Dell EMC NX3240) has been installed in this Cell for Tiger Census database.

Safety Measures: To contain the spread of the Noval Corona Virus, a user policy is put in place to keep safe distancing in the Computer and GIS laboratory. Also, a strategy is in place for staying safe in the computer user facility.

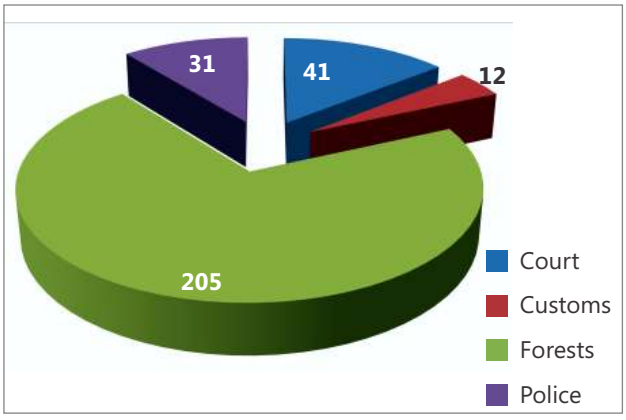
Application of Geoinformatics in Research Projects: Geoinformatics technology is being used in most of the research projects of the institute for wildlife research and conservation. Work is in progress on the development of a spatial database on the boundaries of all the national parks, wildlife sanctuaries, conservation reserves and community reserves in the country. Procurement of beat boundaries of the 17 tiger range states in the country has been done. The country-level data on animal distribution is done through the All India Tiger Monitoring Project which is maintained in the cell. Spatial data for 17 tiger range states is developed and maintained.

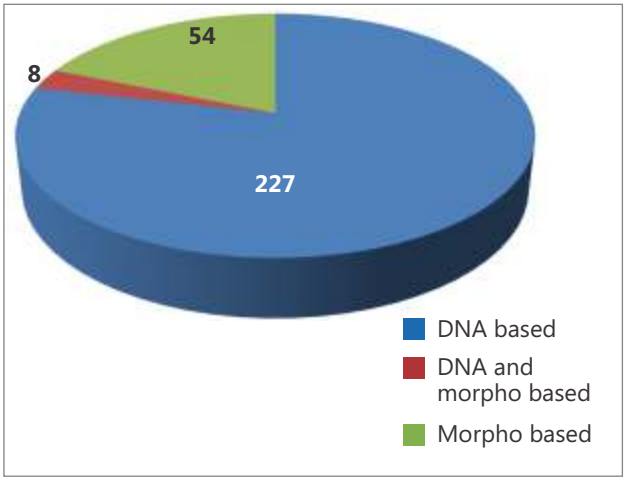
Wildlife Forensic and Conservation Genetics Cell

The Wildlife Forensic and Conservation Genetics (WFCG) Cell was established to strengthen the enforcement of the Wildlife (Protection) Act, 1972 of India. The main functions of the Cell include identification of species from a 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 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 the Southeast Asian region, it also provides advanced training for wildlife crime analysis to the scientific organizations of the neighbouring countries. The WFCG cell provides services related to molecular ecology to various ongoing research projects that involve phylogeny, population genetics and endocrinology.

During 2020-21, the Cell received a total of 289 wildlife offence cases from enforcement agencies across the country, of which 41 were from honourable Courts, 12 from Customs, 205 from the Forest Department and 31 from the Police. An assortment of biological products was received for species identification and of these, 227 cases contained tissue

samples requiring DNA based techniques, 54 cases requiring morphometric technique and 8 cases requiring both DNA and morphometric techniques for species identification. The Cell provided reports on species identification for 233 cases and a further 3 summons were received from various honourable courts for appearances as an expert scientific witness during this period.





The popular lectures were undertaken for various visitors/classes at WFCG Cell and in IGNFA and CASFOS, Dehradun. The experts of WFCG Cell's are providing input in the workshops organized by the regional office of the National Academy of Customs, Indirect Taxes and Narcotics (NACIN) for the training of customs officers in controlling wildlife illegal trade.

The WFGC Cell is involved in researching 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 genetic studies on several wild animals.

Environmental Impact Assessment Cell

The Environmental Impact Assessment Cell of WII continued to undertake R&D related studies, provide professional support in capacity building initiatives at WII and other institutions; professional bodies; and Government and corporate organizations. The efforts of networking with global and regional institutions and collaborations with international agencies also continued to expand and diversify.

Following advisory assignment was completed in the Cell: (i) Mitigation plan for Koderma Detour Dedicated Freight Corridor on Gautam Buddha Wildlife Sanctuary; (ii) The Nodal Officer, EIA cell made a site visit to provide technical inputs on the construction of New High-Level Bridge and approach road across Son River in Km. 6+600 to 10+100 near Jogdha on Bahari-Hanumana Road- SH-52 passing through Son Gharial Sanctuary, Madhya Pradesh and had consultations with concerned authorities between 14 and 18 December 2020; (iii) The Nodal Officer, EIA cell as a nominated member of the committee constituted by the SC-NBWL, provided technical inputs and submitted a site visit report and recommendations on the Laldhang – Chillarkhal stretch of the road passing through the buffer zone of Rajaji Tiger Reserve.

Following advisory assignments were initiated in the cell: (i) Preparation of Wildlife Management Plan for 89.688 Ha forest land in Koderma forest division, Jharkhand to be diverted in favour of Dedicated Freight Corridor Corporation of India Ltd. (DFCCIL); (ii) Preparation of Integrated Wildlife Action Plan comprising of mitigation and compensating measures with landscape approach of entire forest area in Hazaribagh Wildlife Forest Division, Hazaribagh West Forest Division and Koderma Forest Division in the impact zone of the Koderma Detour of DFCCIL project.

Library and Documentation Centre (L&DC)

The Library and Documentation Centre (L&DC) of WII plays a vital role in the 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: (a) To serve as a repository of all wildlife-related literature published in India; (b) To acquire, organize and disseminate all relevant literature on biodiversity conservation and related fields; (c) To serve the user

readership through normal and special library & information services. (d) To establish and maintain links with other national information systems in India and other countries to ensure the free flow of information at national and international levels. (e) To serve as a training centre for information personnel and users. (f) 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 approx. 29,200 books, 8,800 maps/ toposheets, more than 7,500 bound volumes of old and rare journals. The library also maintains a good collection of scientific papers number 11,250. 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.

The infrastructure and physical environment of L&DC is reorganized. RFID technology is implemented in L&DC. Library documents tagged with RFID chips and RFID gate is installed to restrict unauthorized access to 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. Approximately 150 queries were attended from outside users and more than 3,000 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, papers presented and other categories in this period. Specialized bibliographies were also compiled for different courses and on user request.

Wildlife Health Services

Wildlife Health Bridge 2020-21: Wildlife Institute of India in collaboration with Zoological Society of London (ZSL), Royal Veterinary College, University of Melbourne (UoM) and University of Edinburgh (UoE) had organized the following courses for the veterinary officers of Bihar as part of Wildlife Health Bridge 2021-22. These courses were organized over three months: (i) 4 January–12 March 2021 (IWAH 2021 online mode) - Tutors of various institutions; (ii) 15–19 March 2021 at WII (Health Management of Captive Wild Animals) - WII faculty; (iii) 21 March – 4 April 2021 at Sariska Tiger Reserve, Rajasthan (Field Course on Interventions in Wild Animal Health) – WII faculty and external resource persons.

The objectives of these courses were to enhance the knowledge and skills of veterinary professionals in health management of captive and free-ranging wildlife and field investigations and diagnosis of emerging diseases; enhance knowledge and skills of veterinary faculty in zoological medicine, husbandry and nutrition; improve management of captive and free-ranging wildlife; conduct research on wildlife health on husbandry, nutrition and diseases for improved health of wildlife in captivity and free-ranging.

All three components of Wildlife Health Bridge 2020-21 were attended by 10 veterinary officers working with Bihar Forest Department, Govt. of Bihar. Besides, the field component on IWAH held in Sariska was also attended online by 8 Postgraduate students of The Royal (Dick) School of Veterinary Studies, University of Edinburgh.

Teaching inputs were provided on wild animal immobilization, managing animals in distress, Wild Animal translocation: Case studies, Introduction to Wildlife Health Management, Tropical diseases, besides live demonstration of immobilization procedures and biological sampling in two Sambar deer, *Rusa unicolor*.

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, a conference system, projection system, various audio-visual equipment, still cameras and video cameras with accessories 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 prepares four quarterly issues of the e-newsletter of WII. The issues were uploaded to the website of the Institute during the reporting period.

International Day for Biological Diversity Celebrations, Dehradun, 22 May 2020.

ENVIS Resource Partner, "Wildlife and Protected Areas" at Wildlife Institute of India, Dehradun organised an Online Photography contest on 21 May 2020 to celebrate the International Day for Biological Diversity "Our Solutions are in Nature" on 22 May 2020. The main aim of organising this online photography contest was to raise awareness among citizens and understand issues related to biodiversity among students, children etc.

A nomination advertisement was circulated and uploaded to the WII-ENVIS website, social media platforms, viz. WII-ENVIS; MoEFCC's Facebook page and Twitter handler, etc. Over 290 enthusiastic appl1icants were registered for the photography contest in three different categories. All interested students, researchers, amateur, professional photographers etc. registered themselves through the online google registration form. The theme of photography was "Nature showcasing solutions to mankind". The best photographers in each category will be awarded merit certificates. All the participants will also be given the e-Certificate.

Dugong Day - 2020 Celebrated at WII, 28 May 2020.

On the occasion of Dugong Day – 2020, online competitions were conducted by the CAMPA - Dugong Recovery Project Team at Tamil Nadu. The competitions were held four for age group categories. There were five competitions, i.e. Essay Writing; Poetry Writing; Drawing; Painting; and Video Making. Two topics were given for each age group, and the entries were invited in two languages, i.e. English and Tamil. This enabled children from all backgrounds, especially the local fishing community of Tamil Nadu to take part in the competitions. A total of 315 entries from India and abroad were received. All participants were given participation certificates, and the winners (76 in number) were awarded certificates and gifts consisting of awareness material and souvenirs.

World Elephant Day Celebrations, New Delhi, 12 August 2020.

World Elephant Day is an international annual event, dedicated to the preservation and protection of the world's elephants. The goal of World Elephant Day is to create awareness of elephant conservation and to share knowledge and positive solutions for the better protection and management of wild and captive elephants.

This year, World Elephant Day was celebrated jointly by Project Elephant Division and Elephant Cell of WII at Indira Paryavaran Bhawan, New Delhi. The programme involved releasing the booklet on "Best Practices of Human-Elephant Conflict Management in India" and the launch of the beta version of the National Portal on Management of Human-Elephant Conflict called "Surakhsya" for collection of real-time information & also for managing the conflicts on a real-time basis. A video on measures for encouraging human-elephant co-existence through HEC mitigative approaches was also screened. The programme was held in the august presence of Shri Prakash Javadekar, the Hon'ble Minister EF&CC; Shri Babul Supriyo, the Hon'ble MoS, EF&CC; Dr Sanjay Kumar, DGF&SS, MoEFCC; Shri Soumitra Dasgupta, ADG (Wildlife); Shri Noyal Thomas, IGF & Director Project Elephant, MoEFCC; and other senior officers of MoEFCC. The State Forest Departments, WII and other stakeholder organizations joined the celebrations on the virtual medium.

Shri Prakash Javadekar, the Hon'ble Minister, EF&CC emphasized on co-existence of people with elephants and the efforts taken by the government to augment food and water availability to wild animals in forests. He also stressed the use of technology and urged scientists and policymakers to implement out of box ideas to mitigate HEC. Shri Babul Supriyo, the Hon'ble Minister of State, EF&CC raised concern over the death of humans and elephants that die every year due to increasing HEC and the efforts taken by the Ministry and State FDs to address the situation. He echoed the need of people and elephants to co-exist which blends well with the theme of the World Elephant Day 2020, "Living with Elephants" and urged people to pledge to come together in protecting the National Heritage Animal for future generations.

WII Participated in Basantotsav Flower Exhibition 2021, Dehradun, 13-14 March 2021.

The prestigious Basantotsav Flower Exhibition 2021 was organized at the Uttarakhand Raj Bhavan (Governor House) in Dehradun, which was inaugurated by Her Excellency, Governor of Uttarakhand, Smt. Baby Rani Maurya. Wildlife Institute of India (WII) participated in this exhibition. The WII exhibition showcased important research activities and achievements of the Institute, with special emphasis on Uttarakhand. Panels showcasing the rise in tiger and leopard numbers were also exhibited. The star attractions of the WII stall were the aquarium with Mahseer fish and an Elephant Selfie Point.

Her Excellency visited the WII Stall and was welcomed

and briefed about the significant activities of the Institute. She took a keen interest in knowing about the Mahseer and conservation initiatives in Uttarakhand.

The exhibition was visited by the Honourable Ministers Shri Subodh Uniyal and Shri Satpal Ji Maharaj, besides the general public. Takeaway materials were also placed at the stall for visitors.

OUTREACH ACTIVITIES

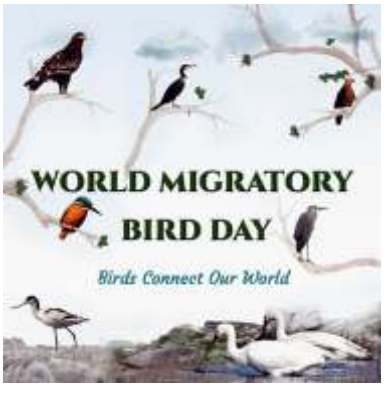
Earth Day Celebrated, Dehradun, 22 April 2020.

Following this year's theme on Earth Day, i.e. Climate Change, the NMCG team at WII decided to create an awareness video revolving around this subject. The team tried to depict how human distancing from the

environment during the pandemic has given it some time to heal. The team made a compilation of all the reports that show nature's process of healing. The reports explained that even after the lockdown is over, everybody should keep the environment and surroundings clean and let them nurture. The members of the Ganga Ridai Eco-club were involved in making a video on how small changes in the daily routines can contribute towards a better environment. The video was uploaded on various social media platforms, like YouTube, Instagram, and Facebook, and was even forwarded on WhatsApp.

Migratory Bird Day Celebrated, Dehradun, 9 May 2020.

It was decided to celebrate the day online because of the current pandemic. The social media platforms, viz. Instagram and Facebook were chosen to conduct the activities. On the official handle, the Ganga Darpan pictures of various birds were uploaded for the participants to identify. The participants with



maximum correct answers were recognized and felicitated.

Celebration of International Day for Biological Diversity, Dehradun, 22 May 2021.

ENVIS Resource Partner at Wildlife Institute of India, Dehradun and WWF India, New Delhi jointly organized a webinar to celebrate the International Day for Biological Diversity. The collaboration was under the Ek Bharat Shrestha Bharat Scheme. The theme for this year was "We're part of the solution #ForNature" as announced by the Secretariat of the Convention on Biological Diversity. The main aim to organize the webinar was to aware people of the importance of biodiversity and its conservation, the coastal and marine ecosystem of India and how the ecosystem is a critical entity in the sustenance of life on this planet earth. If we are part of a solution for nature then only, we could reverse the species decline. Over 262 participants registered themself, more than 200 participants participated through Zoom and 50 plus participants attended webinars through YouTube Live.

The speakers of the webinar Dr Erach Bharucha, Director, Bhartiya Vidyapeeth Institute of Environmental Education and Research (BVIEER) and Dr K. Sivakumar, Scientist-F covered topics related to the importance of biodiversity and its conservation. The audience of the webinar appreciated the talk delivered by the speakers. To mark this important day ENVIS Resource Partner also published an e-poster to aware people of the importance of the day and how the Indians are always 'Part of The Solution' that needs to be strengthened for the better conservation of biodiversity and how much it is important to save the ecosystem.

Celebration of World Turtle Day, 23 May 2021.

World Turtle Day is celebrated every year on 23 May to raise awareness on the importance of turtle and tortoise and their habitats and to help turtles survive and thrive in their natural habitat. To mark this day ENVIS Resource Partner at Wildlife Institute of India organized an online Slogan Writing Contest to celebrate World Turtle Day. The ENVIS RP also published e-posters to aware people of the importance of sea turtles and how much it is important to save sea turtles. It included information on Turtles. The Indian coastal waters support five species of sea turtle and India is the largest known nesting population of olive ridley turtles.

NMCG team of WII decided to celebrate the day by involving school and college students to participate online in drawing, painting, essay writing, slogan writing, and video making competitions. There were three categories based on the classes of students. The theme was 'Turtle Conservation or River Ganga –Pre and Post Lockdown.' The total numbers of entries received were 40. The certificates were awarded to the winners.

Celebration of World Dugong Day, 29 May 2021.

World Dugong Day is celebrated every year on 29 May to aware people of Dugong. ENVIS Resource Partner at Wildlife Institute of India celebrated this important day by publishing an e-poster showcasing a few facts about Dugongs (sea cows) and their habitat. They live only in coastal waters of the Pacific and Indian Oceans and graze on seagrasses. Their life is up to 70 years. The Dugongs have also been categorized as a Schedule I species according to Wildlife Protection Act and are also included in Appendix 1 of CITES. IUCN has classified these as vulnerable species. The e-poster also includes the Prehistoric Dugongs of

India. Ancient India had four species of dugongs, the highest anywhere in the world.

World Environment Day Celebrated, Dehradun, 5 June 2020.

World Environment Day, 2020 was celebrated at WII. The theme for World Environment Day was "Biodiversity", as declared by the UNEP. On this World

Environment Day, the NMCG team of WII tried to reach individuals through social media platforms to take a pledge towards keeping the environment healthy. A pledge and an environment quiz were devised using Google forms, and the link was circulated on social media. The response was great, and a total of 213 individuals took the pledge, and the total number of participants in the quiz was more than 700. A participation certificate was given to every individual. A video clip was prepared, with a message from the Director and Scientists of Wildlife Institute of India explaining the theme of World Environment Day.

Winners of Online Photography Competition

Winners of Online Slogan Writing Competition

The video was uploaded on the newly created Twitter handle of Wildlife Institute of India and on various other social media platforms, which acquired a huge viewer base.

ENVIS Resource Partner, "Wildlife and Protected Areas" at Wildlife Institute of India, Dehradun published an e-poster to mark this important day and organized a webinar on 'Restoring Our Ecosystem for Sustainable Living' in collaboration with Centre for Public Policy and Good Governance (CPPGG), Uttarakhand. Dr Dhananjai Mohan, Director inaugurated the webinar and thanked the CPPGG, Uttarakhand for coming forward and collaborating for the webinar with ENVIS RP Wildlife Institute of India. The webinar was attended by the participants from Forest and Environment Department, Panchayati Raj Department and also the student community. The webinar covered various talk on different topics, namely (i) Restoring ecosystems and livelihoods and nature-based solutions for ecosystem restoration by Dr K.Sivakumar; (ii) Strengthening governance for restoring ecosystems by Dr Nasim Ahmad Ansari; and (iii) Nature-based solutions for ecosystem restorations by Dr Nihal Anwar Siddiqui.

ENVIS Resource Partner at Wildlife Institute of India, Dehradun also organized online events namely Online Photography Competition; Online Poster Competition; and Online Slogan Writing Competition with the collaboration of ENVIS HUB- Uttarakhand Pollution Control Board (UPCB) under Ek Bharat Shrestha Bharat Programme to celebrate World Environment Day on 5 June 2021. The participants from different states appeared in these online contests and submitted their entries online. The winners of the contest got prizes and certificates in different categories.

Webinar Session with School Students, Dehradun, 28 August 2020.

A webinar session was with Gangaridai Eco-club members, where the students were educated about the natural world by the NMCG team members. A total of 56 students attended the session.

Wild with Art, Dehradun, 7 September – 8 October 2020.

A Wildlife Painting Competition was organized online for three categories of students, *i.e.* classes 6-10, classes 7-12 and college students. The theme of the competition was 'Go with the upcoming Wildlife Week'. The results of this competition will be announced by 20 October 2020.

Wildlife Search in Backyard, Dehradun, 7 September – 8 October 2020.

An Online Photography Competition was organized on the theme of 'Wildlife that Surrounds Us'. People

sent photographs of many species they found in their homes or backyard for this competition. The results of this competition will be declared by 20 October 2020.

Hindi Pakhwada Celebrations at WII, Dehradun, 14-28 September 2020.

The Hindi Pakhwada (fortnight) was celebrated at the Institute with full enthusiasm and commitment. It started with a circular by the Chairperson of the Vibhagiya Rajbhasha Karyanwayan Samiti (VRKS) of the Institute, Dr Monali Sen, requesting all the employees and officials of the Institute to maximize their work in Hindi. The banner of Hindi Pakhwada was displayed at the Institute's main gate. The standees were prepared to display the quotations on Hindi by the great leaders and eminent personalities of our country. The messages and videos in Hindi contributed by the Director, Registrar, faculty members and staff were uploaded on the website of the Institute during this period.

On the closing day of Hindi Pakhwada, many activities were organized by the VRKS. A quiz in Hindi was organized for the staff and the officers of the Institute, in which almost all the participants attempted the questions. An extempore speech competition was also conducted for the participants. The Hindi poem recitation was also organized on this day. Dr Dhananjai Mohan, Director, WII and Dr Ruchi Badola, Scientist-G expressed their views on this occasion. Two bilingual signages indicating the path were prepared and installed on the Institute campus.

Constitution Day 2020 Celebrated at WII, Dehradun, 26 November 2020.

On the occasion of Constitution Day, an "Oath-taking" ceremony was held at the Wildlife Institute of India. Its scientist and staff reiterated their commitments towards the "Preamble" of India's Constitution.

Online Workshop with DPOs of Nehru Yuva Kendra Sangathan, Dehradun, 26 October 2020.

An online two-day workshop, "Training the Trainers" was organized with Nehru Yuva Kendra Sangathan (NYKS) District Project Officers of all five Ganga states was conducted to sensitize them about the biodiversity of river Ganga and encourage the youth to get involved in the awareness activities. A total of 40 participants attended the workshop.

Painting on Walls, Uttarkashi, Bijnor and Hooghly, October and November 2020.

Painting on walls was done in Uttarkashi, Bijnor and Hooghly to create awareness about the biodiversity of Ganga and its importance.

Online Slogan/ Poem Writing Competition, "Kavya Ganga", Dehradun, 2 November 2020.

WII organized an online slogan/ poem writing competition, "Kavya Ganga" for school students of three groups, *i.e.* classes 5-8, classes 9-10 and classes 10-12. Over 80 entries were received from all over the country.

Youth Participation in Namami Gange Program, Dehradun, 17 November 2020. An online training session on "Youth Participation in Namami Gange Program" was conducted in the regional level training workshop, which was organized by NYKS in Lucknow. A total of 41 participants attended the session.

Online Workshop with NYKS District Youth Coordinators, Dehradun, 28 November 2020.

Following the first session of "Training the Trainers" with NYKS District Project Officers of all five Ganga states, an online workshop with NYKS District Youth Coordinators of all five Ganga states was conducted to sensitize them about the biodiversity of river Ganga and encourage the youth to get involved in the awareness activities. A total of 36 participants attended the workshop. The guest session was conducted by Dr Vishnupriya Kolipakam on river dolphins.

A Workshop Session with the Veterinarians of Uttarakhand State, Dehradun, 11 January 2021.

A workshop session with the Veterinarians of Uttarakhand State was held on 11 January 2021 in Wildlife Institute of India, Dehradun. A total of 36 participants attended the session.

An Awareness Session with Gangangaridai Nukkad Natak, Varanasi, 3 January 2021.

An awareness session with Gangangaridai Nukkad Natak by the Varanasi team was held at Ganga Darpan Interpretation Centre in Sarnath, Varanasi.

World Wildlife Day 2021 Celebrations, 3 March 2021.

(i) *At Asan Conservation Reserve:* An awareness workshop with schools near Asan River was conducted on the occasion of World Wildlife Day. Forty-four students participated in the interactive session.

(ii) *At Ganga Darpan, Sarnath:* The students were sensitized about the turtles found in River Ganga by the researchers through the digital story. Total fifty students participated in the workshop.

International Women's Day 2021, 8 March 2021.

International Women's Day 2021 was celebrated with female students and teachers at Ganga Darpan. The role of teachers and students in river conservation was discussed. A total of 56 women participated in the workshop.

International Day of Action for Rivers Celebrated by WII, Uttarkashi, 14 March 2021.

The International Day of Action for Rivers was celebrated by WII-NMCG with enthusiasm. An activity was conducted with 84 school students and teachers of Sanskrit Mahavidyalaya, Uttarkashi. All the students took the pledge to be a part of river conservation.

Ganga Chaupal with women group in Bhatwari Block near Assi Ganga was organized on 14 March 2021. Forty women participated and talked about how their daily activities can help in river conservation. Other important topics, such as Alternatives of plastic, rainwater conservation and waste segregation, were also discussed.

Tiger Cell

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 the past year include:

Countrywide assessment of tigers, co-predators, prey and their habitat:

(i) Coordinated with the States and provided scientific and technical inputs to conduct Phase I survey in all potential tiger habitats of 20 states of the country.

(ii) Customized shapefiles for 615 Forest Divisions of the country for systematic collection of Phase I data in MSTrIPES framework.

(iii) Analyzed Phase I data from about 491 Forest Divisions of India to generate country-wide occupancy and distribution maps for tigers, co-predators and prey.

(iv) As a part of Phase II, covariates on habitat characteristics and human impacts were obtained from remotely sensed data for modelling tiger occupancy and abundance.

(v) Processed and analyzed about 3.48 crores camera trap photographs received from 141 sites with 26,838 camera trap locations.

(vi) Analyzed 76,651 tiger images and 51,777 leopard images in program ExtractCompare and Hot Spotter for their identification.

(vii) A total of 1,546 genetic samples were analyzed for individual identification of tigers to arrive at minimum tiger numbers.

(viii) Twelve sites were sampled for estimating prey abundance from camera trap-based distance sampling using Random Encounter Model (REM) framework. Testing and development of a REM data processing tool are underway.

(ix) Showcased all India tiger estimation process to three International peers (Dr Chris Carbone, Dr Joseph Bump and Dr Matt Hayward).

(x) Prepared a summary report titled "Status of tigers in India 2018" which was released by the Honorable Prime Minister of India on 29 July 2019 on the occasion of the Global Tiger Day.

Monitoring System for Tigers: Intensive Protection and Ecological Status (MSTrIPES):

(i) An image processing software known as CaTRAT (Camera Trap data Repository and Analysis Tool) was developed and used for geo-tagging of camera trap images obtained from the field.

(ii) A web server which is a systematic database of the data generated using the MSTrIPES program from across the implementation sites has been hosted at Tiger Cell. This makes the server the

largest repository of information on wildlife crimes, illegal activities, human disturbances, ecological status of important species, habitat parameters and human-wildlife conflict.

(iii) Regular inputs in conceptualization, design and customization of multilingual android mobile applications for MSTrIPES patrol and ecological modules.

(iv) Currently apps are being developed for a higher version of Android (Android 7.0 onwards).

(v) MSTrIPES Polygon search module app developed for North East, Jammu & Kashmir and Jharkhand.

Management Effectiveness Evaluation (MEE) of Protected Areas and Tiger Reserves: Provided inputs by reviewing MEE draft reports from 20 sites.

National Repository for Camera Trap Photographs of Tigers (NRCTPT):

(i) Over 40,000 tiger photographs maintained under the National tiger photo database library at the Cell. New tiger photographs obtained as a part of the national tiger assessment 2018 are being archived.

(ii) 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.

Training and Capacity Building: During the past one year, three regional workshops were conducted with the assistance of WII's MSTrIPES team to train about 400 officials, frontline staff, computer operators, GIS technicians and field biologists of Forest Departments of Jharkhand, Rajasthan, Arunachal Pradesh and WWF India on MSTrIPES patrol module and ecological protocols.

Research and technical assistance to NTCA, Government of India and State Forest Departments:

(i) Evaluation of about 28 proposals on developmental projects in the tiger landscapes of the entire country and reports communicated to NTCA and Wildlife Division of MoEFCC for Standing Committee of National Board for Wildlife.

(ii) Supervision of a research project on tiger and prey augmentation in Palamau Tiger Reserve, Jharkhand.

(iii) Participated and prepared posters and standee for NTCA stall in India Pavilion at 13th Conference of Parties of Convention on the Conservation of Migratory Species (CMS-COP) held at Gandhinagar, Gujarat.

(iv) Inputs in 14th Conference of the Parties to the UN Convention to Combat Desertification (UNCCD COP) held in New Delhi.

(v) Inputs on assessment of tiger reintroduction program in Sariska Tiger Reserve, Rajasthan.

(vi) Mapping of structural connectivity for Panna Landscape, Madhya Pradesh.

(vii) Corridor mapping for Sunabeda landscape, Odisha.

(viii) Inputs in the investigation of tiger death (ST 16) in Sariska Tiger Reserve, Rajasthan as a part of NTCA appointed committee.

(ix) Participated and presented in Capacity building workshop on countrywide assessment of Tiger, Prey and Habitat organized by Global Tiger Forum in Kathmandu, Nepal in July 2019.

(x) Presented MSTrIPES conflict module in the "Collaborative approaches for Human-Wildlife Conflict" meeting organized by Uttarakhand Forest Department.

(xi) Inputs in vertical training organized by NTCA at Palamau Tiger Reserve, Jharkhand.

(xii) Inputs on the revision of tourism carrying capacity within the core zone of Kanha Tiger Reserve, Madhya Pradesh as a part of the NTCA appointed committee.

(xiii) Regular inputs in review meetings, Technical Committee Meetings, Chief Wildlife Warden and Field Directors' meetings organized by NTCA.

(xiv) Regular inputs in PG Diploma, Certificate, M.Sc., PhD courses of WII.

(xv) 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 2020-21, the main thrust of the activities has

been on the updating of the databases on Protected Areas, Species and Wildlife Bibliography, based on the collection of current information from various published/unpublished sources during the above mentioned period. The Protected Area Database of the country has been updated and presently there are 981 Protected Areas including 104 National Parks, 566 Wildlife Sanctuaries, 214 Community Reserves and 97 Conservation Reserves in the country, covering 1,71,921 km^2 which is 5.23% 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 current literature published on Indian wildlife in various issues of journals/ periodicals during the said period. The Protected Area Network report has been updated by incorporating the latest information. The Website of the national wildlife database has been updated further by incorporating the latest information. Nearly two hundred queries were received and outputs were provided in various desired formats.

Herbarium

During the reporting period, herbarium staff provided their inputs in various field activities and surveyed different protected areas. Approximately 750 plant specimens were identified, which were collected by research scholars and faculty members from various parts of the country, such as Pin Valley National Park, Harike Wildlife Sanctuary, Punjab, Rajaji National Park, Corbett National Park, Kedarnath WS, and along rivers like Ganga, Yamuna, Damodar, Ramganga etc. and Haiderpur wetland. The plant specimens collected under various projects were also identified.

Campus Development

The construction work of stone masonry boundary wall with G.I. Chain link fabric fencing in Block-III; and Construction of brick boundary wall in Block-I & IV were completed. The construction of reproductive control laboratory and the construction of an Animal Housing facility at WII; and the Construction of Porta Cabin for Tiger Project staff at WII are in progress during the reporting period.

Wildlife Institute of India - Category 2 Centre (WII-C2C) for World Natural Heritage Management and Training for Asia and the Pacific Region

The Agreement between the Government of India and UNESCO for the establishment in Dehradun of a 'Centre for World Natural Heritage Management and Training for Asia and the Pacific Region as a Category 2 Centre under the auspices of UNESCO was formally signed on 2 September 2015 by the Director-General of Forests, Ministry of Environment, Forest and Climate Change, Government of India as a counterpart to the signature by the Director-General, UNESCO, Paris. The signing followed the approval of this Agreement by the Government of India's Cabinet of Ministers, chaired by Hon'ble Prime Minister, Shri Narendra Modi on 5 August 2015.

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.

Nominations/ Dossiers

A key objective of the Centre is to contribute towards enhancing the representation of properties on the World Heritage List. Towards this end, the Centre offers technical support to State Parties in the process of nomination of World Heritage Sites.

World Heritage Nomination Dossier Preparation for Garo Hills Conservation Area, Meghalaya, India: The proposed site of Garo Hills Conservation Area (GHCA), Meghalaya was formally placed on the Tentative List of India's World Heritage Sites in September 2018. Subsequently, an agreement was signed between the Chief Wildlife Warden, Government of Meghalaya and the Wildlife Institute of India, Dehradun in December 2018 for the preparation of a detailed proposal for the inscription of Garo Hills Conservation Area as a World Heritage Site. Towards this end, WII-C2C has undertaken various activities, both in terms of field tour and literature documentation for the proposed site, as well as meetings and consultations with relevant stakeholders.

A first draft of the nomination dossier, as per the nomination format, viz. Annex 5 of

the Operational Guidelines for the Implementation of the World Heritage Convention for the inscription of Garo Hills Conservation Area, Meghalaya as a World Heritage Site was submitted to the Government of Meghalaya in October 2020 for review and further finalisation. This was followed by a high-level meeting with the Hon'ble Minister and senior officials of the Department of Environment & Forest, Government of Meghalaya in January 2021 to share the status of the nominations dossier and acquire necessary feedback. Currently, work is in progress to update the document for final submission.

Proposal for the nomination of Kailash Landscape within India on the Tentative List of World Heritage Sites in India:

The WII-C2C has been associated with the process of documenting the Kailash Landscape in India to be placed on the Tentative List of Indian World Heritage Sites towards the purpose of a future nomination as proposed UNESCO World Heritage Site. Several consultations and workshops were held with a spectrum of stakeholders during the preceding years. A proposal for inclusion of the 'Sacred Mountain Landscape and Heritage Routes', encompassing the Pithoragarh District of Uttarakhand State, India, on the Tentative List of World Heritage Sites in India was forwarded to the World Heritage Centre in April 2019. WII-C2C has subsequently communicated with and received a certified map from the Survey of India outlining the international boundary of India in the region where the Kailash landscape is located in the Pithoragarh district of Uttarakhand, India.

Adi Kailash Landscape Expedition, 8-16 October 2020:

A seven-member multidisciplinary team headed by Dr Dhananjai Mohan, Director, WII conducted an expedition to the Adi Kailash Landscape to identify its key sites of natural and cultural importance for nomination as a UNESCO World Heritage Site. The said landscape covers an area of 6,386 sq km within India in the Pithoragarh district of north-western Uttarakhand. Through the expedition, the team documented a wide variety of its Himalayan and trans-Himalayan ecosystems, habitat and biodiversity alongside the religio-spiritual significance of the Adi Kailash landscape. During the expedition, the team completed a kora (sacred circuit) of the Adi Kailash peak (5,975 m) using the high altitude Sinla Pass (5,500 m) to cross over from the Vyans to the Darma valley. The team travelled through several scenic and culturally relevant settlements including Tawaghat, Chhiyalek, Garbyang, Gunji and Kuti along with a slight detour for Kalapani, the origin of the river Kali and Om Parvat. On this mountain slope, snowfall appears to take the shape of the holy word "Om". The team also experienced the cultural richness of the region's main inhabitants, the Rung community, whose traditional lifestyle is intricately linked with nature. As a member of the team, Shri Bishan Singh Bonal, President, Rung Kalyan Sanstha, Former ADG (Project Tiger/WL & HoFF) brought in the particular perspective of having grown up in the region and the team's visit to his ancestral village of Baun was of specific value. Shri Arun Kumar Saini, Officer Surveyor, represented the Survey of India on the team to corroborate the boundaries of the proposed landscape.

The expedition team concluded that though the region was dotted with culturally significant natural sites, more rigorous work about mapping to historical sources was needed. WII-C2C has also engaged with the Rung Kalyan Sanstha (RKS), a civil society organisation comprising of members from the local ethnic community, who have submitted a document on key cultural attributes of the proposed Kailash landscape.

Project on potential World Heritage Sites in Madhya Pradesh, India:

Madhya Pradesh Tourism Board has signed an agreement with WII-C2C for a project titled, 'Identification and prioritization of potential World Heritage Sites in the Madhya Pradesh State of India'. For this purpose, the Centre is undertaking various activities for documenting potential sites with Outstanding Universal Value in Madhya Pradesh that may be included in the Tentative List of World Heritage Sites of India. Inception meetings and consultation workshops have been conducted with

key stakeholders in Madhya Pradesh for preliminary identification of potential sites in the State.

WII-C2C conducted a capacity-building workshop in Orchha for 'Inventorisation and Prioritisation of Potential World Heritage Sites in Madhya Pradesh' for tourist guides in the State during November 2020. This was followed by a field visit to Bhedaghat, Jabalpur for documentation of its values. A sharing-cum-consultation workshop on the project was organised in January 2021 in Rishikesh with high-level Tourism and Forest officials of the Government of Madhya Pradesh. A field visit was undertaken to some of the identified sites in Bhedaghat and Satpura, Madhya Pradesh for community interaction and PRA exercise in March 2021. This was followed by another national-level consultation organised in Pachmarhi during 19-20 March 2021 for finalising the criteria of the selected sites. WII-C2C formally submitted to the MPTB at the end of March 2021 the final Tentative List documentation for two priority sites, namely, Satpura Tiger Reserve and the Bhedaghat Landscape in Madhya Pradesh. This was subsequently submitted onwards to ASI and UNESCO World Heritage Centre and the two sites are now successfully included in the Tentative List of India.

Periodic Reporting for World Heritage Sites of the Asia and Pacific Region:

Periodic Reporting is one of the core conservation monitoring mechanisms of the World Heritage Convention. The Periodic Reporting process provides an assessment of the application of the World Heritage Convention by the States Parties, i.e. the legislative and administrative provisions which they have adopted and other activities which they have taken for the application of this Convention in their territory. It also provided updated information about the sites to record possible changes in the state of conservation of sites. The process is undertaken through a specially formulated Questionnaire which has to be filled with information on the World Heritage Sites of each country. C2C, under the aegis of the World Heritage Centre, play a key role in the Periodic Reporting process on a regional scale.

In this context, WII-C2C has been integrally involved with the current Third Cycle of Periodic Reporting for Asia and the Pacific Region during 2020-21. The Centre's specific responsibility is to provide technical support and capacity-building for thematic issues of natural sites. In addition, the Director, Wildlife Institute of India has been designated as National Focal Point for Natural/Mixed Sites in India. WII-C2C participated in all the bimonthly capacity building sessions on this process conducted by the World Heritage Centre from September 2020 through March 2021. The Centre also made specific presentations during the WHC sessions for Asia-pacific members on its role and activities related to Periodic Reporting in December 2020 and on its experiences with Management Planning and Management Effectiveness Evaluation of World Heritage Sites in March 2021.

The Centre has also conducted capacity-building sessions for Site Managers of Natural/ Mixed World Heritage Sites in India, both in online and offline mode. Following several online sessions for technical support to the Site Managers, a workshop was held for representatives of all the Indian sites in Kaziranga National Park, Assam during 3-4 March 2021. Opening remarks were made by Dr Dhananjai Mohan, Director, Wildlife Institute of India and National Focal Point for Natural/ Mixed Sites in India. A special address was provided by Mr Amit Sahai, PCCF (Wildlife), Assam and Dr V.K. Yadav, Chief Wildlife Warden, West Bengal. Fifteen participants included guests and site managers from six Natural World Heritage Sites viz. Great Himalayan National Park Conservation Area, Kaziranga National Park, Keoladeo National Park, Manas National Park, Sundarbans National Park and the Western Ghats. The programme comprised of orientation on World Heritage, overview of reporting and monitoring obligations, hands-on session on filling-up the Periodic Reporting Online Questionnaire, followed by a field visit to understand the Outstanding Universal Value of the Kaziranga National Park.

WII-C2C Participation in 3rd Cycle of Periodic Reporting for APA Schedule of Training Sessions conducted by UNESCO World Heritage Centre:

- Warm-Up & Information Session, 24 September 2020.
- Access & Use of the Questionnaire – Refresher Session, 8 October 2020.
- Questionnaire Walk-Through: Section I, 15 October 2020.
- Questionnaire Walk-Through: Section II, 22 October 2020.
- Action Plans: Suwon Action Plan for Asia, 29 October 2020.

- Understanding Outstanding Universal Value & Attributes, 12 November 2020.
- Synergies between Conventions, 19 November 2020.
- Factors Affecting the Properties (C, N, M), 3 December 2020.
- Reporting On Natural Heritage, 17 December 2020.
- Q&A Session: Section I, 14 January 2021.
- Maps, Boundaries & the Retrospective Inventory, 28 January 2021.
- Sustainable Development Goals & World Heritage, 11 February 2021.
- Management Plans & Impact Assessments, 25 February 2021.
- Q&A Session: Section II, 11 March 2021.

WII-C2C Presentations for APA Region:

- WII-C2C Overview of Activities and Experience with Periodic Reporting, 17 December 2020.
- WII Role in Management Planning and Management Effectiveness Evaluation Framework, 11 March 2021.

WII-C2C Sessions for National Focal Point & Site Managers India:

- First Briefing Session for World Heritage Sites (Natural/ Mixed), India (online), 21 October 2020.
- Training Session for Site Managers (Natural/ Mixed), India (online), 13 November 2020.
- Training Session for Site Managers (Natural/ Mixed), India (online), 16 December 2020.
- Capacity-building Workshop on Periodic Reporting for World Heritage Site Managers (Natural/ Mixed), India (on-site in Kaziranga National Park, Assam, India), 3 March 2021.

Mainstreaming Natural Heritage

Towards the purpose of mainstreaming and capacity building on natural heritage in policy and practice in

India and the region, WII-C2C and ASI have agreed in principle to establish collaboration and strengthen their partnership in this sector. An MoU has been signed between the two agencies in March 2021 on Academic and Research Collaboration including undertaking joint research projects, capacity-building workshops/ training expeditions to heritage sites and strengthening interdisciplinary courses in heritage conservation.

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.

State of Conservation Report 2020 for World Heritage Sites: As part of the advisory and technical support mandate of WII-C2C India, the Centre provided necessary inputs for preparation of the World Heritage State of Conservation (SoC) Report 2020 for World Heritage Sites of Manas Wildlife Sanctuary, Assam, Great Himalayan National Park Conservation Area, Himachal Pradesh and Sundarbans National Park, West Bengal for submission to UNESCO World Heritage Centre by December 2020.

Technical Advice to Central and State Governments of India: The Centre provided inputs on the official response to the Government of India on several Parliamentary Questions related to natural World Heritage Sites in India. These included the response to

queries raised in both the Lok Sabha and Rajya Sabha on varied topics, viz. number of World Heritage Sites, new proposals under consideration, actions for the conservation of the sites, etc. The Centre also provided review and comments on proposals for Tentative Listing in India (Natural/Mixed Sites) to the Archaeological Survey of India, the nodal agency for World Heritage in the country.

Inputs for IUCN World Heritage Outlook 2020: World Heritage Outlook, an initiative by IUCN, is a global assessment of all natural World Heritage Sites and the action needed to achieve excellence in their conservation. The assessment is undertaken to fill the current knowledge gap on such sites and provide a global overview of their state of conservation. Following the first two Outlook reports in 2014 and 2017, the current assessment is ongoing in 2020. WII-C2C has been associated with this process providing information on on-site managers and knowledge experts and verifying the site assessment reports. In this context, a meeting was held of the Regional Review Group for Asia comprising WCPA Asia members on 9 September 2020 to discuss the overall results, including overall consistency of final ratings if considered across the region. WII-C2C provided feedback was provided related to assessments of Indian Natural World Heritage Sites. The final IUCN World Heritage Outlook 2020 was released in December 2020 for all natural World Heritage Sites.

Celebration of World Heritage Day, Dehradun, 18 April 2020.

Due to the global outbreak of Covid-19 and the containment measures, WII-C2C celebrated World Heritage Day (WHD) on 18 April 2020 by organizing drawing and essay writing competitions through an online system by following social distancing norms suggested by the Government of India. To commemorate the occasion and spread awareness about natural heritage among students, children of officials and staff of forestry institutions based in Dehradun, studying in 9 different schools, participated in the online competitions. Entries were evaluated by a 4-member committee. Criteria for evaluation included relevance to the subject, originality/ perspective, composition and overall presentation. Prizes were awarded to the top three candidates in both essay writing and drawing competitions, including consolation prizes to encourage the participants.

Research & Monitoring

A function of the Centre is to research identified priority areas related to natural World Heritage protection and management, including a focus on models of community participation. The World Heritage Committee also encourages State Parties to support research, since knowledge and understanding are fundamental to the identification, management and monitoring of World Heritage properties.

Plausible alternative futures of Island mangroves in the Asia-Pacific: Scenario-based analysis and quantification of mangrove ecosystem services in coastal hazard mitigation and climate change adaptation in Andaman Island, India:

A collaborative research study under a project funded by Institute for Global Environmental Strategies (IGES), Japan is being carried out on the mangroves of the Andaman Islands in India to combat the possible adverse impacts of climate change. Particularly, ecosystem services of mangroves remain at the centre of discussion considering their exceptional ability to survive in the fragile coastal environment, while providing tremendous services such as storm surge control, sediment retention, arresting carbon, etc. Yet, despite such services, mangroves are still among the fastest declining tropical forests, especially in Asia-Pacific, owing to the large-scale alteration of their natural habitats. In the preliminary phase, an extensive literature review was carried out to understand the Mangrove change patterns over time. The study area is fairly well studied in the post-tsunami event of 2004. The Land Use Land Cover of Andaman Island is mapped using satellite images for a three-time period (2005, 2010 and 2019) to understand the spatial extent of Mangrove and its relationship with other Land Cover types.

In the present study, the Land Use Land Cover of Andaman is classified into the following six classes at 1: 50,000 scale. These six classes are Built-up, Cropland, Forest, Mangrove, Mangrove degraded and Waterbody. The satellite image was classified based on the visual interpretation key which takes into consideration the elements of visual interpretation like tone, texture, colour, shape, location, association.

Long-term Monitoring of Outstanding Universal Values (OUV) of Great Himalayan National Park Conservation Area:

Himachal Pradesh Forest Department and WII-C2C on Natural World Heritage Management and Training for Asia and the Pacific Region, Wildlife Institute of India Dehradun signed a Memorandum of Agreement (MoA), to conduct the study on "Long-term Monitoring of Outstanding Universal Values of Great Himalayan National Park Conservation Area". The present project activities scheduled to complete on annual basis, i.e. from 2020 to 2022.

A desktop review is being carried out to identify features of Outstanding Universal Values within the identified study area and the surrounding region. For this purpose project team members are engaged in

reviewing published literature, reports to collate the data related to Outstanding Universal Values of potential sites. A range of additional sources of information including scientific reports produced by, and information on the websites of HP Forest Department, and relevant Institutes have also been reviewed. Due to the current pandemic situation field project activities were initiated in November 2020. A team of WII visited GHNPCA and met with the Director and DFO of GHNPCA on 26 November 2020 at Shamshi, Kullu and discussed project work. This was followed by a planning workshop with the officials and staff of GHNPCA on 18 February 2021 to discuss the next steps of the initiation of the project.

International Convention Cell

The International Convention Cell was created at the Wildlife Institute of India, Dehradun on 18 December 2020. In compliance with the 49th GB and with the approval of competent authority, the Institute established a Convention Cell to provide technical assistance to MoEFCC in meeting its obligations towards International Conventions relating to wildlife. The Convention Cell will function as a think tank to address the Sustainable Development Goals.

The mandate of the Cell are as follows: (i) The Cell will critically analyze primarily the three Rio Conventions, i.e. UNCBD, UNCCD, UNFCCC and other related conventions to wildlife, biodiversity and ecosystem services specifically in the Indian context; (ii) Act as repository and dissemination of information to the conventions; (iii) The Cell will work towards building the capacity of relevant stakeholders to deal with various activities of international conventions in India; (iv) The Cell will provide specific inputs to wildlife, ecosystem, disaster risk reduction and National Status Reports for each convention.

The Cell will function under the direct control of the Director, WII. The Nodal Officer, Wildlife Policy Research Cell (WPRC) will deal with all necessary routine works and secretarial support. A team of four scientists is constituted to coordinate the required functioning of the Cell towards fulfilling its mandates. The Cell will be housed in the WII-C2C building henceforth.

Vigilance Cases of WII for the Year 2020-21

Vigilance Cases as on 01.04.2019	No. of vigilance cases added during the year	No. of vigilance cases pending as on 31.03.2020
Nil	Nil	Nil

(Dr. Monali Sen)
Chief Vigilance Officer

Right to Information

RTI Cases	Opening Balance as on 1st April 2020	No. of new applications directly received from Indian Citizens during 2020-21	No. of new applications received as transferred from other Public Authorities during 2020-21	2019-20 No. of applications transferred to other Public Authorities during 2020-21	No. of applications as on 31.03.2021	No. of applications rejected during 2020-21	No. of applications disposed off during 2020-21	No. of applications not disposed off/rejected and hence carried forward to next year 2021-22
(a)	(b)	(c)	(d)	(e)	(f) (b+c+d)-(e)	(g)	(h)	(i) {f-(g+h)}
RTI Application	06	103	13	00	122	00	119	03
First Appeal	01	20	00	00	21	00	17	04
CIC Cases	00	01	00	00	01	00	01	00

CPIO (RTI)

VISITORS

VISITORS

- IFS Probationers from Indira Gandhi National Forest Academy, Dehradun, 5 January 2021
- Forest Guards from Forest Training Institute, Sundernagar, Himachal Pradesh, 5 February 2021.
- B.Sc. Students (Forestry) 2017 Batch from Forest College and Research Institute Hyderabad, 9 February 2021.
- Visit of Veterinary Officers from ITBP, Dehradun, 19 February 2021.
- Study tour of forest guards from Forest Training Institute, Sundernagar, Himachal Pradesh, 15 March 2021.

Teaching Inputs Provided to Other Institutions in Dehradun

Dr Abhijit Das (3 May 2020). B**eautiful amphibians of India.** Regional Museum of Natural History, Bhubaneswar.

Dr Abhijit Das (1 June 2021). **Research opportunities in field herpetology.** Bodoland University, Assam.

Dr Abhijit Das (17 June 2021). **Herpetofauna Conservation: What it all takes?** University of Science and Technology, Meghalaya.

Dr Abhijit Das (7 July 2021). **Azadi ka Amit Mahotsav: Herpetofauna of Northeast India.** Tripura Forest Department.

Dr Abhijit Das (12 July 2020). **Snakes conservation issues.** Vizag Zoo, Andhra Pradesh Forest Department.

Dr Abhijit Das (23 July 2020). **Xap, Bhekuli: Herpetofauna of Assam**. Gauhati College, Guwahati.

Dr Abhijit Das (25 July 2020). **Snakebite mitigation.** Aaranyak, Guwahati.

Dr Abhijit Das (26 July 2020). **Snakebite: How can we prevent it?** Wildlife Trust of India.

Dr J.A. Johnson (3 August 2020). **Teaching inputs for IFS Probationers (2019-2021 batch) through Webinar.** Indira Gandhi National Forest Academy, Dehradun.

Dr Abhijit Das (7 August 2020). **Herpetofaunal research thrust areas.** Sikkim University.

Dr Abhijit Das (21 August 2020). **Research opportunities in Herpetology.** Digboi College, Assam.

Dr Abhijit Das (14 September 2020). **Research Opportunities in Barak Valley and Beyond.** G.C. College, Silchar.

Dr Abhijit Das (3 October 2020). **Conservation of Reptiles and amphibians.** Ministry of Environment, Forest and Climate Change.

Dr Ramesh Chinnasamy (6 October 2020). **Introduction to Human-Wildlife Conflict and Mitigation, National Webinar on celebrating "World Wildlife Day."** Virtual meet - Nature Club of Rajapalayam Rajus College, Rajapalayam, Tamil Nadu, India.

Dr Malvika Onial (7 October 2020). **Wildlife Week - 2020.** Department of Forestry, Dolphin PG Institute of Biomedical and Natural Sciences, Dehradun.

Dr Malvika Onial (22 November 2020). **Panellist in a session on the 'Wild Heart of India' Literary Seminar.** Valley of Words International Festival 2020.

Dr Abhijit Das (20 January 2021). **Herpetofauna of Himalaya.** Zoological Survey of India, Kolkata.

Dr Abhijit Das (17 February 2021). **Herpetofauna of Northeast India.** Ashoka Trust in Research in Ecology and Environment.

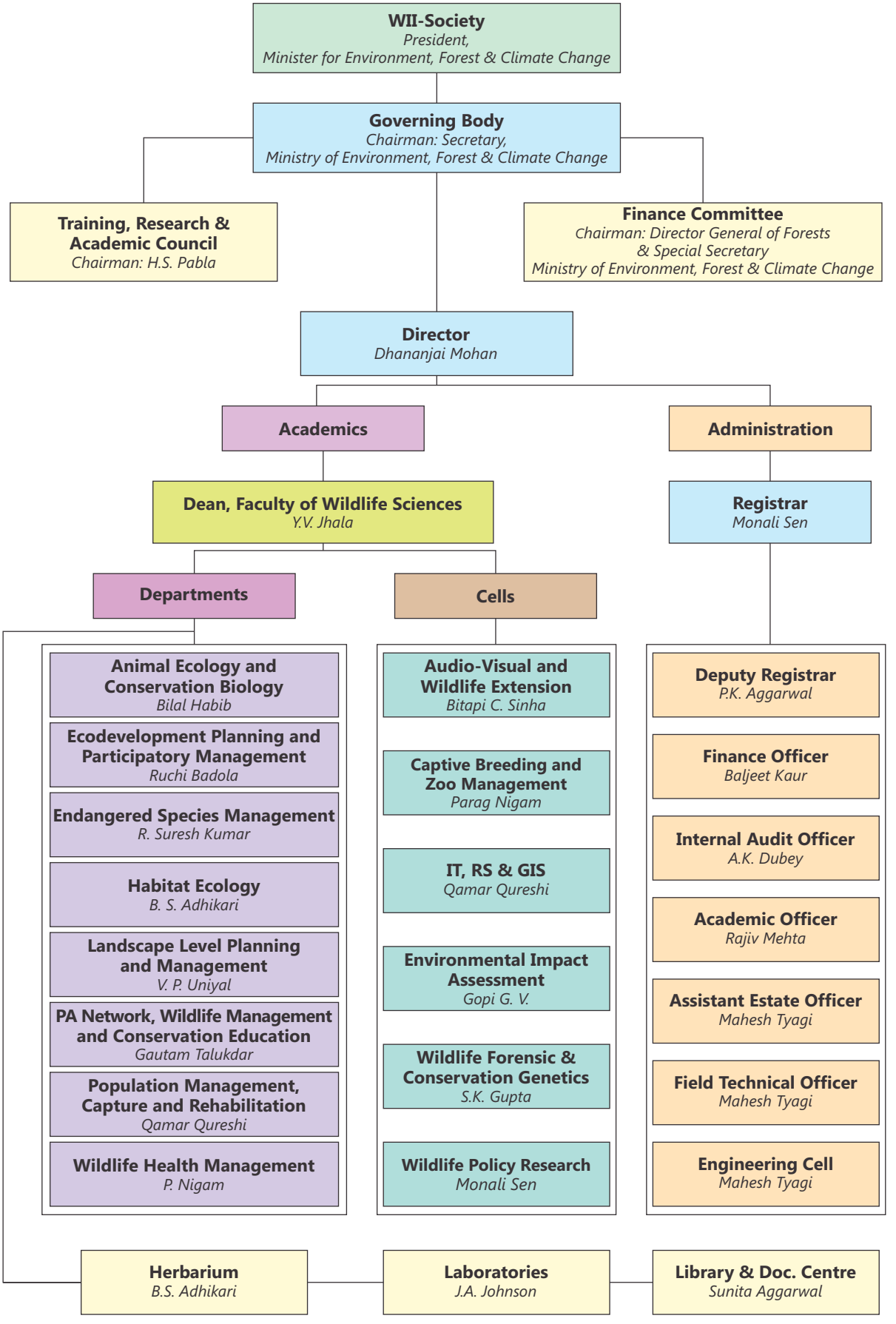
Dr Malvika Onial (20 February 2021). **Panellist in a webinar on the contribution of tourism for conservation and enhancement of world heritage sites in India.** Development and Research Organisation for Nature, Arts and Heritage, India.

Dr Abhijit Das (4 March 2021). F**ield techniques, population studies, identification, marking of Reptiles and amphibians.** IWAH, ZSL and Royal Veterinary Students.

Dr Kafil Hussain (18 March 2021). **Nutritional diseases in wild animals (Online lecture).** Department of Animal Genetics and Breeding (AGB), College of Veterinary Science & AH, Junagadh Agricultural University, Junagadh.

GOVERNANCE

ORGANISATIONAL STRUCTURE OF WII



WII-ORGANISATION CHART
WII-SOCIETY

President

1. Hon'ble Minister of Environment, Forest & Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road,
New Delhi-110 003

Vice-President

2. Hon'ble Minister of State for Environment, Forest & Climate Change,
Government of India,
Indira Paryavaran Bhavan,
Jor Bagh Road,
New Delhi-110 003

Members

3. Hon'ble Member of Parliament,
Lok Sabha, New Delhi,
802, Narmada Apartments,
Dr. Bishambar Das Marg,
New Delhi-110 001

4. Hon'ble Member of Parliament,
Lok Sabha,
18, Janpath,
New Delhi-110 001

Permanent Address
222, Urban Estate-II,
Hisar – 125 005 (Haryana)

5. Hon'ble Member of Parliament,
Rajya Sabha,
C-1/22, Humayun Road,
New Delhi

North –East India

6. Hon'ble Forest Minister, Assam,
Janata Bhawan 326,
D-Block Dispur,
Guwahati - 781 006

7. Minister of Forest & Environment Department,
Sericulture & Weaving Department,
Warimagirr, Williamnagar,
East Garo Hills Dist Meghalaya

8. Hon'ble Chief Minister & Forest Minister,
Arunachal Pradesh,
Gyangkhar village,
P.O Lemberdung,
PS Tawang, Dist. Tawang,
Arunachal Pradesh

Eastern, India

9. Hon'ble Dy. Chief Minister & Forest Minister,
Office of Dy. Chief Minister,
Main Secretariat,
Patna – 800015, Bihar

10. Hon'ble Chief Minister & Forest Minister,
Jharkhand,
Chief Minister Residence, Kanke Road,
Ranchi – 834 008

Western Region

11. Hon'ble Minister of Forest,
Environment & Panchayat,
G-1 Ground Floor,
Golden Hill Apartment, Mangor,
Vasco-Da-Gama, Goa

12. The Hon'ble Minister of Forests & Environment,
Government of Gujarat,
1st Floor, Swarnim Sankul-1, New Sachivalaya,
Gandhinagar, Gujarat

Southern India

13. Hon'ble Minister of Environment and Forests,
Science and Technology,
Govt. of Andhra Pradesh,
Room no: 121, L-Block
Hyderabad, Andhra Pradesh

14. Hon'ble Minister of Forest, Ecology & Environment,
Govt. of Karnataka,
Vikasa Soudha,
Bangalore 560 001

Northern India

15. Hon'ble Minister of Public Works (B&R),
Forests, Architecture & Civil Aviation,
Haryana Civil Secretariat, 8th Floor,
Chandigarh.

16. Hon'ble Minister of Food & Civil Supply,
Environment & Forest & Education,
Govt. of NCT of Delhi,
A-Wing, 8th Level,
Delhi Secretariat, IP Estate,
New Delhi- 110002

Central India

17. Hon'ble Minister of Forests,
"Mingachal",
D 7-8, Bharat Mata Chowk,

Shankar Nagar,
Raipur, Chhattisgarh

Permanent Member

18. Hon'ble Forest Minister
Uttarakhand
Shrikhot, Ganganali,
Srinagar, Garhwal

19. Shri Uday Singh Wala
CEO, WL Epic Media P Ltd.,
Bungalow 82, Aram Nagar Part 2,
Andheri West, Mumbai – 400061

20. Shri Vijay Mehta,
Chairman,
Mefcom Group,
5th Floor, Sanchi Building,
77, Nehru Place,
New Delhi – 110 019

21. Shri T.K. Joshi,
Conservationist,
B- 22, New Krishna Park,
New Delhi - 110 018

Address at Dehradun-
Shri T.K. Joshi,
Laxmi Kant Niwas,
Salan Gaon, Bhagwantpur,
Dehradun - 248 009 (Uttarakhand)

22. Shri Himanshu Malhotra,
Wildlife Film Maker & Conservationist,
Multi-Media, C-50 Defence Colony,
New Delhi – 110024

23. Shri Damodar Sharma, IAS (Retd.),
Former Secretary (Forests),
Government of Rajasthan,
House No. 65, Scheme No. 08,
Aditya Vihar, Gandhipath,
Vaishali Nagar,
Jaipur – 302 021 (Rajasthan)

24. Shri R.P. Agarwalla, IFS (Rtd.),
21 B, Hatisil Kharghuli,
Dr. Bhupen Hazarika Path,
Guwahati – 781 004

25. Dr H.S. Singh,
Plot 44, Sector-8,
Gandhinagar – 382 010 (Gujarat)

26. Director-General,
Institute of Technology and Science (ITS),
Mohan Nagar,
Ghaziabad – 201 007

Residence:
155 B, Pocket IV,
Mayur Vihar Phase I,
Delhi – 110 091

27. Professor Dileep K. Singh,
Professor,
Department of Zoology,
University of Delhi,
Delhi –110 007

28. Shri S. S. Bisht
Former Principal Chief Conservator of Forests &
Head of Forest Force,
Government of West Bengal,
Bist Bhawan, Lane C-12, Turner Road,
Dehradun

29. Director,
Bombay Natural History Society,
Hornbill House, Opp.Lion Gate,
Shaheed Bhagat Singh Road,
Mumbai - 400 001 (Maharashtra)

30. Secretary General & CEO
World Wide Fund for Nature-India (WWF),
"Secretariat",
172-Lodhi Estate,
New Delhi - 110 003

31. Executive Vice President,
Wildlife Preservation Society of India,
Heritage Apartments Flat No.-2,
1st Floor,18-New Road,
Dehradun – 248 001

32. Director,
Centre for Environment Education,
Nehru Foundation for Development,
Thaltej Tekra,
Ahmedabad - 380 054

33. Dr. Anil Prakash Joshi,
Himalayan Environmental Studies
& Conservation Organization,
Village: Shuklapur,
P.O. : Ambiwala,
Via: Prem Nagar,
Dehradun (Uttrakhand)

Member (*Ex-Officio*)

34. Secretary to the Govt. of India,
Ministry of Environment, Forest & Climate
Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

35. The Secretary,
Government of India,
Ministry of Finance,
North Block,
New Delhi - 110 001

36. Secretary,
Government of India,
Department of Science and Technology,
Technology Bhavan,
New Mehrauli Road,
New Delhi - 110 01

37. The Secretary,
Government of India,
Department of Education,
Ministry of Human Resource Development,
Higher Education,
127-C Shastri Bhavan,
Dr Rajendra Prasad Road,
New Delhi

38. The Advisor (Environment & Forest)
of Niti Aayog,
Sansad Marg,
New Delhi

39. The Chairman,
University Grant Commission,
Bahadur Shah Zafar Marg,
New Delhi

40. The Chief Secretary,
Govt. of Uttarakhand
"Sachivalaya"
Dehradun

41. 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 - 110 003

42. Additional Director General of Forest (WL)
& Director Wildlife Preservation,
Government of India,
Ministry of Environment, Forest & Climate
Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

43. Special Secretary & Financial Advisor
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan
Jor Bagh Road, Ali Ganj
New Delhi - 110 003

44. Director General,
Indian Council of Forestry Research & Education,
P.O. New Forest,
Dehra Dun - 248 006

45. Director,
Zoological Survey of India,
Prani Vigyan Bhawan,
M-Block, New Alipore – 700 053
Kolkata

46. Director,
Botanical Survey of India,
CGO Complex,
3 MSO Building,
Block F, 5th & 6th Floor,
DF Block, Sector-I, Salt Lake City
Kolkata - 700 064 (West Bengal)

47. Dean,
Faculty of Wildlife Sciences
Wildlife Institute of India
Chandrabani
Dehradun – 248 001

48. Registrar
Wildlife Institute of India
Chandrabani
Dehradun – 248 001

49. Dr Dhananjai Mohan,
Director, Wildlife Institute of India,
Chandrabani,
Dehradun - 248 001

Permanent Invitee

50. Inspector General of Forests (WL)
Ministry of Environment, Forest & Climate
Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

51. Member Secretary,
National Tiger Conservation Authority
B-1 Wing, 7th Floor,
Paryavaran Bhavan,
CGO Complex,
New Delhi- 110 003

52. 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,
   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 - 110 003

3. Shri S.S. Bist,
   Ex. Principal Chief Conservator of Forests
   & Head of Forest Force,
   Govt of West Bengal,
   Bisht Bhawan, Lane C-12, Turner Road,
   Dehradun

4. Shri Uday Sinh Wala,
   CEO, WL Epic Media P Ltd.,
   Bungalow 82, Aram Nagar Part 2,
   Andheri West,
   Mumbai – 400 061

5. Shri Vijay Mehta,
   Chairman,
   Mefcom Group, 5th Floor,
   77, Nehru Place, Sanchi Building,
   New Delhi – 110 019

6. Shri T.K. Joshi,
   Conservationist,
   B- 22, New Krishna Park,
   New Delhi - 110 018

   Address at Dehradun:
   Shri T.K. Joshi,
   Conservationist,
   Laxmi Kant Niwas,
   Salan Gaon, Bhagwantpur,
   Dehradun - 248 009 (Uttarakhand)

7. Shri Himanshu Malhotra,
   Wildlife Film Maker & Conservationist,
   Multi-Media,
   C-50 Defence Colony,
   New Delhi – 110024

8. Shri Damodar Sharma, IAS (Retd.),
   Former Secretary (Forests),
   Government of Rajasthan,
   House No. 65, Scheme No. 08,
   Aditya Vihar, Gandhipath, Vaishali Nagar,
   Jaipur – 302 021 (Rajasthan)

9. Shri Praveen Garg,
   Financial Advisor & Additional Secretary,
   Ministry of Environment, Forest & Climate Change,
   Indira Paryavaran Bhavan,
   Jor Bagh Road, Ali Ganj,
   New Delhi - 110 003

10. Chief Secretary,
    Govt. of Uttarakhand,
    "Sachivalaya"
    Dehradun

11. Chief Wildlife Warden,
    Govt. of Assam,
    Basistha Forest Complex,
    Guwahati – 781 029 (Assam)

12. Chief Wildlife Warden,
    Govt. of Bihar,
    Technology Bhawan, 4th Floor,
    Vishweshariya Bhawan Campus,
    Beli Road,
    Patna – 800 015 (Bihar)

13. Chief Wildlife Warden,
    Govt. of Delhi,
    A-Block, 2nd Floor,
    Vikas Bhavan, I.P Estate,
    New Delhi – 110 002

14. Chief Wildlife Warden,
    Govt. of Goa,
    Forest Department,
    Old Passport Office Building,
    Gomantak Maratha Samaj Building,
    Panaji, Goa – 403 001

15. Chief Wildlife Warden,
    Govt. of Andhra Pradesh,
    Aranya Bhawan,
    Saifabad,
    Hyderabad – 500 004

16. PCCF & Chief Wildlife Warden,
    Govt. of Uttarakhand,
    85, Rajput Road,
    Dehradun – 248009

17. Additional Director General of Forest (WL),
    & Director, Wildlife Preservation,
    Ministry of Environment, Forest & Climate Change,
    Indira Paryavaran Bhavan,
    Jor Bagh Road, Ali Ganj,
    New Delhi - 110 003

18. Director General,
Indian Council of Forestry Research & Education,
P.O. New Forest,
Dehra Dun - 248 006

19. Dr H.S. Pabla,
Chairman, WII- TRAC,
Former PCCF (Madhya Pradesh),
E-5, Surendra Garden, Hoshangabad Road,
Bhopal-462 026

20. Dr Y.V. Jhala,
Dean,
Faculty of Wildlife Sciences,
Wildlife Institute of India,
Chandrabani,
Dehradun - 248 001

21. Dr Dhananjai Mohan,
Director,
Wildlife Institute of India,
Chandrabani,
Dehradun - 248 001

Permanent Invitee

22. Inspector General of Forests (WL),
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
JorBagh Road, Ali Ganj,
New Delhi - 110 003

23. The 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, Ali Ganj,
New Delhi - 110 003

WII FINANCE COMMITTEE

Chairman

1. 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 - 110 003

Members

2. Dr H.S Pabla,
Chairman, WII- TRAC
Former PCCF (Madhya Pradesh),
E-5, Surendra Garden, Hoshangabad Road,
Bhopal- 462 026

3. Shri Soumitra Dasgupta,
Additional Director General of Forest (WL),
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

4. Shri Vijay Mehta,
Chairman, Mefcom Group,
5th Floor, 77, Nehru Place,
Sanchi Building,
New Delhi – 110 019

5. The Special Secretary & Financial Advisor,
Ministry of Environment, Forest & Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road, Ali Ganj,
New Delhi - 110 003

6. Dean, FWS,
Wildlife Institute of India,
Dehradun

7. Director,
Wildlife Institute of India,
Dehradun

TRAINING RESEARCH AND ACADEMIC COUNCIL

Chairman

1. Dr H.S. Pabla,
Former PCCF & CWLW, M.P.
E-5 Surendra Garden,
Hoshangabad Road,
Bhopal - 462 028

Members (*Ex-officio*)

2. Director (Wildlife Preservation)/
Additional Director General (Wildlife),
Ministry of Environment, Forests & Climate Change,
Government of India, Indira Paryavaran Bhawan,
Jor Bagh, Lodi Road,
New Delhi - 110 003

(3-15) Chief Wildlife Wardens on a regional rotational basis

Northern Region (2 representatives)	Punjab, Chandigarh
Eastern Region (2 representatives)	West Bengal, A&N Islands
Central India (1 representative)	Madhya Pradesh
Western Region (2 representatives)	Gujarat, Maharashtra
Southern Region (2 representatives)	Puducherry, Telangana
North-eastern Region (3 representatives)	Nagaland, Sikkim, Tripura
Permanent Invitee	Uttarakhand

16. Director,
Botanical Survey of India,
Ministry of Environment,
Forest and Climate Change,
C.G.O. Complex, 3 MSO Building,
Block-F, 5th & 6th Floor, DF Block,
Sector-I, Salt Lake City,
Kolkata - 700 064, West Bengal

17. Director,
Zoological Survey of India,
Prani Vigyan Bhawan,
M-Block, New Alipore,
Kolkata - 700 053, West Bengal

18. Member Secretary,
Central Zoo Authority,
Pt. Deendayal Antyodaya Bhawan,
B-1 Wing, 6th Floor, CGO Complex,
New Delhi - 110 011

Members

19. & 20. Two representatives from University who are Members of WII-Society

Dr Dileep K. Singh,
Professor, Department of Zoology,
University of Delhi,
Delhi - 110 007

Dr A.K. Puri,
155B - Pocket-IV, Mayur Vihar, Phase-I,
New Delhi - 110 091

21. Dr S. Shivaji,
Research Consultant, Jhaveri Microbiology Centre, L.V. Prasad Eye Institute,
L.V. Prasad Marg, Banjara Hills,
Hyderabad - 500 034, Andhra Pradesh

22. Dr Pradeep Vyas,
Former Chief Wildlife Warden,
Govt. of West Bengal, Kolkata,
EE-188/4, Sector-II, Salt Lake City,
Kolkata - 700 091, West Bengal

23. Dr Ajith Kumar,
Director of the Post-Graduate Program in Wildlife Biology and Conservation,
551, 7th Main Road,
Rajiv Gandhi Nagar,
2nd Phase, Kodigehalli,
Bengaluru - 560 097, Karnataka

24. A Representative of the Indian Council of Forest, Research & Education (ICFRE),
P.O. New Forest,
Dehra Dun - 248 006, Uttarakhand

25. Dean,
Faculty of Wildlife Sciences,
Wildlife Institute of India,
Chandrabani,
Dehra Dun - 248 001, Uttarakhand

26. & 27. Two senior most Head of Departments (in terms of pay-scale (to be nominated by Director, WII),
Wildlife Institute of India, Chandrabani,
Dehra Dun - 248 001, Uttarakhand

28. Faculty Member
(In charge of Research Coordination),
Wildlife Institute of India,
Chandrabani,
Dehra Dun - 248 001, Uttarakhand

Member-Secretary

29. Director,
Wildlife Institute of India,
Chandrabani,
Dehra Dun - 248 001, Uttarakd

PUBLICATIONS

PEER-REVIEWED JOURNAL: NATIONAL

Adhikari BS, Kumar A, Bhardwaj AK (2020). **Floral diversity and patterns of vegetation in and around Siswan Community Reserve (SCR) in Punjab, India.** *Indian Forester*, 146 (2): 125-135.

Ahmad A, Kumar A, Rawat GS, Gopi GV (2020). **Recent record of a threatened holoparasitic plant Sapria himalayana Griff. in Mehao Wildlife Sanctuary, Arunachal Pradesh, India.** *Journal of Threatened Taxa*, 12(10): 16399-16401.

Ansari NA, Bhardwaj AK, Srivastav A (2020). **Assessment of Protected Area Management Effectiveness of Sikkim, Eastern Himalaya, India.** *Indian Forester*, 146(10): 901-910.

Arekar K, Sathyakumar S, Karanth KP (2020). **Integrative taxonomy confirms the species status of the Himalayan langurs, Semnopithecus schistaceus Hodgson, 1840.** *Journal of Zoological Systematics and Evolutionary Research*, 59(2): 543-556.

Boruah B, Kumar A, Das A (2020). **Cirsium wallichii DC. (Asteraceae): a key nectar source of butterflies.** *Journal of Threatened Taxa*, 12(14): 17049–17056.

Chaida L, Das A, Tshering U, Wangdi D (2020). **Assamese Cat Snake, Boiga quincunciata (Wall, 1908) (Reptilia: Squamata: Colubridae): New country record for Bhutan.** *Journal of Threatened Taxa*, 12(5): 15664–15667.

Chauhan M, Uniyal VP (2020). **A checklist of Dung beetles of Uttarakhand, Western Himalaya India.** *Indian Forester*, 146 (11): 1059-1064.

Chauhan M, Uniyal VP, Chandra A, Thakur P, Mehrwar V (2021). **Preliminary assessment and conservation of insect pollinators through community participation in the Lahaul and Spiti district of Himachal Pradesh, India.** *Current Science*, 120(5): 883-887.

Dash SK, Chettri A, Naha D, Sathyakumar S (2021). **First report of the Asiatic Brush-tailed Porcupine, Atherurus macrourus (Linnaeus, 1758) (Mammalia: Rodentia: Hystricidae) from West Bengal, India.** *Journal of Threatened Taxa*, 13(1): 17561-17563.

De K, Ali SZ, Dasgpta N, Uniyal VP, Johnson JA, Hussain SA (2020). **Evaluating performance of four species distribution models using Blue-tailed Anax guttatus (Insecta: Odonata) as a model organism from the Gangetic riparian zone.** *Journal of Threatened Taxa*, 12(14): 16962–16970.

Frank SJD, Pandian M, Gopi GV (2021). **Nest-site characteristics of an urban heronry at Ranipet Police Station, Tamil Nadu.** *Indian Birds*, 17 (1): 4-7.

Kannan K, Johnson JA (2020). **Fish diversity in streams/rivers of Kalakad-Mundanthurai Tiger Reserve, Tamil Nadu, India.** *Journal of Threatened Taxa*, 12(15): 17077–17092.

Kashyap P, Rizvi AN, Bhattacharya T, Uniyal VP (2020). **Community Structure and Habitat Specific Variations of Soil-Inhabiting Nematodes in the Forests of Gangotri National Park, Uttarakhand, India.** *Indian Journal of Nematology*, 50(2): 107-116.

Kumar A, Page N, Adhikari BS, Nair M, Rawat GS (2021). **On the rediscovery of a rare root parasite Gleadovia ruborum Prain & Gamble (Orobanchaceae) from Uttarakhand, western Himalaya, India.** *Journal of Threatened Taxa*, 13(8):19185–19188.

Kumar S, Dolia J, Chaudhary V, Kumar A, Das A (2021). **Black-Bellied Coral Snake, Sinomicrurus nigriventer (Wall, 1908) (Elapidae): An extended distribution in Western Himalaya, India.** *Journal of Threatened Taxa*, 13(7): 18939-18942.

Mathela M, Bargali H, Sharma M, Sharma R, Kumar A (2020). **Brainstorming on the future of highly threatened medicinal plants of Western Himalaya, India.** *Current Science*, 118(10): 1485-1486.

Mohanti A, Arya S, Joshua J, Gopi GV (2020). **Black-capped Kingfisher, Halycyon pileata from Dibang Valley, Arunachal Pradesh, and it's status in north-eastern India.** *Indian Birds*, 16(3): 100-102.

Pal R, Bhattacharya T, Sathyakumar S (2020). **Woolly Flying Squirrel Eupetaurus cinereus: A new addition to the diet of Snow Leopard Panthera uncia.** *Journal of Bombay Natural History Society*, 2020 Jun 30: 117.

Rawat C, Gopi GV, Deepan C, Arya SK, Adhikari BS, Mohan D (2021). **A high elevation record of the Yellow-legged Buttonquail Turnix tanki from Nainital, Uttarakhand.** *Indian Birds*, 17(1): 20-21.

Satpathy S, Sivakumar K, Johnson JA (2021). **Fish communities and associated habitat variables in the upper Subansiri River of Arunachal Pradesh, eastern Himalaya, India.** *Journal of Threatened Taxa*, 13(1): 17477–17486.

Sharma R, Sharma M, Mathela M, Bargali H, Kumar A (2021). **A unique archetype of conservation in Himachal Pradesh, western Himalaya, India.** *Journal of Threatened Taxa*, 13(6):18647–18650.

Singh SP, Bhattacharyya A, Mittal A, Pandey A, Tewari A, Latwal A, David B, Adhikari BS, Kumar D, Negi GCS, Mir IA, Tamta KK, Sambhav K, Shekhar M, Phulara M, Manzoor M, Singh N, Tewari P, Ranhotra PS, Singh P, Dhaila P, Sah P, Kumar R, Joshi R, Rawal RS, Rawal R, Singh RD, Shah S, Sharma S, Nanda SA, Gumber S, Singh U, Reshi Z (2021). **Indian Himalayan timberline ecotone in response to climate change - initial findings.** *Current Science*, 120 (5): 859-871.

Vedagiri T, Prabakaran N, Nair VS, Ramesh C (2021). **Ecological significance of two large heritage trees in Moyar River Valley, Southern India.** *Journal of Threatened Taxa*, 13: 17,587–17,591.

PEER-REVIEWED JOURNAL: INTERNATIONAL

Adhikari BS, Kumar R (2020). **Effect of snowmelt regime on the phenology of herbaceous species at and around treeline in Western Himalaya, India.** *Notulae Scientia Biologicae* 12(4): 901-919.

Amarasinghe P, Joshi S, Page NV, Wijedasa LS et al. (2021). **Evolution and biogeography of Memecylon.** *American Journal of Botany*, 108(4): 628–646.

Apte D, Narayana S, Dutta S (2019). **Impact of sea surface temperature anomalies on giant clam population dynamics in Lakshadweep reefs: Inferences from a fourteen years study.** *Ecological Indicators*, 107, Pp 105604.

Bagaria P, Nandy S, Mitra D, Sivakumar K (2021). **Monitoring and predicting regional land use and land cover changes in an estuarine landscape of India.** *Environmental Monitoring and Assessment*, 193(124): 4.

Balajeid, Lyngdoh S, Habib B, Shrotriya S (2020). **Dietary spectrum in Himalayan wolves: comparative analysis of prey choice in conspecifics across high elevation rangelands of Asia.** *Journal of Zoology*, 310(1): 24-33.

Bandyopadhyay U, Dey R, Bhattacharyya K, Mallick K, Mazumder A, Gayen S, Das M, Raha1 A, Sanyal AK, Kumar V, Uniyal VP, Chandra K (2021). **Taxonomy and ecology of genus Phlogophora Treitschke, 1825 (Lepidoptera: Noctuidae) in Indian Himalaya with a description of a new species.** *Zootaxa*, 5004 (2): 311–342.

Banerjee K, Goswami DS, Das A (2020). **Edema in a Himalayan toad Duttaphrynus himalayanus (Gunther 1864) (Anura: Bufonidae).** *IRCF Amphibians and Reptiles*, 27(2): 209-210.

Banerjee K, Boruah B, Das A (2020). **First record of Carrion Feeding by tadpoles of Duttaphrynus himalayanus and Nanorana viciña from Western Himalaya, India.** *Tropical Natural History*, 20(3): 268-271.

Bargali H, Mathela M, Sharma R, Sharma M, Yaming D, Kumar A (2021). **Plant studies in Himachal Pradesh, Western Himalaya: a systematic review.** *Journal of Mountain Science*, 18(7):1856-1873.

Baruah B, Das A (2020). **Predation on the egg mass of the terai tree frog Polypedates taeniatus (Anura: Rhacophoridae) by flesh fly larvae (Diptera: Sarcophagidae).** *IRCF Amphibians and Reptiles*, 27(2): 228-230.

Bhandari A, Ghaskadbi P, Nigam P, Habib B (2021). **Dhole pack size variation: Assessing the effect of Prey availability and Apex predator.** *Ecology and Evolution*, 11(9): 4774-4785.

Bhatt U, Adhikari BS, Habib B, Lyngdoh S (2020). **Temporal interactions and moon illumination effect on mammals in a tropical semievergreen forest of Manas National Park, Assam, India.** *Biotropica*, 53(3): 831–845.

Bhattacharya A, Chatterjee N, Rawat GS, Habib B (2020). **Blue Sheep Resource Selection in Alpine Grasslands of a Western Himalayan Landscape – A Point Process Approach.** *Zoological Studies*, 59.

Bhattacharya A, Chatterjee N, Shrotriya S, Sinha B, Habib B (2020). **First Photographic Evidence of Himalayan Brown Bear from Lippa - Asrang Wildlife Sanctuary, Himachal Pradesh, India.** *International Bear News*, 29 (1): 23-25.

Bhattacharya M, Adhikari BS, Gopi GV (2021). **Tawny Fish-Owl (Ketupa flavipes Hodgson, 1836): A new record from a sacred grove in Zemithang Valley, Arunachal Pradesh.** *Journal of Threatened Taxa*, 13(2): 17837-17840.

Bisht S, Banerjee S, Qureshi Q, Jhala Y (2019). **Demography of a high-density tiger population and its implications for tiger recovery.** *Journal of Applied Ecology*, 56(7): 1725–1740.

Chakrabarti S, Jhala YV (2019). **Battle of the sexes: a multi-male mating strategy helps lionesses win the gender war of fitness.** Behavioural Ecology, XX(20): 1–12.

Chandra R and Uniyal VP (2021). **An ethnobotanical study of wild medicinal plants among the mountain community of Western Himalayas: A case study of Govind Wildlife Sanctuary and National Park.** *Medicinal Plants*, 13 (2): 251-265.

Chatterjee N, Nigam P, Habib B (2020). **Population density and habitat use of two sympatric small cats in a central Indian reserve.** *PLoS ONE*, 15(6): e0233569.

Chatterjee N, Nigam P, Habib B (2020). **Population estimate, habitat-use and activity patterns of the Honey badger in a dry deciduous forest of central India.** *Frontiers in Ecology and Evolution*, 8: 472.

Das A, Deepak V, Captain A, Edward EOZ, Gower DJ (2020). **Description of a new species of Smithophis Giri et al. 2019 (Serpentes: Colubridae: Natricinae) from Arunachal Pradesh, India.** *Zootaxa*, 4860 (2): 267–283.

Das A, Gower DJ, Deepak V (2020). **Lost and found: rediscovery and systematics of the Northeast**

Indian snake, Hebius pealii (Sclater, 1891). *Vertebrate Zoology*, 70(3): 305–318.

Deepak P, Dinesh KP, Prasad VK, Das A, Devi SA (2020). **Distribution status of the Western burrowing frog, Sphaerotheca paschima in India.** *Zootaxa*, 4894 (1): 146-150.

Dey P, Uniyal VP, Husmann A, Stuning D (2021). **Revision of the genus Prometopidia Hampson, 1902, with a description of the new species P. joshimathensis sp. nov. from West-Himalaya and its subspecies P.j. yazakii ssp. nov. from Nepal (Lepidoptera: Geometridae, Ennominae).** *Zootaxa*, 4980 (1): 28–44.

Dhondiyal A, Rawat A, Uniyal VP, Rawat A, Sharma A, Sathyakumar S (2021). **A brief overview of the application of pollution monitoring indices on the Amrit Ganga river, Uttarakhand, India.** *International Journal of Fisheries and Aquatic Studies*, 9(1): 288-295.

Dolia J, Das A (2020). **Ophiophagus hannah, Nesting Behaviour.** *Herpetological Review*, 51(3): 624.

Frank SJD, Gopi GV, Sankar K (2021). **Dry season resource selection among sympatric ungulates in a tropical coastal landscape: implications for conservation and management.** *Tropical Ecology*, 62: 418–426.

Habib B, Ghaskadbi P, Khan S, Hussain Z, Nigam P (2021). **Not a cakewalk: Insights into movement of large carnivores in human-dominated landscapes in India.** *Ecology and Evolution*, 11: 1653–1666.

Hatkar P, Ramesh C (2020). **Review on non-venomous marine Serpentes: Little file sea snake, Acrochordus granulatus (Schneider, 1799), with an observation on bycatch composition from India.** *Captive & Field Herpetology*, 4(1): 45-55.

Jain A, Blanco FC, Palot JM, Das S, Deepak V, Das A (2021). **A Review of Distribution of Cantor's Giant Softshell Turtle in India Along with Multiple Notable New Records from Kerala State.** *Chelonian Conservation and Biology*, 20(1): 125-132.

Jhala YV, Banerjee K, Chakrabarti S, Basu P, Singh K, Dave C, Gogoi K (2019). **Asiatic Lion: Ecology, Economics, and Politics of Conservation.** *Frontiers in Ecology and Evolution*, 7 (312): 1-21.

Johnson JA, Sharma A, Rajput V, Dubey VK, Sivakumar K (2020). **Taxonomic and guild structure of fish assemblages in the streams of Western Himalaya, India.** *Community Ecology*, 21: 239-257.

Johnson JA, Watham T, Gopi GV, Sivakumar K (2020). **Development of habitat suitability criteria for the conservation of the black-necked crane in Nyamjang Chu River in eastern Himalaya, India in connection with a proposed hydropower dam.** *River Research and Applications*, 2021(37): 321-329.

Joshi BD, Lyngdoh S, Singh SK, Sharma R, Kumar V, Tiwari VP, Dar SA, Maheshwari A, Pal R, Bashir T, Reshamwala HS, Shrotriya S, Sathyakumar S, Habib B, Kvist L, Goyal SP (2020). **Revisiting the Woolly Wolf, Canis lupus chanco phylogeny in Himalaya: Addressing taxonomy, spatial extent and distribution of an ancient lineage in Asia.** *PLoS ONE*, 15(4): e0231621.

Kashyap P, Rizvi AN, Uniyal VP (2020). **Assessment of Soil Physicochemical Properties along an Altitude Gradient in High Altitude Region of Gangotri National Park, Uttarakhand, India.** *Journal of Ecophysiology and Occupational Health*, 20 (3&4): 134–139.

Khan S, Nath A, Das A (2020). **The distribution of the elongated tortoise, Indotestudo elongata on the Indian subcontinent: implications for conservation and management.** *Herpetological Conservation and Biology*, 15(1): 212–227.

Koetke L, Bhattacharya T, Sathyakumar S (2020). **Diet overlap between livestock and wild herbivores in the Greater Himalaya.** *Mountain Research and Development*, 40(1): R21-R27.

Kumar N, Jhala YV, Qureshi Q, Gosler AG, Sergio F (2019). **Human attacks by an urban raptor are tied to human subsidies and religious practices.** *Scientific Reports*, 9(1): 1-10.

Kumar U, Awasthi N, Qureshi Q, Jhala YV (2019). **Do conservation strategies that increase tiger populations have consequences for other wild carnivores like leopards?** *Scientific Reports*, 9(1): 1-8.

Kumari S, Uniyal VP, Singh AP (2021). **New record of the genus Erannis Hübner, [1825] from India (Lepidoptera: Geometridae, Ennominae).** *SHILAP Revista de Lepidoterologia*, 5: 2340-4078.

Lalronunga S, Lalhmangaiha K, Zosangliana I, Lalhmingliani E, Gower DJ, Das A, Deepak V (2021). **A new species of Stoliczkia Jerdon, 1870 (Serpentes: Xenodermidae) from Mizoram, India.** *Zootaxa*, 4996 (3): 569-580.

Maheshwari A, Sathyakumar S (2020). **Patterns of Livestock Depredation and Large Carnivore Conservation Implications in the Indian Trans-Himalaya.** *Journal of Arid Environments*, 182: 104241.

Mariadassou M, Suez M, Sathyakumar S, Vignal A, Arca M, Nicolas P, Faraut T, Esquerre D, Nishibori M, Vieaud A, Chen CF, Pham HM, Roman Y, Hospital F, Zerjal T, Rognon X, Tixer-Boichard M (2020). **Unravelling the history of the genus Gallus through whole-genome sequencing.** *Molecular Phylogenetics and Evolution*, 158: 107044.

Mehrwar V, Uniyal VP (2021). **Insect pest diversity of standing crops and traditional pest management in agricultural areas of Mandakini Valley, Garhwal**

Himalaya, Uttarakhand, India. *International Journal of Horticulture, Agriculture and Food Science*, (5) 4: 1-9.

Modi S, Habib B, Ghaskadbi P, Nigam P, Mondol S (2019). **Standardization and validation of a panel of cross-species microsatellites to individually identify the Asiatic wild dog, Cuon alpinus.** *PeerJ*, 7, e7453.

Modi S, Mondol S, Ghaskadbi P, Hussain Z, Nigam P, Habib B (2018). **Non-invasive DNA-based species and sex identification of Asiatic wild dog, Cuon alpinus.** *Journal of Genetics*, 97(5): 1457-1461.

Muliya SM, Nath A, Kumar GC, Visvanathan A, Selvan M, Gowda R, Santra V, Das A (2021). **Addressing Wallacean shortfall using small sampling approach: a case study with endemic Lycodon flavicollis (Squamata: Colubridae) Mukherjee & Bhupathy, 2007.** *Journal of Asia-Pacific Biodiversity*, 14(2): 159-168.

Murmu E, Adhikari BS, Vashistha HB (2020). **Role of Informal Institutions in Biodiversity Conservation: Perspective of the Santhal Tribe of India.** *Journal of Non-timber Forest Products*, 27(3): 139-146.

Naha D, Chaudhary P, Sonker G, Sathyakumar S (2020). **Effectiveness of non-lethal predator deterrents to reduce livestock losses to leopard attacks within a multiple-use landscape of the Himalayan region.** *PeerJ*, 8: e9544.

Naha D, Dash SK, Chettri A, Chauhdary P, Sonker G, Heurich M, Rawat GS, Sathyakumar S (2020). **Landscape predictors of human-leopard conflicts within multi-use areas of the Himalayan region.** *Scientific Reports*, 10(1): 1-12.

Naha D, Dash SK, Chettri A, Roy A, Sathyakumar S (2020). **Elephants in the neighbourhood: patterns of crop-raiding by Asian elephants within a fragmented landscape of Eastern India.** *PeerJ*, 8: e9399.

Naha D, Dash SK, Kupfermna C, Beasley JC, Sathyakumar S (2021). **Movement behaviour of a solitary large carnivore within a hotspot of human-wildlife conflicts in India.** *Scientific Reports*, 11 (1): 3862.

Naha D, Dash SK, Sathyakumar S (2020). **Inaccurate methods and erroneous conclusions drawn on human-leopard coexistence in India – Response to Puri et al., 2020 "The balancing act: Maintaining leopard-wild prey equilibrium could offer economic benefits to people in a shared forest landscape of Central India.** *Ecological Indicators*, 117: 106632.

Naniwadekar R, Ghuman S, Gopal A, Page N, Ramachandran V (2020). **Characteristics of Narcondam hornbill, Rhyticeros narcondami nest trees.** *Hornbill Natural History and Conservation*, 1 (2):1–9.

Naniwadekar R, Gopal A, Page N, Ghuman S, Ramachandran V, Joshi J (2021). **Large frugivores matter more on an island: Insights from an island-mainland comparison of plant–frugivore communities.** *Ecology and Evolution*, 00:1–14.

Nawani S, Das A, Das I (2020). **A new item in the diet of Kashmir Rock Agama, Laudakia tuberculata.** *IRCF Amphibians and Reptiles*, 27(2): 275-276.

Nawani S, Deepak V, Gautam KB, Gupta SK, Boruah B, Das A (2021). **Systematic status of the rare Himalayan wolf snake, Lycodon mackinnoni Wall, 1906. (Serpentes: Colubridae).** *Zootaxa*, 4966 (3): 305–320.

Nelms SE, Duncan EM, Patel S, Badola R, Bhola, Chakma S, Chowdhury GW, Godley BJ, Haque AB, Johnson JA, Khatoon H, Kumar S, Napper I, Hasan Niloy, MNH, Tanjila A, Badola S, Dev D, Rawat S, Santillo D, Sarker S, Sharma E, Koldewey H (2020). **Riverine plastic pollution from fisheries: Insights from the Ganges River system.** *Science of the Total Environment*, 756(2021): 1-13.

Nigam P, Talukdar A, Habib B, Pandav B, Malik PK, Kalyanasundaram S (2020). **Hematologic and serum biochemical reference values in chemically immobilized free-ranging Sambar, Rusa unicolor.** *European Journal of Wildlife Research*, 66(6): 1-7.

Noor A, Mir ZR, Gopi GV, Habib B (2020). **Density of leopard in a moist-temperate forest of western Himalaya, India.** *Tropical Ecology*, 61 (3): 301-310.

Page NV, Ingalhallikar S, Sardesai MM (2020). **Ariopsis macrosperma sp. nov. (Araceae) from the northern Western Ghats, India.** *Nordic Journal of Botany*, 38(1): 1–3.

Page NV, Nandikar MD (2020). **A remarkable new species of Salacia (Celastraceae: Salacioideae) from the Western Ghats, India.** *Nordic Journal of Botany*, 38 (4).

Page NV, Shanker K (2020). **Climatic stability drives latitudinal trends in range size and richness of woody plants in the Western Ghats, India.** *PLoS ONE*, 15 (7):1-23.

Pal R, Bhattacharya T, Qureshi Q, Buckland S, Sathyakumar S (2021). **Using distance sampling with camera traps to estimate the density of group-living and solitary mountain ungulates.** *Oryx*, 55(5): 668-676.

Pal R, Thakur S, Arya S, Bhattacharya T, Sathyakumar S (2020). **Mammals of the Bhagirathi basin, Western Himalaya: understanding distribution along spatial gradients of habitats and disturbances.** *Oryx*, 1-11.

Pande A, Mondol S, Sathyakumar S, Mathur V, Ray Y, Sivakumar K (2020). **Past records and current distribution of seabirds at Larsemann Hills and**

Schirmacher Oasis, East Antarctica. *Polar Record*, 56 (e40): 1-10.

Patel N, Baruah B, Das A (2020). **Sibynophis sagittarius: Albinism.** *Herpetological Review*, 51(1): 156.

Patel N, Das A (2020). **Shot the Spot: A reliable field method for identification of Amolops formosus (Anura: Ranudae).** *Herpetozoa*, 33:7-15.

Paul S, Sarkar D, Patil A, Ghosh T, Talukdar G, Kumar M, Habib B, Nigam P, Mohan D, Pandav B, Mondol S (2020). **Assessment of endemic northern swamp deer, Rucervus duvaucelii duvaucelii distribution and identification of priority conservation areas through modelling and field surveys across north India.** *Global Ecology and Conservation*, 24: e01263.

Prasad VK, Gautam KB, Gupta SK, Murthy RS, Ramesh K, Shinde AD, Das A (2020). **Determining cryptic amphibian diversity from Panna Tiger Reserve, central India, using an integrated approach.** *Zootaxa*, 4851 (3): 450–476.

Qureshi Q, Gopal R, Jhala YV (2019). **Twisted tale of the tiger: the case of inappropriate data and deficient science.** *PeerJ*, 1-12.

Rai ID, Padalia H, Singh G, Adhikari BS, Rawat GS (2020). **Vegetation dry matter dynamics along treeline ecotone in Western Himalaya, India.** *Tropical Ecology* 61: 116-127.

Rathore RS, Pati J, Das A, Pandav V (2021). **Population status and distribution of Mugger Crocodile, Crocodylus palustris in Similipal Tiger Reserve, Odisha, India.** *The Herpetological Bulletin*, 156: 28-30.

Rawat A, Gulati G, Maithani R, Sathyakumar S, Uniyal VP (2020). **Bioassessment of Mandakini River with the help of aquatic macroinvertebrates in the vicinity of Kedarnath Wildlife Sanctuary.** *Applied Water Science*, 10:36.

Rawat S, Nagar B, Adhikari BS, Pandey R, Alatalo JM (2021). **Biomass loss in village ecosystems in Western Himalaya due to wild monkey interactions: A case study.** *Environmental Challenges*, 4 (2021): 1,00,085.

Ray P, Malla G, Manral U, Johnson JA, Sivakumar K (2020). **Avifaunal diversity along with the riverine habitats of Papikonda National Park, Andhra Pradesh, India.** *Journal of Threatened Taxa*, 12(14): 16993–16999.

Reshamwala HS, Mahar N, Dirzo R, Habib B (2021). **Successful neighbour: Interactions of the generalist carnivore red fox with dogs, wolves and humans for continued survival in dynamic anthropogenic landscapes.** *Global Ecology and Conservation*, 25: e01446.

Sadhukhan S, Hennelly L, Habib B (2019). **Characterising the harmonic vocal repertoire of the Indian wolf, Canis lupus pallipes.** *PLoS ONE*, 14(10). e0216186.

Sadhukhan S, Root-Gutteridge H, Habib B (2021). **Identifying unknown Indian wolves by their distinctive howls: its potential as a non-invasive survey method.** *Scientific Reports*, 11(1): 1-13.

Saxena A, Chatterjee N, Rajvanshi A, Habib B (2020). **Integrating large mammal behaviour and traffic flow to determine traversability of roads with heterogeneous traffic on a Central Indian Highway.** *Scientific Reports*, 10(1): 1-12.

Sharma A, Dubey VK, Johnson JA, Rawal YK, Sivakumar K (2021). **Is there always space at the top? Ensemble modelling reveals climate-driven high-altitude squeeze for the vulnerable snow trout Schizothorax richardsonii in Himalaya.** *Ecological Indicators*, 120: 106900.

Sharma A, Dubey VK, Johnson JA, Rawal YK, Sivakumar K (2021). **Introduced, invaded and forgotten: allopatric and sympatric native snow trout life-histories indicate brown trout invasion effects in the Himalayan hinterlands.** *Biological Invasions*, 23: 1497-1515.

Sharma SP, Katdare S, Zaidi Z, Ghazi MGU, Gupta SK, Hussain SA (2020). **Mitochondrial DNA analysis reveals extremely low genetic diversity in a managed population of the Critically Endangered Gharial, Gavialis gangeticus, Gmelin 1789.** *The Herpetological Journal*, 30: 202-206.

Singh A, Gupta SK, Alström P, Mohan D, Hooper DM, Kumar RS, Bhatt D, Singh P, Price TD (2020). **Taxonomy of cryptic species in the Cyornis rubeculoides complex in the Indian subcontinent.** *IBIS*, 162: 924-935.

Singh AP, De K, Uniyal VP, Sathyakumar S (2020). **Forest cover types as determinants of moth diversity in the Indian Himalayan region.** *Munis Entomology & Zoology*, 15 (2): 348-356.

Singh AP, De K, Uniyal VP, Sathyakumar S (2021). **An experimental study on Bioturbation and dung removal activities of Catharsius molossus (Linnaeus, 1758) (Coleoptera: Scarabaeidae) in the Greater Himalaya.** *Journal of Asia-Pacific Biodiversity*, 14 (3): 169-173.

Singh B, Kumar A, Uniyal VP, Gupta SK (2021). **Phylogeography and population genetic structure of Red Muntjacs: Evidence of enigmatic Himalayan Red Muntjac from India.** *BMC Ecology and Evolution*, 21(1): 1-5.

Singh G, Srinivas Y, Kumar GC, Singh A, Sharma CP, Gupta SK (2020). **Identification of selected small**

cats using hair morphology and forensically informative nucleotide sequencing (FINS): wildlife forensics perspective. *Legal Medicine*, 44: 101692.

Srinivas Y, Pande A, Gole S, Prem Jothi PVR, Madhu Magesh K, Pathan S, Dudhat S, Shekar R, Kukadia D, Johnson JA, Mondol S, Sivakumar K (2020). **Mitochondrial phylogeography reveals high haplotype diversity and unique genetic lineage in Indian Dugongs, Dugong dugon.** *Aquatic Conservation: Marine and Freshwater Ecosystems*, 31(4): 818-829.

Srivastava N, Ramesh K, Sathyakumar S (2020). **Avoidance or Coexistence? The Spatiotemporal Patterns of Wild Mammals in a Human-dominated Landscape in the Western Himalaya.** *Mountain Research and Development*, 40(2): R20.

Thirumurugan V, Vishnu SN, Khanduri S, Ramesh C, Talukdar G, Das A (2020). **Crocodylus palustris, Mugger Crocodile scavenging.** *Herpetological Review*, 51(2): 321-322.

Tiwari P, Bhattacharya P, Rawat GS, Rai ID, Talukdar G (2021). **Experimental warming increases ecosystem respiration by increasing above-ground respiration in alpine meadows of Western Himalaya.** *Scientific Reports*, 11(1): 1-10.

Tripathi R, Jangid AK, Silwal M, Dutta S (2020). **The first report of matriphagy in Stegodyphus pacificus Pocock 1900.** *Acta Arachnologica*, 69 (1): 17–21.

Yadav P, Kumar A, Hussain SA, Gupta SK (2020). **Evaluation of the effect of longitudinal connectivity in population genetic structure of endangered golden mahseer, Tor putitora, Cyprinidae in Himalayan rivers: Implications for its conservation.** *PLoS ONE*, 15(6): e0234377.

SEMINAR, CONFERENCE PROCEEDINGS

Basu O, Kumar A, Ram J (2020). **Ecosystem Services and their Economic Valuation in Sunderban Mangroves of India.** In book: Perspectives on Biodiversity of India, Vol (IV), *Proceedings International Biodiversity Congress (IBC) 2018*. Centre for Innovation in Science and Social Action (CISSA).

Kawlni L, Muliya SK, Dutta P, Rehaman M, Kolipakam V, Dutta TK, Vangchhia B, Hussain K, Qureshi Q, Jhala YV (2020). **Antimicrobial resistance profiles and molecular phylogeny of ESBL determinant genes in Escherichia coli in camp elephants of Karnataka.** *Proceedings of 14th Annual Convention of Association of Indian Zoo and Wildlife Veterinarians*. Pp 225.

Muliya SK, Kawlni L, Hussain K, Gusain P, Kolipakam V, Qureshi Q and Jhala YV (2020). **Imunocontraception as a management tool in dealing with human-wildlife conflict in India.** *Proceedings of 14th Annual Convention of Association of Indian Zoo and Wildlife Veterinarians*. Pp 39.

Khan S, Habib B (2019). **Living in the Anthropocene: Space-use and Movement of Indian Grey Wolf in Maharashtra, India.** *In conference proceeding of 1st International Conservation Conference - 2019, Dept of Wildlife Sciences, AMU Aligarh*. Pp 94.

Sadhukhan S, Habib B (2020). **Counting wolves in a densely populated landscape: Can acoustic monitoring be the ultimate solution?** In conference proceeding of Virtual International Statistical Ecology Conference, Sydney, Australia. Pp 38.

Sadhukhan S, Habib B (2019). **Characterising the Harmonic Vocal Repertoire of the Indian Wolf, *Canis lupus pallipes*.** In conference proceeding of 1st International Conservation Conference-2019, Dept of Wildlife Sciences, AMU Aligarh. Pp 25.

Sadhukhan S, Habib B (2019). **Recognising wolf howls.** In conference proceeding of XXVII International Bioacoustics Congress, University of Sussex, Brighton, England (2019). Pp 93.

REPORTS

Mohan D, Talukdar GH, Sen M, Ansari NA (2021). **Technical Manual for Management Effectiveness Evaluation (MEE) of 210 National Parks and Wildlife Sanctuaries in India during 2020-21.** *Wildlife Institute of India, Dehradun*, Pp 45.

Mohan D, Talukdar GH, Sen M, Ansari NA (2020). **Management Effectiveness Evaluation (MEE) of National Parks and Wildlife Sanctuaries in India.** Wildlife Institute of India, Dehradun. *Process and Outcomes*, 2018-19 (IV): 283.

Nigam P, Lakshminarayanan N, Kumar A, Mondol S, Habib B, Pandav B, Toppo FJ (2021). **Conservation management of elephants in Chhattisgarh: Capacity building initiative on the dispersal and ranging patterns of elephants for effective management of human-elephant interactions.** *Project Report III (2019-21), Wildlife Institute of India and Chhattisgarh Forest Department*, Pp 67.

Tyagi PC, Yadav SP, Ansari NA, Ghosh S (2020). **Guidelines, Criteria and Indicators for Evaluation of Indian Zoological Parks through Management Effectiveness Evaluation Process.** *Wildlife Institute of India and Central Zoo Authority, Ministry of Environment, Forest and Climate Change, Government of India*. Pp 50.

TECHNICAL REPORTS

Ahmad A, Gopi GV (2020). **An investigation of species occupancy patterns and niche differentiation among sympatric carnivores across varying land use and disturbance regimes in and around Mehao Wildlife Sanctuary, Arunachal Pradesh.** *DST Project Completion Report. Wildlife Institute of India,* Technical Report No./2020/14. Pp 71.

Habib B, Khandekar V, Nigam P, Mondol S, Jayaramegowda R, Ghanekar R, Kumar A (2020). **Identification of human-leopard conflict hotspots for prioritizing the mitigation measures in Junnar Forest Division, Pune, Maharashtra.** *Wildlife Institute of India and Maharashtra Forest Department.* Technical Report No. 2020/01. Pp 42.

Habib B, Basu N, Goyal SP (2020). **Planning, Designing and Development of Greenfield Airport at Murti Village, Chandrapur, Maharashtra: Wildlife Study.** *Wildlife Institute of India, Dehradun 248001, India.* Technical Report 2020/02. Pp 62.

Habib B, Khandekar V, Nigam P, Mondol S, Jayaramegowda R, Ghanekar R, Kumar A (2020). **Identification of human- leopard conflict hotspots for prioritizing the mitigation measures in Junnar Forest Division, Pune, Maharashtra.** *Wildlife Institute of India and Maharashtra Forest Department.* Technical Report No. 2020/01, Pp 42.

Habib B, Lyngdoh S, Kumar A, Noor A, Sharma A, Yadav N, Goyal N (2021). **Status of Wildlife in the State of Haryana 2021 – Survey Protocol.** *Wildlife Institute of India & Haryana Forest Department.* Technical Report No. 2021/06, Pp. 69.

Habib B, Nigam P, Pallavi G, Gomes L, Praveen NR, Sinha V, Ladkat NS, Guruprasad G, Bhagwat S (2020). **Status of Tigers, Co-Predator and Prey in Tadoba Andhari Tiger Reserve (TATR) 2019.** *Wildlife Institute of India and Maharashtra Forest Department.* Technical Reprt No. 2020/05, Pp 47.

Habib B, Saxena A, Bhanupriya R, Jhala YV, Rajvanshi A (2020). **Assessment of impacts of National Highway 715 (Earlier NH 37) on wildlife passing through Kaziranga Tiger Reserve, Assam.** *Wildlife Institute of India.* Technical Report No. 2020/11, Pp 36.

Habib B, Saxena A, Jhala YV, Rajvanshi A (2020). **Monitoring of animal underpasses on National Highway 44 (Earlier 7) passing through Pench Tiger Reserve, Maharashtra, India.** *Wildlife Institute of India.* Technical Reprt No. 2020/09, Pp 30.

Habib B, Saxena A, Mahima, Jhala YV, Rajvanshi A (2020). **Assessment of Impacts of State Highway 33 on Flora and Fauna of Nagarhole Tiger Reserve, India.** *Wildlife Institute of India*. Technical Report No. 10/2020, Pp 70.

Habib B, Sinha BC, Bhattacharya A (2020). **Assessment of Biodiversity for effective management and evaluation of ecotourism potential of four Protected Areas in Himachal Pradesh, India.** *Project Completion Report. Wildlife Institute of India and Himachal Pradesh Forest Department.* Technical Report No. 2020/03. Pp 62.

Pandav B, Habib B (2020). **Rapid assessment of wildlife and suggested mitigation measures for development of Delhi Dehradun highway in the Shivalik hills.** *Wildlife Institute of India, Dehradun.* Technical Report No. 2020/08 - Pp. 61.

Wildlife Institute of India (2020). **Mitigation measures for doubling of the Tiniaghat - Castlerock - Caronzol, SWR Railway Track, Karnataka.** *Wildlife Institute of India, Dehradun*. Technical Report No.2020/18, Pp. 108.

Wildlife Institute of India (2021). **Conservation Plan for Biodiversity likely to be impacted by Greenfield Jewar International Airport, Gautam Budh Nagar, Uttar Pradesh, India.** *Wildlife Institute of India, Dehradun.* Technical Report No. 2021/02, Pp 236.

PAPER PRESENTED

Khan S, Sadhukhan S, Habib B (2020). **Movement and space use of Indian grey wolf, Canis lupus pallipes in the human-dominated landscape.** Paper presented in Festival of Ecology, British Ecological Society Conference (held online), 14-18 December 2020.

Reshamwala HS, Dirzo R, Habib B (2020). **Spatial ecology of red fox in the north-western Trans-Himalayan Landscape, India.** Paper presented in Festival of Ecology, British Ecological Society Conference (held online), 14-18 December 2020.

Biswas S, Bhatt S, Sarkar D, Pandav B, Talukdar G, Mondol S (2020). **Corridor connectivity drives tiger meta-population dynamics in the Terai-Arc landscape, India.** *5th biennial and 1st ever virtual North American Congress for Conservation Biology (NACCB)*, 27-31 July 2020.

Sivakumar K (2020). **Environmental Impact Assessment and development of Environmental Management Plan for Hydro Projects.** *International College of Engineering and Management, Omen*, 24 November 2020.

Sivakumar K (2020). **Dugong Conservation in India.** *International Webinar on Marine Mammal Conservation in India: status, challenges and opportunities*, 12-14 October 2020. Dehradun.

Sivakumar K (2020). **Project Dolphin: Hope for Marine Mammals in India.** *International Webinar on Marine Mammal Conservation in India: status,*

challenges and opportunities, Dehradun. 12-14 October 2020.

Sivakumar K (2020). 'Importance of e-Flow for the River Health' in the 5th India Water Impact Summit organized by NMCG, Government of India, 10-15 December 2020.

BOOK CHAPTERS

Hussain K, Muliya SK, Gusain P, Nasir M, Bindhani UT, Sahu B and Roy K (2021). **Nutritional diseases in wild animals.** Compendium of Vocational training programme on "Technological Advances in Captive Breeding and Health Management of Wild Animals under the aegis of Institutional Development Plan, Indian Council of Agricultural Research, New Delhi. Pp 30-32.

Sivakumar K (2020). **Impact of climate change on coastal and marine biodiversity (in Tamil).** In: (Ed) K. Nagarathinam, Climate Change. An International Guide to Media Persons. Earth Journalism Network, Internews and Madurai Kamaraj University, Madurai, India. Pp 82.

POPULAR ARTICLES

Arya SK, Gopi GV (2021). **An annotated bird checklist of community-managed lands in Kailash Sacred Landscape-India, Kumaon Himalaya.** Check List, 17 (2): 365–383.

Dhawan B, Dubey VK, Sharma A, Johnson JA, Sivakumar K (2020). **Field Guide to Fishes of Rudraprayag.** Wildlife Institute of India, Dehradun. (1): 16.

Noor A, Bushra A, Sharma RK, Sultan, Rahul De, Goyal SP, Habib B (2021). **Jungle cat activity in a human-dominated agricultural landscape, India.** Cat News, 73: 12–13.

PICTORIAL GUIDE

Kaur S, Uniyal VP, Gopi GV (2020). **Woodpeckers of Pawalgarh Conservation Reserve.** *Pictorial Guide. Wildlife Institute of India, Dehradun*, Pp 31. ISBN 81-85496-51-X.

AWARDS

Dr Kafil Hussain received a **Certificate of Award in Conservation Biotechnology & Forensics** Session on 20 December 2020 in the 14th Annual Convention of Association of Indian Zoo and Wildlife Veterinarians.

ACCOUNTS

SEPARATE AUDIT REPORT ON THE ACCOUNTS OF WILDLIFE INSTITUTE OF INDIA, DEHRADUN FOR THE YEAR 2020-21

1. We have audited the attached Balance Sheet of the Wildlife Institute of India, Dehradun (WII) as at 31 March 2021 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. BALANCE SHEET

1. Assets

1.1 Investment-Others (Schedule 10): Rs.4922.24 lakh

WII did not include its investment of Rs.1710 lakh in nine Fixed Deposit Receipts (FOR) under Assets in Schedule 10 'Investment-Others'. This resulted in understatement of its Assets and overstatement of Cash and Bank balance by Rs.1710 lakh.

1.2 Investments from Earmarked Funds (Schedule 9): Rs. Nil

No amount has been shown in this schedule. However, an amount of Rs. 71akh was invested in Fixed Deposit from Externally Aided Project Funds. Thus, investment from Earmarked Funds was understated by Rs. 7lakh. This has been pointed in the previous years also but no remedial action was taken.

1.3 Current Assets (Schedule 11): Rs. 1678.75 Lakh

i) Part A (4) of Schedule-11 did not include an amount of Rs. 5316.11 lakh being closing balance of externally funded projects at WII. Hence, current assets were understated by Rs. 5316.11 lakh. Similar observations were made in the previous years too but no remedial action was taken.

2. Liabilities

2.1 Earmarked Funds (Schedule 3): Rs. 553.93 lakh

Schedule-3 did not include the balances and transactions related to the externally funded projects at WII (Opening Balance Rs. 6658.31 lakh, Receipts Rs. 4772.76 lakh, Payments Rs. 6114.96 lakh and Closing Balance Rs. 5316.11 lakh). This resulted in understatement of Liabilities/Earmarked Funds by Rs. 5316.11 lakh. Similar observation was made in previous year report too but no remedial action was taken.

B. INCOME AND EXPENDITURE ACCOUNT

1. Expenditure Rs. 2818.70 lakh

1.1 Establishment Expenses (Schedule-20): Rs.2145.38 lakh

1.1.1 Overstatement of Expenditure

WII made salary payment of Rs.151.17 lakh for March 2020 in April 2020. This had resulted in overstatement of Expenditure by Rs. 151.17 lakh besides understatement of Prior-period Expenses by the same amount.

1.1.2 Understatement of Expenditure

WII made salary payment of Rs.108.81 lakh for March 2021 pertaining to its Group A/B/C staff in April 2021 without making any provisions for outstanding Establishment Expenses during 2020-21. This had

resulted in understatement of expenditure and current liabilities during 2020-21 both by Rs.108.81 lakh.

1.2 Other Administrative Expenses (Schedule 21): Rs. 673.32 lakh

1.2.1 Overstatement of expenditure

WII made expenditure of Rs. 20.18 lakh in FY 2020-21 towards Other Administrative Expenses (Telephone, Electricity, Internet lease, Newspaper) pertaining to the prior period FY 2019-20. This had resulted in overstatement of expenditure by Rs. 20.18 lakh besides understatement of Prior-period Expenses by the same amount.

Similar observation was made in previous audit but no remedial action was taken.

1.2.2 Understatement of Expenditure

i) WII made payments of Rs.4.80 lakh in April 2021 towards Telephone and Electricity bills for February/March 2021 without making any provisions for outstanding Other Administrative Expenses during 2020-21. This had resulted in understatement of expenditure and current liabilities during 2020-21 both by Rs.4.80 lakh.

Similar observation was made in previous audit but no remedial action was taken.

2. Income 'Rs. 2249.88 lakh'

2.1 Income from Investments (Schedule 15): Rs. Nil

The interest income of Rs. 56 lakh earned by WI! from FDs made from Earmarked Funds has not been depicted in the above schedule. Similar observation was pointed out in previous years' report but no remedial action was taken.

2.2 Other Income (Schedule 18): Rs. Nil

WII did not depict income of Rs. 8.17 lakh received from auction of old Metallic, Wooden, Plastic and Electronic asset items. This resulted in understatement of Income by Rs. 8.17 Iakh.

C. GRANT-IN-AID:

WII received Grants in Aid of Rs. 22 crore besides opening balance of Rs. 1.18 crore and other receipts of Rs.4.37 crore. Out of total available amount of Rs.27.55 crore, WI! made payments of Rs.27.07 crore and an amount of Rs.0.48 crore was closing balance as on 31 March 2021.

D. GENERAL

1. Non-Provisioning of Terminal Benefits

WII did not make any provision for 'Terminal Benefits' *viz*., Gratuity, Pension, Accumulated Leave Encashment' of its officers/ officials and a 'Nil' balance/figure was reflected in both Schedule-7 'Current Liabilities and Provisions' and Schedule-20 'Establishment Expenses' of the accounts. Therefore, liabilities as well as expenditure were understated to that extent.

AS&FA, MOEFCC in the 70th meeting of WII Governing Body (May 2020) suggested the Institute to get the actual requirement of its pension liabilities assessed through approved actuarial agencies. However, WII is yet to get it done.

2. Non-Provisioning of Audit Fee

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 Provision' and Schedule-21 'Other Administrative Expenses' of the accounts. therefore, liabilities as well as expenditure were understated to that extent.

3. Static Balances :

Audit Observed the following static balances under various schedules of the Balance Sheet as on 31 March 2021.

S.No.	Schedule/Head	Balance as on 31.03.2020 (in Rs.)	Amount lying since year
1	Sch.7-Current Liabilities and Provision-Other Payments Outstanding (Grant in aid) (2017-18)	121355	2017-18
2	Sch-11- Current Assets, Loans and Advances-Advance for IIT Kanpur	1239000	2017-18
3	Sch.11- Current Assets, Loans and Advances-Loan for World Environment Day (MoEF&CC)	280984	2011-12
4	Sch. 11- Current Assets, Loans and Advances-Loan for WCF Workshop	30253	2012-13
5	Sch-11- Current Assets, Loans and Advances-Loan for Civil Work to CPWD	17830008	Not furnished
6.	Sch.11- Current Assets, Loans and Advances-Advance Payment to CCU	15271531	2019-20
7	Sch.11- Current Assets, Loans and Advances-TDS to refunded by the ITO (Pension Fund)	4389787	2017-18
8	Sch.11- Current Assets, Loans and Advances-TDS to refunded by the ITO (GPF)	2277757	2017-18
9	Sch.11- Current Assets, Loans and Advances-TDS to refunded by th ITO (Corpus Fund)	2907227	2017-18
10	Sch.11- Current Assets, Loans and Advances-Training cost accrued but not received	660000	1996-2006
11	Sch.11- Current Assets, Loans and Advances-Grant in aid (2017-18)	121355	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 made in previous audit.

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 theexplanations 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 0/31 March 2021 and

b. In so far as it relates to Income and Expenditure Account of the deficit/or the year ended on that date.

For and on behalf of the C&AG of India

Director General of Audit (ESD

Place: New Delhi
Date : 18/2/2022

ANNEXURE – I

Internal Audit/Control System

1. Adequacy of internal audit system

WII is audited by the Internal Audit Wing of MOEFCC. last internal audit was conducted in August 2018 by MOEFCC forthe period 2013-14 to 2017-18. Thus the internal audit of WII was not conducted for the period from 2018-19 to 2020-21.

2. Adequacy of internal control system

a. 11 audit paras of 02 inspection reports for the period from 2010-11 to 2017-18 are outstanding (3 paras of 2010-14 IR and 8 paras of 2014-18 IR).

b. Broadsheet of long term advances are not being maintained.

c. Registers of Valuables, Expenditure Control, Contracts and Works Control are not being maintained.

3. System of physical verification of fixed asset.

a. WII conducted physical verification of fixed assets procured during FY 2019-20 and FY 2020-21 in August 2021. Complete Physical verification of all assets at Wit as on 31 March 2021 was not conducted. Complete and up-to-date physical verification is necessary to ascertain the actual status of fixed assets of the Institute and take follow-up action and also to ensure the correctness of figures depicted in balance sheet.

b. Fixed Assets Register is not being maintained properly. The register is not signed and closed at the year end. Accounts for Furniture and Fixture and Buildings are not maintained up to date.

c. WII auctioned old Fixed Asset items during 2020-21. However, for many items the rate of depreciation used to arrive Written Down Value was not as per the rate for the respective blocks of Fixed Assets indicated by the Institute in Schedule-8 of Balance Sheet.

4. System of physical verification of inventory

a. WII did not furnish any report on Physical verification of consumable stores.

b. WII in March 2019 conducted physical verification of books as on 31 December 2018. 132 books worth Rs. 82817.50 were missing. During 2020-21 Wit recovered RS.12735 in lieu of lost books.

5. Regularity in payment of statutory dues

No irregularity was observed pertaining to the payment of statutory dues in WII.

Director (EA)

ANNEXURE – A

Material for Management letter

1. Misclassification of expenditure

WII paid Advance Vehicle Insurance premium of Rs. 0.84 lakh for the year 2020-21 in 2019- 20. However, in 2020-21 WII booked Rs. 0.84 lakh in Schedule-21 'Other Administrative Expenses' under the head 'POL for Vehicles' instead of 'Vehicle insurance'.

2. Assets acquired from sponsored projects not depicted in Notes to Accounts

WII did not disclose the details of fixed assets acquired from the externally aided project funds in Notes to Accounts.

3 Fixed Assets (Schedule 8): Rs. 1662.94 lakh

3.1 WII depicted an amount of Rs. 66.07 lakh under Land in Schedule 8 'Fixed Assets', whereas the actual amount is Rs. 80.31 lakh. This resulted in understatement of Fixed Assets by Rs. 14.24 lakh.

3.2 i) WII did not reduce the value of old Metallic, Wooden, Plastic and Electronic asset items auctioned during 2020-21 from the respective blocks of Fixed Assets. Combined Written Down Value of these items was Rs. 1.47 lakh. This resulted in overstatement of Fixed Assets by Rs. 1.47 lakh.

ii) WII depicted expenditure of Rs. 1.07 lakh on Magazines and Annual AMC for library RFID system as addition to Fixed Assets after charging depreciation of Rs. 0.27 lakh at the rate of 20 per cent for half year. This resulted in overstatement of Fixed Assets besides understatement of Expenditure both by Rs. 1.07 lakh.

4. Current Assets (Schedule 11): Rs. 1678.75 lakh

4.1 Rent of RS.0.46 lakh for the period July 2020 to March 2021 was receivable from Union Bank of India as on 31 March 2021. However, WII did not depict the same under Schedule -11. This resulted in understatement of Current Assets by RS.0.46 lakh.

4.2 WII depicted advance road tax paid Rs. 0.26 lakh for FY 2021-22 under Other Administrative Expenses in FY 2020-21. This resulted understatement of Current Assets and overstatement of Expenditure by Rs.0.26 lakh.

5. Current Liabilities and Provision (Schedule 7): Rs. 2262.2S lakh

i) Advance of RS.11.S4 lakh paid to CPWD from Capital Grant was not shown as unutilized grant in this schedule. This resulted in understatement of Liabilities by Rs. 11.54 lakh.

ii) WII utilised Rs. 3.21 lakh, from its Grant received for Creation of Capital Assets for repair and maintenance work which is a revenue expenditure. This resulted in understatement of Liabilities on account of unutilized capital grant by Rs. 3.21 lakh.

6. Understatement of Expenditure

WII did not depict the value of old Metallic, Wooden, Plastic and Electronic asset items auctioned during 2020-21 in Schedule-21 'Other Administrative Expenses'. Combined Written Down Value of these items was Rs. 1.47 lakh. This resulted in understatement of Expenditure by Rs. 1.47 lakh.

7. Grants/Subsidies (Schedule 13): Rs. 2146.22 lakh

WII included Grants received for Creation of Capital Assets Rs.60 lakh reduced by Rs. 53.78 lakh Contribution towards Capital fund/capitalization during 2020-21 in Income from Grants¬in-aid (Schedule 13). This resulted in overstatement of Income account by RS.6.22 lakh.

8. Income from Royalty, Publication, etc. (Schedule 16): Rs.15.13 lakh

WII did not depict Rs. 0.15 lakh rent received from Union Bank of India during 2020-21. This resulted in understatement of income by Rs. 0.15 lakh.

Director (EA)

Statement shwoing the 'Date of Submission of Accounts', 'Period of Audit' etc., relating to the Wildlife Institute of India, Dehradun for the year 2020-21

(Amount in Rs.)

1	Date of submission of the Accounts to the Audit by Wildlife Institute of India, Dehradun.		25 August 2021
2	Where applicable reasons for returning the accounts for revision indicating why the accounts could not be certified with qualifications.		N.A
3	Date of submission of revised accounts to Audit where revision was considered essential.		N.A.
4	Date on which audit was taken up and completed.		from 16 September to 1 October 2021
5	Date of issue of draft SAR to the Board for replies/comments.		20 October 2021
6	Date of receipt of replies/comments from the Board (if received)		14 December 2021
7	Date of issue of draft SAR including replies/comments of the Board along with Aide-memoire to CAG's office for approval		10.01.2022
8	(a) Date of CAG's office letter communicating approval of SAR.		01.02.2022
	(b) Date of receipt of letter and approval at 8(a)		
9	Date of issue of final Separate Audit Report to Government of India/State Government/CAG's office. English version- Hindi Version (if required) -		18.02.2022
10	Reasons for delay, if any, at variious stages.		
11	Dates of presentation of the previous Audit Reports before Parliament. (Where the Audit Reports for previous years have not been placed, year to which these pertain may also be indicated).	**Year** 2018-19 2019-20	**Lok Sabha | Rajya Sabha** Information not available Yet to be presented in Parliament

Director (EA)

Annotated replies to the queries of Headquarter Office in respect of SAR of WII, Dehradun for the year 2020-21

(Amount in Rs.)

S.No.	Para No. in the SAR	Queries of CAG Headquarters	Replies
1.	Separate Audit Report on the Accounts of Wildlife Institute of India, Dehradun for the year 2020-21	There are a lot of persistent irregularities. These need to be taken up separately by the management for compliance.	Noted for compliance
2.	**1.1 Investment-Others (Schedule 10) : Rs. 4922.24 1akh** WII did not include its investment of Rs.1710 lakh in nine Fixed Deposit Receipts (FDR) under Assets in Schedule-10 'Investment-Others'. This resulted in understatement of its Assets and overstatement of Cash and Bank balance by Rs.1710 lakh.	Misclassification of head, it may be retained in SAR	Retained please
3.	**1.2 Fixed Assets (Schedule 8) : Rs. 1662.94 lakh** 1.2.1 WII depicted an amount of Rs. 66.07 lakh under Land in Schedule 8 'Fixed Assets', whereas the actual amount is Rs. 80.31 lakh. This resulted in understatement of Fixed Assets by Rs. 14.24 lakh.	Rs. 14.24 lakh is less than 2 percent of Rs. 1662 lakh, it may be shifted to ML	Shifted to ML please
4.	**1.2.2 i)** WII did not reduce the value of old Metallic, Wooden, Plastic and Electronic asset items auctioned during 2020-21 from the respective blocks of Fixed Assets. Combined Written Down Value of these items was Rs. 1.47 lakh. This resulted in overstatement of Fixed Assets by Rs. 1.47 lakh	Rs. 1.47 lakh is less than 2 percent of Rs. 1662 lakh, it may be shifted to ML.	Shifted to ML please
5.	**ii)** WII depicted expenditure of Rs. 1.07 lakh on Magazines and Annual AMC for library RFID system as addition to Fixed Assets after charging depreciation of Rs. 0.27 lakh at the rate of 20 per cent for half year. This resulted in overstatement of Fixed Assets besides understatement of Expenditure both by Rs. 1.07lakh.	Rs. 1.07 lakh is less than 2 percent of Rs. 1662 lakh, it may be shifted to ML	Shifted to ML please
6.	**1.3 Investments from Earmarked Funds (Schedule 9): Rs. Nill** No amount has been shown in this schedule. However, an amount of Rs. 7 lakh was invested in Fixed Deposit from Externally Aided Project Funds. Thus, investment from Earmarked Funds was understated by Rs. 7 lakh. This has been pointed in the previous years also but no remedial action was taken.	Repeat comment, it may be retained in SAR	Retained please
7.	**1.4 Current Assets.(Scheduie 11) : Rs. 1678.75 lakh** **i)** Part A (4) of Schedule-11 did not include an amount of Rs. 5316.11 lakh being closing balance of externally funded projects at WII. Hence, current assets were understated by Rs. 5316.11 lakh. Similar observations were made in the previous years too but no remedial action was taken.	Repeat comment, it may be retained in SAR	Retained please
8.	Rent of Rs. 0.46 lakh for the period July 2020 to March 2021 was receivable from Union Bank of India as on 31 March 2021. However, WII did not depict the same under Schedule-11. This resulted in understatement of Current Assets by Rs. 0.46 lakh.	Rs. 0.46 lakh is less than 2 percent of Rs. 1678 lakh, it may be shifted to ML	Shifted to ML please
9.	WII depicted advance road tax paid Rs. 0.26 lakh for FY 2021-22 under Other Administrative Expenses in FY 2020-21. This resulted understatement of Current Assets and overstatement of Expenditure by Rs. 0.26 lakh.	Rs. 0.26 lakh is less than 2 percent of Rs.1678 lakh, it may be shifted to ML	Shifted to ML please
10.	**2.1 Earmarked Funds (Schedule 3): Rs. 553.93 lakh** Schedule-S did not include the balances and transactions related to the externally funded projects at WII (Opening Balance Rs. 6658.31 lakh, Receipts Rs. 4772.76 lakh, Payments Rs. 6114.96 lakh and Closing Balance Rs. 5316.11 lakh). This resulted in understatement of Liabilities/Earmarked Funds by Rs. 5316.11 lakh. Similar observation was made in previous year report too but no remedial action was taken.	It may be merged with comment no.1.4 (i). it may be retained in SAR	Retained please

(Amount in Rs.)

S.No.	Para No. in the SAR	Queries of CAG Headquarters	Replies
11.	**2.2 Current Liabilities and Provision (Schedule 7): Rs. 2262.25 lakh** **i)** Advance of Rs. 11.54 lakh paid to CPWD from Capital Grant was not shown as unutilized grant in this schedule. This resulted in understatement of Liabilities by Rs. 11.54 lakh.	Rs. 11.54 lakh is less than 2 percent of Rs, 2262 lakh, it may be shifted to ML	Shifted to ML please
12.	WII utilised Rs. 3.21 lakh, from its Grant received for Creation of Capital Assets for repair and maintenance work which is a revenue expenditure. This resulted in understatement of Liabilities on account of unutilized capital grant by Rs. 3.21 lakh.	Rs. 3.21 lakh is less than 2 percent ofRs. 2262 lakh, it may be shifted to ML	Shifted to ML please
13.	**1.1 EstabJishment Expenses (Schedule-20): Rs. 2145.38 lakh** **1.1.1 Overstatement of Expenditure** WII made salary payment of Rs.151.17 lakh for March 2020 in April 2020. This had resulted in overstatement of Expenditure by Rs. 151.17 lakh besides understatement of Prior-period Expenses by the same amount.	Accural system is not followed, it may be retained in SAR	Retained please
14.	**1.1.2 Understatement of Expenditure** WII made salary payment of Rs. 108.81 lakh for March 2021 pertaining to its Group NB/C staff in April 2021 without making any provisions for outstanding Establishment Expenses during 2020-21. This had resulted in understatement of expenditure and current liabilities during 2020-21 both by Rs. 108.81 lakh.	Accural system is not followed, it may be retained in SAR	Retained please
15.	**1.2 Other Administrative Expenses (Schedule 21): Rs. 673.32 lakh** **1.2.1 Overstatement of expenditure** WII made expenditure of Rs. 20.18 lakh in FY 2020-21 towards Other Administrative Expenses (Telephone, Electricity, Internet lease, Newspaper) pertaining to the prior period FY 2019-20. This had resulted in overstatement of expenditure by Rs. 20.18 lakh besides understatement of Prior-period Expenses by the same amount.	Accural system is not followed, it may be retained in SAR	Retained please
16.	**1.2.2 Understatement of Expenditure** **i)** WII made payments of Rs. 4.80 lakh in April 2021 towards Telephone and Electricity bills for February/March 2021 without making any provisions for outstanding Other Administrative Expenses during 2020-21. This had resulted in understatement of expenditure and current liabilities during 2020-21 both by Rs. 4.80 lakh.	Accural system is not followed, it may be retained in SAR	Retained please
17.	**1.2.2 Understatement of Expenditure** **ii)** WII did not depict the value of old Metallic, Wooden, Plastic and Electronic asset items auctioned during 2020-21 in Schedule-2l 'Other Administrative Expenses'. Combined Written Down Value of these items was Rs. 1.47 lakh. This resulted in understatement of Expenditure by Rs. 1.47 Iakh.	Amount is not material, it may be shifted to ML	Shifted to ML please
18.	**2. Income 'Rs. 2249.88Iakh'** **2.1 Income from Investments (Schedule 15): Rs. Nil** The interest income of Rs. 56 lakh earned by WII from FDs made from Earmarked Funds has not been depicted in the above schedule. Similar observation was pointed out in previous years' report but no remedial action was taken.	Repeat comment, It may be retained in SAR	Retained please
19.	**2.2 Grants/Subsidies (Schedule 13): Rs. 2146.22 lakh** WII included' Grants received for Creation of Capital Assets Rs. 60 lakh reduced by Rs. 53.78 lakh Contribution towards Capital fund/capitalization during 2020-21 in Income from Grants-in-aid (Schedule 13). This resulted in overstatement of Income account by Rs. 6.22 lakh.	Amount is less than 2 percent, it may be shifted to ML.	Shifted to ML please
20.	**2.3 Other Income (Schedule 18): Rs. Nil** WII did not depict income of Rs. 8.17 lakh received from auction of old Metallic, Wooden, Plastic and Electronic asset items. This resulted in understatement of Income by Rs. 8.17 lakh.	It may be retained in SAR as it is more than 2 percent.	Retained in SAR please
21.	**2.4 Income from Royalty, Publication, etc. (Schedule 16): Rs. 15.13 lakh** WII did not depict Rs. 0.15 lakh rent received from Union Bank of India during 2020-21. This resulted in understatement of income by Rs. 0.15 lakh.	Amount is not material, it may be shifted to ML	Shifted to ML please

(Amount in Rs.)

S.No.	Para No. in the SAR	Queries of CAG Headquarters	Replies
22.	**C. Grant-in-aid:** WII received Grants in Aid of Rs. 22 crore besides opening balance of Rs. 1.18 crore and other receipts of Rs. 4.37 crore. Out of total available amount of Rs. 27.55 crore, WII made payments of Rs. 27.07 crore and an amount of Rs. 0.48 crore was closing balance as on 31 March 2021.	Huge balance of Rs.7.61 crore is lying in saving/current account, it may be examined in T A. Flagged for audit scrutiny	Noted for compliance please
23.	**D. General** **1. Non-Provisioning of Terminal Benefits** WII did not make any provision for "Terminal Benefits' viz., Gratuity, Pension, Accumulated Leave Encashment' of its officers/officials and a 'Nil' balance/figure was reflected in both Schedu1e-7 'Current Liabilities and Provisions' and Schedule-20 'Establishment Expenses' of the accounts. Therefore, . liabilities as well as expenditure were understated to that extent. AS&FA, MOEFCC in the 70th meeting of WII Governing Body (May 2020) suggested the Institute to get the actual requirement of its pension liability assessed through approved actuarial agencies. However, WII is yet to get it done.	Check list point, it may be retained in SAR Replies	Retained in SAR please
24.	**Non-Provisioning of Audit fee** 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.	Comment is without amount, it may be retained in SAR as accrual system is not followed	Retained in SAR please
25.	**3. Static balances:** Audit observed the following static balances under various schedules of the Balance Sheet as on 31 March 2021.	It may also examined in Ta also, it may be retained in SAR	Retained in SAR please

S.No.	Schedule/head	Queries of CAG as 31.03.2021	Amount lying since year
1.	Sch.7- Current Liabilities and provision - Other Payments Outstanding (Grant in aid-2017-18)	121355	2017-18
2.	Sch.11- Current Assets, Loans and Advances- Advance for ITT Kanpur	1239000	2017-18
3.	Sch.11-Current Assets, Loans and Advances- Loan for World Environment Day (MoEF&CC)	280984	2011-12
4.	Sch.11- Current Assets, Loan and Advances- Loan for WCF Workshop	30253	2012-13
5.	Sch.11- Current Assets, Loans and Advances- Advance for Civil Works to CPWD	17830008	not furnished
6.	Sch.11- Current Assets, Loan and Advances- Advance payment to CCU	15271531	2019-20
7.	Sch.11- Current Assets, Loan and Advances- TDS to be refunded by the ITO (Pension Fund)	4389787	2017-18
8.	Sch.11- Current Assets, Loan and Advances- TDS to be refunded by the ITO (GPF)	227757	2017-18
9.	Sch.11- Current Assets, Loan and Advances- TDS to be refunded by the ITO (Corpus Fund)	2907227	2017-18
10.	Sch.11- Current Assets, Loan and Advances- Training cost accrued but not received	660000	1996-2006
11.	Sch.11- Current Assets, Loan and Advances- Grant in aid (2017-18)	121355	2017-18

(Amount in Rs.)

S.No.	Para No. in the SAR	Queries of CAG Headquarters	Replies
	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 made in previous audit.		
26.	**Annexure** **1. Adequacy of internal audit system** WII is audited by the Internal Audit Wing of MOE FCC. Last internal audit was conducted in August 2018 by MOEFCC for the period 2013-14 to 2017-18. Thus the internal audit ofWII was not conducted for the period from 2018-19 to 2020-21. **2. Adequacy of internal control system** **a.** 11 audit paras of 02 inspection reports for the period from 2010-11 to 2017-18 are outstanding (3 paras of 2010-14 IR and 8 paras of 2014-18 IR). **b.** Broadsheet of long term advances are not being maintained. **c.** Registers of Valuables, Expenditure Control, Contracts and Works Control are not being maintained . **3. System of physical verification of fixed asset.** **a.** WII conducted physical verification of fixed assets procured during FY 2019-20 and FY 2020-21 in August 2021. Complete Physical verification of all assets at WII as on 31 March 2021 was not conducted. Complete and up-to-date physical verification is necessary to ascertain the actual status of fixed assets of the Institute and take follow-up action and also to ensure the correctness of figures depicted in balance sheet. **b.** Fixed Assets Register is not being maintained properly. The register is not signed and closed at the year end. Accounts for Furniture and Fixture and Buildings are not maintained up to date. **c.** WII auctioned old Fixed Asset items during 2020-21. However, for many items the rate of depreciation I used to arrive Written Down Value was not as per the rate for the respective blocks of Fixed Assets indicated by the Institute in Schedule-8 of Balance Sheet. **4. System of physical verification of inventory** **a.** WII did not furnish any report on Physical verification of consumable stores. **b.** WII in March 2019 conducted physical verification of books as on 31 December 2018. 132 books worth Rs. 82817.00 were missing. During 2020-21 WII recovered Rs. 12735 in lieu of lost books. **5. Regularity in payment of statutory dues** No irregularity was observed pertaining to the payment of statutory dues in WII.	Approved	Noted please

Sr. Audit Officer (EA)

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
(A) GRANT-IN-AID (General)					**Expenses**				
To Opening Balance					By Salaries & Allowances	-	-	-	23,77,76,818.00
Cash in Bank	1,17,81,369.04	-	1,17,81,369.04	83,75,247.25	By Medical	-	-	-	90,39,762.50
Cash In Hand	-	-	-	1,47,705.00	By LTC	-	-	-	18,35,620.00
					By OTA	-	-	-	-
To Grant in Aid (Revenue)	3,40,00,000.00	-	3,40,00,000.00	29,63,17,000.00	By Honorarium	-	-	-	1,44,420.00
To Grant in Aid (Capital)	-	-	-	1,86,00,000.00	By Fellowship & Wages (R/Proj)	2,40,915.00	-	-	2,13,699.00
To Grant (other Projects)	32,38,750.00	-	32,38,750.00	-	By Stipend of MSc Students	-	-	-	8,23,179.00
To MSc Course Fe	41,03,400.00	-	41,03,400.00	31,96,800.00	By Leave encashment & Gratuity	-	-	-	1,54,24,368.00
To Bus Charges	-	-	-	2,10.046.00	By Bonus	-	-	-	-
To Building Rent+HLF	-	-	-	9,42,306.00	By Fellowship Forenis Cell	-	-	-	-
To WII Products	-	-		5,474.00	By Base Camp Exp. (Res Project)	58,880.00	-	58,880.00	82,824.00
To Misc Receipts	-	-	-	19,95,535.29	By Vehicle insurance	88,000.00	-	88,000.00	-
To Elect & Water	-	-	-	9,37,085.00	By Annual Res Seminar-ARS	40,613.00	-	40,613.00	12,02,721.00
To Interest on Saving A/c	787.00	-	787.00	2,87,891.00	By Estate Security	63,54,384.00	-	63,54,384.00	9,46,292.00
To Loan & Advance	-	-	-	-	By POL, Hiring of Veh (R/Proj)	1,02,558.00	-	1,02,558.00	2,34,822.00
To EMD Security Deposit	-	-	-	1,20,000.00	By Contingencies (Res Proj)	2,78,479.00	-	2,78,479.00	6,79,238.00
To Hostel Caution Money	-	-	-	32,83,892.00	By Travel Expenses (Res. Proj)	4,43,363.00	-	4,43,363.00	7,69,558.00
To Intt on HBA	-	-	-	1,76,942.00	By Lab Expenses-Forc Lab	6,83,161.00	-	6,83,161.00	6,71,005.00
To Travel/FA Adv.-GIA	7,87,977.00	-	7,87,977.00	-	By M.Sc Expenditure	17,91,022.00	-	17,91,022.00	35,63,190.00
To Travel Adv.(R/Proj)	1,07,196.00	-	1,07,196.00	22,196,.00	By Elect and Water Charges	99,16,134.00	-	99,16,134.00	52,51,780.00
To FA (Research Project)	6,41,403.00	-	6,41,403.00	5,63,345.00	By Hospitality/Entertainment	1,24,940.00	-	1,24,940.00	1,61,581.00
To LTC Adv	45,000.00	-	45,000.00	-	By POL of WII Vehicle	4,74,816.00	-	4,74,816.00	4,07,851.00
To Medical Adv	39,000.00	-	39,000.00	-	By Postage & Telegram	1,92,675.00	-	1,92,675.00	1,72,699.00
To M.Sc-FA & TA Advance	4,78,694.00	-	4,78,694.00	3,57,848.00	By Repair & Maint of Vehicle	5,23,031.00	-	5,23,031.00	7,35,464.75

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Sundry Creditors	4,98,034.00-	-	4,98,034.00	-	By Sport	1,13,913.00	-	1,13,913.00	2,37,019.00
To Expenses for Capitales	-	-	-	6,09,331.00	By Stationery & Consumables	9,05,818.00	-	9,05,818.00	5,40,546.00
To Opening Stock-Library	2,151,.00	-	2,151.00	6,308.00	By Telephone & Trunk Calls	9,96,595.00	-	9,96,595.00	3,22,921.00
To GPF Recd	-	-	-	24,99,780.00	By Legal Expenses	12,60,86.00	-	12,60,86.00	18,66,149.00
To Adv payment CPWD	-	-	-	85,80,651.00	By Operational expenses	10,03,317.00	-	10,03,317.00	25,20,174.00
To Adv Payment CCU	-	-		21,93,224.00	By Printing & Binding	40,36,373.00	-	40,36,373.00	16,51,568.00
To Advance for Veh. Ins.	84,100.00	-	84,100.00	82,062.75	By Maint of WII Campus	5,33,253.00	-	5,33,253.00	8,53,874.00
To Campus Development-CPWD	-	-	-	-	By Repair of equip/furniture	40,427.00	-	40,427	6,000.00
To Telephone-Income	-	-		5,348.00	By Computer AMC & Cons.	24,00,589.00	-	24,00,589.00	21,78,778.00
To Bouns Refund	-	-	-	-	By Lab. Exp-Research Lab	1,66,275.00	-	1,66,275.00	78,839.00
To GST	-	-	-	86,851.00	By Lab. Expenses-Gen.	-	-	-	58,622.00
To CGEGIS	-	-	-	1,13,130.00	By Maint. Of Civil Work	8,04,060.00	-	8,04,060.00	16,49,063.00
To Library Books	12,735.00	-	12,735.00	-	By Transferred to Trg A/c	-	-	-	50,00,000.00
					By Travel Expenses	7,30,988.00	-	7,30,988.00	19,63,250.00
					By Lib expenses	2,99,988.00	-	2,99,988.00	44,396.00
					By Computer/ Periphirel	6,05,585.00	-	6,05,585.00	13,44,022.00
					By Furniture & Fixture	18,939.00	-	18,939	6,23,887.00
					By Journals & Periodicals	1,41,299.00	-	1,41,299.00	6,04,530.00
					By Lab Exp-Harberiam	-	-	-	10,473.00
					By Forest & Tour Adv-GIA	3,277.00	-	3,277	7,87,977.00
					By Medical Adv	-	-	-	39,000.00
					By Forest advance R/Proj	1,58,517.00	-	1,58,517.00	6,41,403.00
					By Tour Advance -R/Proj	22,196.00	-	22,196.00	1,07,196.00
					By M.Sc. TA Advance	6,01,688.00	-	6,01,688.00	40,000.00
					By M.Sc. FA Advance	-	-	-	4,38,694.00

RECEIPT					PAYMENT				
Particulars	Plan	Non Plan	Total	Previous Year	Particulars	Plan	Non Plan	Total	Previous Year
By Building Complex	-	-	-	30,720.00					
By Campus Development	-	-	-	1,07,73,875.00					
By Vehicle	-	-	-	-					
By Forensic Lab.	91,198.00	-	91,198	4,67,514.00					
By CGEGIS	31,010.00	-	31,010.00	-					
By Office equipment	-	-	-	3,57,255.00					
By Office Eqpt (Res. Proj)	6,779.00	-	6,779.00						
By Camp Eqpt (Res. Proj.)	-	-	-	1,19,760.00					
By GPF-CDL	24,99,780.00	-	24,99,780.00	-					
By GST	73,523.00	-	73,523.00	-					
By Prev. Year bal. Transf. to Corpus	34,69,598.00	-	34,69,598.00	21,26,241.00					
By Elect. Equipment	-	-	-	2,04,254.00					
By Advance for CPWD	-	-	-	1,25,32,180.00					
By Advance for CCU	-	-	-	29,82,500.00					
By Sundry Creditores	-	-	-	9,29,461.00					
By Complementry-Library	2,151.00	-	2,151.00	6,308.00					
By Intt. Refund	38,70,437.00	-	38,70,437.00	-					
By Security Deposit	5,56,968.00	-	5,56,968.00	5,23,409.00					
Adv for Vehical Ins. Premium	1,33,786.00	-	1,33,786	84,100.00					
By LTC Advance	-	-	-	45,000.00					
By Hostel Causel Money	16,21,795.00	-	16,21,795.00	-					
By New Salary Account	84,000.00	-	84,000.00	-					
In Bank	47,77,475.04	-	47,77,475.04	1,17,81,369.04					
In Hand	-	-	-	-					
A' Total	**5,58,20,596.04**	**-**	**5,58,20,596.04**	**346,715,998.29**	**A' Total**	**5,58,20,596.04**	**-**	**5,58,20,596.04**	**34,67,15,998.29**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	
Previous Year									
(A) GRANT-IN-AID (CAPITAL)					By Maint. of Civil Work	2,34,677.00	-	2,34,677.00	-
To Opening Balance					By Furniture & Fixter	5,33,653.00	-	5,33,653.00	-
Cash in Bank	-	-	-	-	By Forest Advance	86,000.00	-	86,000.00	-
Cash in Hand	-	-	-	-	By Boundary Wall	40,00,000.00	-	40,00,000.00	-
To Grant in Aid (Capital)	60,00,000.00	-	60,00,000.00	-	By Advance for CPWD	11,53,560.00	-	11,53,560.00	-
To Interest (Saving A/c)	7,890.00	-	7,890.00	-					
					In Bank	-	-	-	-
					In Hand	-	-	-	-
A' Total	**60,07,890.00**		**60,07,890.00**	**-**	**A' Total**	**60,07,890.00**		**60,07,890.00**	**-**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

Pension Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
(A) GRANT-IN-AID (Salary)					By Salary	19,08,09,363.00	-	19,08,09,363.00	-
To Opening Balance					By Fellowship (Res. Project)	43,94,600,00	-	43,94,600.00	-
Cash in Bank	-	-	-	-	By LTC	1,13,812.00	-	1,13,812.00	-
Cash in Hand	-	-	-	-	By Medical	83,42,536.00	-	83,42,536.00	-
To Grand in Aid (Salary)	18,00,00,000.00	-	18,00,00,000.00	-	By Gratulty	91,80,241.00	-	91,80,241.00 -	-
To Bus Charges	27,336.00	-	27,336.00	-	By Honorarlum	67,000.00	-	67,000.00	-
To Electricity & Water	7,29,989.00	-	7,29,989.00	-	By Stipend of MSc Students	7,44,000.00	-	7,44,000.00	-
To HBA Intereset	10,000.00	-	10,000.00	-					
To House Licence Fee (HLF)	7,55,868.00	-	7,55,868.00	-					
To Loan Dir. A/c No. 4032	2,90,00,000.00	-	2,90,00,000.00	-					
To Loan Dir. A/c No. 5846	30,44,359.00	-	30,44,359.00	-	In Bank	-	-	-	-
To Advance to General A/c 1297	84,000.00	-	84,000.00	-	In Hand	-	-	-	-
A' Total	**21,36,51,552.00**	**-**	**21,36,51,552.00**	**-**	**A' Total**	**21,36,51,552.00**	**-**	**21,36,51,552.00**	**-**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

General Provident Fund

	RECEIPT					PAYMENT			
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Balance (Bank)	13,84,083.00	-	13,84,083.00	1,23,46,519.00	By Final Payment	2,87,60,442.00	-	2,87,60,442.00	2,55,63,727.00
To Autosweep Bank Balance	35,00,000.00	-	35,00,000.00	-	By Advance/Withdrawl	34,65,290.00	-	34,65,290.00	1,02,07,500.00
To GP Fund Contribution	2,87,12,914.00	-	2,87,12,914.00	2,80,49,962.00	By Investment of FDR	-	-	-	1,00,00,000.00
To Encashment of FDR	67,15,531.00	-	67,15,531.00	96,28,390.00	By Autosweep Investment	70,00,000.00	-	70,00,000.00	35,00,000.00
To Int. on Saving A/c	2,47,324.00	-	2,47,324.00	2,47,324.00					
To Int. on FDR	98,117.00	-	98,117.00	2,63,605.00	By Closing Balance (Bank)	14,32,237.00	-	14,32,237.00	13,84,083.00
B' Total	**4,06,57,969.00**	**-**	**4,06,57,969.00**	**5,06,55,310.00**	**F' Total**	**4,06,57,969.00**	**-**	**4,06,57,969.00**	**5,06,55,310.00**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

Pension Fund

	RECEIPT			Previous Year		PAYMENT			Previous Year
Particulars	**Plan**	**Non Plan**	**Total**		**Particulars**	**Plan**	**Non Plan**	**Total**	
To Opening Balance									
To Cash in Bank	31,23,575.00	-	31,23,575.00	11,19,755.00	By Investment in FDR	17,10,00,000.00	-	17,10,00,000.00	-
To Encashment of FDR	3,48,92,247.00	-	3,48,92,247.00	3,40,16,996.00	By Commuted Value of Pension	2,82,58,683.00	-	2,82,58,683.00	1,56,12,520.00
To Interest (Pension A/c)	8,15,500.00	-	8,15,500.00	4,25,639.00	By Pension/Family Pension	3,02,58,811.00	-	3,02,58,811.00	2,52,14,809.00
To WII contibution	20,02,20,271.00	-	20,02,20,271.00	1,55,000.00	By Autosweep FD	90,00,000.00	-	90,00,000.00	-
To Interest on FDRs	5,75,385.00	-	5,75,385.00	7,64,225.00					
					Cash in Bank	11,09,484.00	-	11,09,484.00	31,23,575.00
C' Total	**23,96,26,978.00**	**-**	**23,96,26,978**	**4,39,50,904.00**	**D' Total**	**23,96,26,978.00**	**-**	**23,96,26,978**	**4,39,50,904.00**

Corpus Fund

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Balace	1,56,83,749.67	-	1.56.83.749.67	3,71,84,421.67	By Investment in FDRs	5,36,54,687.00	-	5,36,54,687.00	7,40,00,000,00 -
To Misc Receipts	1,40,00,845.00	-	1,40,00,845.00	5,15,81,971.00	By Investment in FDRs	-	-	-	4,45,312.00
To Interests on Saving A/c	2,11,217.00	-	2,11,217.00	9,17,357.00	By Autosweep Investment	5,00,,000.00	-	5,00,000.00	1,4500,,000.00
To Interests on FDR	79,43,027.00	-	79,43,027.00	3,537.00	By Misc. A Cont.	590.00	-	590.00	-
To Encashment of FDR	23,73,21,599.00	-	23,73,21,599.00	4,41,775.00	By Pension	19,03,48,519.00	-	19,03,48,519.00	-
					By Loan Loan A/c No. 57945	2,90,00,000.00	-	2,90,00,000.00	
					Closing Balance	16,56,641.67	-	16,56,641.67	11,83,749.00
D' Total	**27,51,60,437.67**	**-**	**27,51,60,437.67**	**9,01,29,061.67**	**F' Total**	**27,51,60,437.67**	**-**	**27,51,60,437.67**	**9,01,29,061.00**

(Baljeet Kaur)
Finance Officer

(Dr. Dhananjai Mohan)
Director

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

Training Account

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening in Bank	1,56,42,733.85	-	1,56,42,733.85	51,62,501.00	By Office Equipment	-	-	-	83,113.00
To Grant Received	-	-	-	50,00,000.00	By Cont/Misc	2,92,799.00	-	2,92,799.00	9,27,707.47
To Interest Received	4,44,664.00	-	4,44,664.00	3,01,729.00	By Camping Gear	29,123.00	-	29,123.00	25,48,116.00
To Other Receipts	10,56,000.00	-	10,56,000.00	2,82,44,265.00	By Travelling Expenses	7,35,167.00	-	7,35,167.00	89,42,264.00
To Adv. for Expenses	15,33,800.00	-	15,33,800.00	12,00,000.00	By TA/DA & Honorarium	2,83,443.00	-	2,83,443.00	6,13,086.00
To Misc Receipts	-	-	-	12,70,000.00	By POL & Maint of Vehicle	1,76,600.00	-	1,76,600.00	8,01,883.00
To Loan D/WII-54272	-	-	-	10,00,000.00	By Boarding & Lodging	34,64,619.00	-	34,64,619.00	58,03,503.00
To Prepaid Vehicle Insurance	-	-	-	23,582,00	By Books	-	-	-	
To Training Cost Accrued But Not Received	1,78,375.00	-	1,78,375.00	-	By Salary & Wages	5,86,413.00	-	5,86,413.00	4,62,356.00
					By Other Advance	15,263.00	-	15,263.00	6,92,800.00
					By Corpus Funds	4,50,000.00	-	4,50,000.00	46,50,000.00
					By Maint of vehicle	-	-	-	60,159.00
					By Sports Item	14,040.00	-	14,040.00	47,976.00
					By Advances for Expenses	-	-	-	8,41,000.00
					By Furniture & Fixture	-	-	-	83,481.00
					By TDS	-	-	-	1,899.00
					By Misc. Receipt-Payment	11,00,000.00	-	11,00,000.00	-
					By Closing in Bank	1,17,08,105.85	-	1,17,08,105.85	1,56,42,733.85
E' Total	**1,88,55,572.85**	**-**	**1,88,55,572.85**	**4,22,02,077.32**	**C' Total**	**1,88,55,572.85**	**-**	**1,88,55,572.85**	**4,22,02,077.32**

RECEIPT & PAYMENT ACCOUNTS FOR THE YEAR 2020-21

Consultancy Project

RECEIPT					PAYMENT				
Particulars	**Plan**	**Non Plan**	**Total**	**Previous Year**	**Particulars**	**Plan**	**Non Plan**	**Total**	**Previous Year**
To Opening Balance :									
at Bank	3,25,82,870.00	-	3,25,82,870.00	2,56,77,042.00	By Office Equipment	20,409.00	-	20,409.00	4,63,189.00
To Grant Received	1,86,82,919.00	-	1,86,82,919.00	1,98,92,408.00	By Training Course Materials	-	-		1,06,530/00
To Interest Saving A/c	8,16,357.00	-	8,16,357.00	9,23,454.00	By Contingenciges/Misc	10,50,963.00	-	10,50,963.00	40,94,087.00
To Misc Receipts	1,23,13,220.00	-	1,23,13,220.00	41,85,898.00	By Fellowship & Wages	1,67,195.00	-	1,67,195.00	6,63,794.00
To Advance for Expenses	22,20,000.00	-	22,20,000.00	12,16,464.00	By Travel Expenses	6,12,799.00	-	6,12,799.00	22,88,018.00
To Loan D/WII-54272	-	-	-	15,00,00.00	By POL & Maint of Vehicle	2,81,088.00	-	2,81,088.00	1,39,925.00
					By Stationery Items	32,138.00	-	32,138.00	2,52,495.00
					By Advances for Expenses	2,20,000.00-	-	2,20,000.00	15,20,000.00
					By Boarding & Lodging	46,60,331.73	-	46,60,33173	42,77,687.00
					By TA/DA & Honorarium	1,68,557.00	-	1,68,557.00	1,46,708.00
					By Transf./ To Corpus Fund	10,00,687	-	10,00,687	32,58,937.00
					By Training Course Fees	7,00,000.00	-	7,00,000.00	28,90,289.11
					By Report Writing	28,683.00	-	28,683.00	10,736.00
					By Advance of Other	2,00,000.00	-	2,00,000.00	-
					By Field Equipment	2,00,000.00	-	2,00,000.00	-
					By Refund of Unspend Amt.	16,45,736.00	-	16,45,736.00	-
					By Loan to other Project	-	-	-	7,00,000.00
					By Misc Receipt-Payment	2,33,691.24	-	2,33,691.24	-
					Total Expenditure	1,12,22,277.97	-	1,12,22,277.97	2,08,12,395.91
					By Bank Balance	5,53,93,088.44	-	5,53,93,088.00	3,25,82,870.41
F' Total	**6,66,15,366.41**	**-**	**6,66,15,366.41**	**5,33,95,266.32**	**E' Total**	**6,66,15,366.41**	**-**	**6,66,15,366.41**	**5,33,95,266.32**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
BALANCE SHEET AS ON 31 MARCH 2021

(Amt. Rs.)

CORPUS /CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS /CAPITAL FUND	1	51,27,21,428.96	74,72,04,640.96
RESERVE AND SURPLUS	2	-	-
ENDOWMENT/EARMARKED FUND	3	5,53,93,088.44	3,25,82,870.41
SECURED LOAN AND BORROWINGS	4	-	-
UNSECURED LOAN AND BORROWINGS	5	3,20,44,359.00	5,56,968.00
DEFERRED CREDIT LIABILITIES	6	8,677.00	38,70,437.00
CURRENT LIABILITIES AND PROVISION	7	22,62,25,272.00	28,64,24,384.00
TOTAL (A)		**82,63,92,825.40**	**1,07,06,39,300.37**
ASSETS			
FIXED ASSETS	8	16,62,93,640.00	18,31,52,664
INVESTMENTS- FROM EARMARKED / ENDOWMENT FUNDS	9	-	-
INVESTMENTS- OTHERS	10	49,22,23,727.00	71,27,81,914.00
CURENT ASSETS, LOANS, ADVANCES ETC.	11	16,78,75,458.00	17,47,04,721.97
MISCELLANEOUS EXPENDITURE (TO THE EXTENT NOT WRITTEN OFF OR ADJUSTED)			
TOTAL (B)		**82,63,92,825.40**	**1,07,06,39.300.37**

(Baljeet Kaur)
Finance Officer

(Dr. Dhananjai Mohan)
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 2021

(Amt. Rs.)

SCHEDULE 1 : CORPUS/CAPITAL FUND		Current Year	Previous Year
Balance as at the beginning of the year		25,83,62,500.29	25,35,22,451.72
Add: Contribution towards Corpus/Capital Fund		53,77,939.00	1,46,99,190.00
Add/(Deduct): Balance of net income (expenditure) transferred from		- 5,63,43,444.00	- 98,59,141.43
TOTAL	**A**	**20,73,96,996.29**	**25,83,62,500.29**
Corpus Fund			
Opening Balance		48,88,42,140.67	41,01,31,173.67
Received during the year		1,40,00,845.00	5,15,81,971.00
Add Accrued Interest		1,36,76,313.00	2,62,08,102.00
Add Interest Earned		2,11,217.00	9,17,357.00
Interest on FDR		79,43,027.00	3,537.00
Less : Paid to Pension Funds		- 21,93,49,109.00	-
TOTAL	**B**	**30,53,24,433.67**	**48,88,42,140.67**
TOTAL A+B		**51,27,21,428.96**	**66,36,53,625.39**

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 2021

(Amt. Rs.)

SCHEDULE 2: RESERVE AND SURPLUS	Current Year	Previous Year
1. Capital Reserve :		
As per last Account	-	-
Addition during the year	-	-
Less : Deductions during the year	-	-
2. Revaluation Reserve :		
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 Reserve :		
As per last Account	-	-
Addition during the year	-	-
Less : Deductions during the year-	-	
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 2021

SCHEDULE3 : EARMARKED FUNDS			Current Year	Previous Year
a)	Opening Balance of the Funds		3,25,82,870.41	2,56,77,042.92
b)	Addition to the Funds			
	i	Grants Received	3,09,96,139.00	2,40,78,306.00
	ii	Interest Received	8,16,357.00	9,23,454.00
	iii	Other for Expenses	22,20,000.00	12,16,464.00
	iv	Loan-54272	-	15,00,000.00
	Total		3,40,32,496.00	2,77,18,224.00
	TOTAL (A+B)		**6,66,15,366.41**	**5,33,95,266.92**
Utilisation/Expendition towards objectives of funds				
c)	i	Capital Expenditures (Fixed Assets)		
		Camp/Field Equipment	2,00,000.00	-
		Office Equipment	20,409.00	4,63,189.00
	ii	Revenue Expenditure		
		Contingencies/Misc.	10,50,963.00	40,94,087.80
		Fellowship & Wages	1,67,195.00	6,63,794.00
		Travel Expenses	6,12,799.00	22,88,018.00
		POL & Maint. Of Vehicle	2,81,088.00	1,39,925.00
		Advance for Expenses (FA)	2,20,000.00	15,20,000.00
		Boarding & Lodging	46,60,331.73	42,77,687.00
		Misc receipt - Payment (Previous Year)	2,33,691.24	-
		Report Writing	28,683.00	10,736.00
		Corpus fund	10,00,687.00	32,58,937.00
		TA/DA & Honorarium	1,68,557.00	1,46,708.00
		Stationery items	32,138.00	2,52,495.00

	Training Course Materials	-	1,06,530.00
	Training Course Fee	7,00,000.00	28,90,289.71
	Sport Expenses	-	-
	Loan to Director WII Other Project	-	7,00,000.00
	Refund of Unspend Amt.	16,45,736.00	-
	Advance for other Firm	2,00,000.00	-
	TOTAL-C	1,12,22,277.97	2,08,12,396.51
NET BALANCE AS AT THE YEAR-END (A+B-C)		**5,53,93,088.44**	**3,25,82,870.41**

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 2021

(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 2021

(Amt. 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	-	5,56,968.00
Internal Loan	3,20,44,359.00	-
Pension Fund	-	-
TOTAL	**3,20,44,359.00**	**5,56,968.00**

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 2021

(Amt. Rs.)

SCHEDULE 6 : DEFERRED CREDIT LIABILITIES:	Current Year	Previous Year
(A) Acceptances secured by hypothecation of capital equipment and other assets	-	-
(B) Others	8,677.00	38,70,437.00
TOTAL	**8,677.00**	**38,70,437.00**

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 2021

(Amt. 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)	28,15,161.00	-
Other Payments outstanding (Grant in Aid) (2017-18)	1,21,355.00	1,21,355.00
(3) Advances Received		
Hostel Caution Money	22,000.00	16,43,795.00
(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	7,08,67,946.00	13,28,45,827.00
GP Fund	15,23,03,362	14,71,80,488.00
(6) Others (Specify)		
EMD Received	-	19,33,158.00
Welfare Fund -	-	-
TOTAL (A)	**22,61,29,824.00**	**28,37,24,623.00**
B) PROVISIONS		
(1) For Taxation		
TDS- Training Account	-	-
GST-Grant in Aid	13,328.00	86,851.00 -
(2) Gratuity		
(3) Superannuation/ Pension	-	-
(4) Accumulated Leave Encashment	-	-
(5) Trade Warranties/ Claims	-	-
(6) Others (Specify)		
TDS refund paid to GPF, Pension & Corpus -	-	
CGEGIS	82,120.00	1,13,130.00
GPF-CDL	-	24,99,780.00
Payment to Income Tax	-	-
Payment made to Sh Rajkishore Mohanto (Res. Projecdt)	-	-
Fellowship (Arrear)	-	-
TOTAL (B)	**96,448.00**	**26,99,761.00**
TOTAL (A+ B)	**22,62,25,272**	**28,64,24,384.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, DEHRADUN
SCHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 2020-21
SCHEDULE 8 : FIXED ASSETS

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 change of dep rates	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 at the current year-end	As at the Previous year-end
LAND												
BLOCK: 0%												
TOTAL	6,607,214.58	-	-	-	-	66,07,214.58	-	-	-	-	66,07,214.58	66,07,214.58
BUILDINGS												
BLOCK: 10%												
TOTAL	11,43,99,167.91	-	40,00,000.00	-	5,38,694.00	11,89,37,861.91	1,04,29,562.00	1,16,93,786.00	-	1,16,93,786.00	10,72,44,075.91	11,43,99,167.91
BLOCK: 5%												
TOTAL	48,40,356.71	-	-	-	-	48,40,358.71	2,97,134.00	2,42,018.00	-	2,42,018.00	45,98,338.71	48,40,356.71
PLANT MACHINERY & EQPT												
BLOCK: 15%												
TOTAL	4,13,61,701.10	-	91,198.00	-	-	4,14,52,899.12	56,06,257.00	62,11,094.00	-	62,11,094.00	3,52,41,805.12	4,13,61,701.10
AC Plant : BLOCK : 10%												
TOTAL	4,04,914.46	-	-	-	-	4,04,914.46	92,573.00	- 40,491.00	-	40,491.00	3,64,423.46	4,04,914.46
FURNITURE, FIXTURES : BLOCK : 10%												
TOTAL	64,62,395.32	4,39,073.00	1,13,519.00	-	-	70,14,987.32	7,36,096,.00	6,95,823.00	-	6,95,823.00	63,19,164.32	64,62,395.32
COMPUTER/PERIPHERALS : BLOCK : 40%												
TOTAL	52,26,201.86	5,86,985.00	18,600.00	-	-	58,31,786.86	7,15,680.00	23,28,004.00	-	23,28,994.00	35,02,792.86	52,26,201.86
LIBRARY BOOKS/BOOKS : BLOCK : 40%												
TOTAL	38,50,712.45	-12,735.00	1,41,299.00	-	-	39,79,276.45	33,35,337.00	15,63,451.00	-	15,53,451.00	24,15,825	38,50,712.45
GRAND TOTAL	**18,31,52,664.39**	**10,13,323.00**	**43,64,61600**	**-**	**5,38,694**	**18,90,69,297 .41**	**2,12,12,639.00**	**2,27,75,657.00**	**-**	**2,27,75,657.00**	**16,62,93,640.40**	**18,31,52,664.39**

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 2021

(Amt. 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. Subsidaries 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 2021

(Amt. 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 (GPF)	-	-
Investment in RBI Bond (Pension)	-	-
Investment in RBI Bond (Corpus Fund)	4,20,00,000.00	4,20,00,000.00
5. Subsidaries and Joint Ventures		
6. Others (Specify)		
Investment in GIA	-	-
Investment in FDR (GPF)	13,33,03,117.00	13,03,69,426.00
Autosweep FDR-GPF	70,00,000.00	35,00,000.00
Investment in FDR (Pension Fund)	5,58,36,358.00	12,03,69,426.00
FDR Corpus Fund	24,45,84,252.00	40,20,43,062.00
Autosweep FDR Corpus fund	5,00,000.00	1,45,00,000.00
Autosweep FDR-Pension Fund	90,00,000.00	-
TOTAL	**49,22,23,727.00**	**71,27,81,914.00**

(Baljeet Kaur)
Finance Officer

(Dr. Dhananjai Mohan)
Director

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
SHEDULES FORMING PART OF BALANCE SHEET FOR THE YEAR ENDED 31 MARCH 2020

(Amt. Rs.)

SCHEDULE : 11 CURRENT ASSETS, LOANS, ADVANCES ETC.	Current Year	Previous Year
(A) CURRENT ASSETS		
(1) Inventories		
Closing Stock of Steel & Cement	-	-
Advance paid for Journals (Grant in Aid)	-	-
Closing Balance of WII Publication	2,98,412.00	3,00,563.00
(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	47,77,475.04	1,17,81,369.04
Training A/c	1,17,08,105.85	1,56,42,733.85
Pension Fund A/c	11,09,484	31,23,575.00
GPF A/c	14,32,237.00	13,84,083.00
Corpus fund No 4032	16,56,614.67	11,83,749.67
Endowment Funds	5,53,93,088.44	3,25,82,870.41
TOTAL (A)	**7,63,75,444.00**	**6,59,98,943.97**
(B) LOANS, ADVANCES AND OTHER ASSETS		
(1) Loans		
(1) Staff FA(MSc) TA(MSc) FA TA LTC Med. Adv.		
Advance for expenses (Staff)	6,04,,965	13,50,671.00
Advance for expenses (Research Projects) (FA-641403+TA-107196)	1,80.713.00	7,48,599.00
Land Acquisition Charges (Deposited in Hon'ble High Court)	1,80,00,000.00	1,80,00,000.00
Advance for expenses (Training Account)	-	8,41,000.00
Advance for IIT kanpur	12,39,000.00	12,39,000.00
Advance for D/WII A/c 54272	86,000.00	-
Advance for Vehicle Insurance	1,33,786.00	84,100.00
(2) Other entities engaged in activities /objectives similar to		
(3) Others (Specify)		
Adv for civil work to CPWD	1,78,30,008.00	1,78,30,008.00
Adv for civil work to CPWD-Capital Account	11,53,560.00	-
Loan for World Environment Day (MoEF)	2,80,984.00	2,80,984.00
Loan for WCF workshop	30,253.00	30,253.00
Loan :- D/WII A/c No. 54189	1,91,489.00	-
Loan :- D/WII A/c No. 58146	3,28,360.00	-
New Salary Account		
Advance payment to CCU	1,52,71,531.00	1,52,71,531.00
Advance Payment-Training Account	15,263.00	6,92,800.00

(2) Advances and other amounts recoverable in cash or in kind or		
(1) On Capital Accounts		
(2) Prepayment		
(3) Others (Specify)		
Security Deposit for Electricity Connection	9,81,968.00	9,81,968.00
TDS to be refunded by the ITO (Pension Fund)	43,89,787.00	43,89,787.00
TDS to be refunded by the ITO (GPF)	22,77,757.00	22,77,757.00
TDS to be refunded by the ITO (Corpus fund)	29,07,227.00	29,07,227.00
(3) Income Accrued		
(1) On Investments from Earmarked / Endowment Funds		
(2) On Invesments -Others		
Interest Accrued on FDR (GIA)	-	-
Interest Accrued on FDR (GPF)	82,90,251.00	96,49,222.00
Interest Accrued on FDR (Pension Fund)	5,32,317.00	49,63,039.00
Interest Accrued on FDR (Corpus Fund)	1,36,76,313.00	2,62,08,102.00
(3) On Loans and Advances		
(4) Others (Specify)		
Training Cost Accrued But not Received	6,60,000.00	8,38,375.00
(4) Expenses payable towards capital/fixed Assets		
(1) Research Project (2017-18)	-	-
(2) Grant in Aid (2017-18)	1,21,355.00	1,21,355.00
(5) Grant in Aid (2018-19)	23,17,127.00	-
TOTAL (B)		**9,15,00,014.00**
10,87,05,778.00		
TOTAL (A+B)	**16,78,75,458.00**	**17,47,04,721.97**

(Baljeet Kaur)
Finance Officer

(Dr. Dhananjai Mohan)
Director

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Sales/Services	12	-	-
Grants/Subsidies	13	21,46,22,061.00	30,02,17,810.00
Fees/Subscriptions	14	83,98,150.00	3,77,11,065.00
Income from Investments (from earmarked/endowment Funds Transferred to funds)	15	-	-
Income from Royalty, Publication etc	16	15,13,193.00	40,95,794.29
Interest Earned	17	4,54,664.00	4,78,671.00
Other Income	18	-	-
Increase/decrease) in stock of Finished goods and works-in-progress	19	-	-
TOTAL (A)		**22,49,88,068.00**	**34,25,03,340.29**
EXPENDITURE			
Establishment Expenses (Plan & Non Plan)	20	21,45,37,760.00	26,58,03,046.50
Other Administrative Expenses (Plan & Non Plan)	21	6,73,32,446.00	86,55,94,352.22
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)		**28,18,70,206.00**	**35,23,62,481.72**
Balance being excess of Income over Expenditure (A-B)		-5,68,82,138.00	-98,59,141.43
Prior period items -		5,38,694.00	-3,81,974.00
BALANCE BEING SURPLUS (DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**-5,63,43,444.00**	**-1,02,41,115.43**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. 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 2020-21

(Amt. Rs.)

SCHEDULE : 13 GRANTS/SUBSIDIES	Current Year	Previous Year
1. Central Government		
Grant -in- Aid from MoEF	22,00,00,000.00	31,49,17,000.00
Amount Capitalized	(-) 53,77,939	1,46,99,190.00
Total	21,46,22,061.00	30,02,17,810.00
2. State Governments (s)	-	-
3. Government Agencies	-	-
4. Institutions/Welfare Bodies	-	-
5. International Organisations	-	-
6. Others (Specify)		
WII Contribution (Pension A/c)	-	-
TOTAL	**21,46,22,061.00**	**30,02,17,810.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. Rs.)

SCHEDULE : 14 FEES/ SUBSCRIPTIONS	Current Year	Previous Year
1. Entrance Fees		
M.Sc.Course Fee	41,03,400.00	31,96,800.00
2. Annual Fees/ Subscriptions	-	-
3. Seminar/ Program Fees		
Seminar/ Workshop Fees	-	-
4. Consultancy Fees		
Consultancy refund	-	-
5. Others (Specify)		
Other Receipt (Training)	10,56,000.00	2,82,44,265.00
Receipt for Training Courses	-	50,00,000.00
Other Project Grant	32,38,750.00	12,70,000.00
Pre-receipted bill issued but not received	-	-
Receipt for Training Cost	-	-
TOTAL	**83,98,150.00**	**3,77,11,065.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. 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 2020-21

(Amt. 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	-	19,95,535.29
UBI Building Rent	-	70,572.00
Misc Income from Lib	-	-
WII Products	-	5,474.00
House Licence Fee	7,55,868	8,71,734.00
Bus Charges	27,336.00	2,10,046.00
Electricity & Water Charges	7,29,989.00	9,37,085.00
Telephone	-	5,348.00
TOTAL	**15,13,193.00**	**40,95,794.29**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. Rs.)

SCHEDULE : 17 INTEREST EARNED	**Current Year**	**Previous Year**
1. On Term Deposits		
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)	4,44,664.00	3,01,729.00
Interest on HBA	10,000.00	1,76,942.00
2. On Savings Account		
1) With Scheduled Banks		
Int. on Savings Account	-	-
Accrued Interest on FDR A/c (GIA)	-	-
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	**4,54,664.00**	**4,78,671.00**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. 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	-	-
EMD Forfeited	-	-
Receipt for Project	-	-
TOTAL	**-**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. 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 2020-21

(Amt. Rs.)

SCHEDULE : 20 ESTABLISHMENT EXPENSES	**Current Year**		**Previous Year**	
	Plan	Non Plan	Plan	Non Plan
1. Salaries and Wages				
Salary & Wages (Training A/c)	19,99,89,604.00	-	4,62,356.00	-
Honorarium	5,86,413.00	-	1,44,420.00	-
Medical	67,000.00	-	90,39,762.50	-
Fellowship - Forensic Cell	-	-	-	-
Salaries & Allowances	7,44,000.00	-	23,77,76,818.00	-
Stipend	-	-	8,23,179.00	-
Fellowship & Wages (Research Project) (Gia-240915+Salary A/c -4394600)	46,35,515.00	-	2,13,699.00	-
HRA	-	-	-	-
2. Allowances and Bonus				
Bonus	-	-	-	-
OTA	-	-	-	-
LTC	1,13,812.00	-	1835,620.00	-
Corps Fund (Training)	-	-	-	-
Transferred to Corpus Fund	-	-	-	-
Honorarium (Training A/c)	-	-	-	-
3. Others (Specify)				
4. Contribution to Other Fund (Specify)				
Leave Salary and Pension Contr.	-	-	23,47,688.00	-
5. Staff Welfare Expenses				
Uniforms	-	-	-	-
6. Expenses on Employees Retirement and Terminal Benefits				
Final Payment				
Leave Encashment & Gratuity	-	-	1,30,76,680.00	-
7. Others (Specify)				
Camp Expenses (Research Project)	58,880.00	-	82,824.00	-
TOTAL	**21,45,37,760.00**	**-**	**26,58,03,046.50**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. Rs.)

SCHEDULE : 21 OTHER ADMINISTRATIVE EXPENSES	R&P	Committed	Current Year		Previous Year	
			Plan	Non Plan	Plan	Non Plan
AMC of Computers	24,00,589.00	-	24,00,589.00	-	18,66,834.00	-
Annual Research Seminar	40,613.00	-	40,613.00	-	12,02,721.00	-
Contingencies/Misc. (Research Project)	2,78,479.00	-	2,78,479.00	-	6,79,238.00	-
Cont./Misc. (Training Account)	6,05,365.00	-	6,05,365.00	-	40,88,909.47	-
Expenses for Library	2,99,988.00	-	2,99,988.00	-	44,396.00	-
Electricity and Water Charges	99,16,134.00	-	99,16,134.00	-	52,51,780.00	-
Maint. Of WII Campus	5,33,253.00	-	5,33,253.00	-	8,53,874.00	-
Estate Security	63,54,384.00	-	63,54,384.00	-	9,46,292.00	-
Lab Expenses (Research lab)	1,66,275.00	-	1,66,275.00	-	78,839.00	-
Lab Expenses (Forensic Lab)	6,83,161.00	-	6,83,161.00.00	-	6,71,005.00	-
Lab Expenses (Harbarium)	-	-	-	-	10,473.00	-
Lab Expenses (Genetic Lab)	-	-	-	-	58,622.00	-
Legal Expenses	12,60,686.00	-	12,60,686.00	-	18,66,149.00	-
M.Sc. Course Expenditure	17,91,022.00	-	17,91,022.00	-	35,63,190.00	-
Operational Expenses	10,03,317.00	-	10,03,317.00	-	2,520,174.00	-
Corpur Fund Transfer (Training Account)	4,50,000.00	-	4,50,000.00	-	46,50,000.00	-
POL & Maintenance of Vehicle (Research Project)	1,02,558.00	-	1,02,558.00	-	2,34,822.00	-
POL & Maintenance of Vehicle (Training A/c)	1,76,600.00	-	1,76,600.00	-	8,62,042.00	-
POL for Vehicles	4,74,816.00	-	4,74,816.00	-	4,07,851.00	-
Postage & Telegrams	1,92,675.00	-	1,92,675.00	-	172,699.00	-
Printing & Binding	40,36,373.00	-	40,36,373.00	-	1,651,568.00	-
Borading & Lodging (Training Account)	34,64,619.00	-	34,64,619.00	-	5,803,503.00	-
Repair & Maintenance of Vehicles	5,23,031.00	-	5,23,031.00	-	549,762.75	-
Vehicle insurance	88,000.00	-	88,000.00	-	185,702.00	-
Repair & Maintenance furniture & Fixture	40,427.00	-	40,427.00	-	6,000.00	-
Sports	1,13,913.00	-	1,13,913.00	-	2,37,019.00	-
Hospitality/entertainment	1,24,940.00	-	1,24,940.00	-	1,61,581.00	-
Sport Goods (Training Account)	14,040.00	-	14,040.00	-	47,9,76.00	-
Stationery	4,07,784.00	4,98,034.00	4,07,784.00	-	5,40,546.00	-
Telephone & TC	9,96,595.00	-	9,96,595..00	-	3,22,921.00	-
Training Cost Expenditure	-	-	-	-	50,00,000.00	-
Travel Exp. (Grant in Aid)	7,30,102.00	-	7,30,102.00	-	19,63,250.00	-
Travel Exp. (Research Project)	4,43,363.00	-	4,43,363.00	-	7,69,558.00	-
Travelling Expenses (Training A/c)	7,35,167.00	-	7,35,167.00	-	89,42,264.00	-
Maintinancae of civil work	10,38,737.00	-	10,38,737.00	-	16,49,063.00	-
Computer Expenses (Consuamble)	-	-	-	-	3,11,944.00	-
Complementary-Lib.	2,151.00	-	2,151.00	-	6,308.00	-
Funds Transfer of Misc. Recipt to Corpus A/c	11,00,000.00	-	11,00,000.00	-	-	
Depriciation during the year 25667171+587147	34,69,598.00	-	34,69,598.00	-	2,62,54,318.00	-
TOTAL	**6,68,34,412.00**	**4,98,034.00**	**6,73,32,446.00**	**-**	**8,65,59,435.22**	**-**

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(Amt. 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 2020-21

(Amt. 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 2020-21

SCHEDULE - 24 SIGNIFICANT ACCOUNTING POLICES (Notes on Accounts)

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.

SCHEDULE – 24 SIGNIFICANT ACCOUNTING POLICES (Notes on Accounts)

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
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
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. Excess Depreciation Charged for Rs. 538694/- during the financial year 2019-20, is now rectified as per the audit para 1.1 of the separate Audit Report as on dated 09.03.2021.

FORM OF FINANCIAL STATEMENTS(NON-PROFIT ORGANISATIONS)
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

(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	-	-	-	-
	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 aggrerate 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 2020 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 2020-21

Income		Expenditure	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	13,84,083.00	Final payment of GPF	2,87,60,442.00
Interest Received on Saving Account	2,47,324.00	Advance/Withdrawal paid	34,65,290.00
GPF Contribution	2,87,12,914.00		
Encashment of FDR	67,15,531.00		
Interest on FDR	98,117.00	Bank Balance	49.32.237.00
Total	**3,71,57,969.00**	**Total**	**3,71,57,969.00**

PENSION FUND ACCOUNT NO. 518502010000018
WILDLIFE INSTITUTE OF INDIA, CHANDRABANI, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 2020-21

Income		Expenditure	
Particulars	**Amount**	**Particulars**	**Amount**
Opening Balance	3123575.00	Investment in FDR	171000000.00
Interest Received on Saving Account	815500.00	Commuted Value of Pension	28258683.00
Interest Earned on FDR	575385.00	Family Pension/ Pension	30258811.00
WII Contribution	200220271.00		
Encashment of FDR	34892247.00	Bank Balance	10109484.00
Total	**239626978.00**	**Total**	**239626978.00**

FORM OF FINANCIAL STATEMENTS (NON-PROFIT ORGANISATIONS)
Wildlife Institute of India, Dehradun
Fixed Assets Purchased from Funds reflected in Schedule-3
ACCOUNT FOR THE YEAR ENDED 201920-21

Particulars	Gross Block					Description					Net Block
		Addition during the year									
	Cost as at the beginning	Upto 30-Sep.	After 30-Sep.	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
PLANT MACHINERY & EQPT											
BLOCK: 15%											
Office Equipment	580114.32	0.00	20409.00	-	5821513.32	-	871696.32	-	871696.32	4949817.00	58,01,104.32
Camp Equipment	2298055.88	150000.00	50000.00	-	2498055.88	-	370958.38	-	370958.38	2127097.50	22,98,055.88
TOTAL	**8099160.20**	**150000.00**	**70409.00**	**-**	**8319569.20**	**-**	**1242654.71**	**-**	**1242654.71**	**7076914.00**	**80,99,160.10**
FURNITURE, FIXTURES											
BLOCK : 10%											
Furiniture & Fixtures	160750.38	-	-	-	160750.38	-	16075.04	-	16075.04	144675.34	1,60,750.38
TOTAL	**160750.38**	**-**	**-**	**-**	**160750.38**	**-**	**16075.04**	**-**	**16075.04**	**144675.34**	**1,60,750.38**
BOOKS : BLOCK : 40%											
Books	2670.22	-	-	-	2670.22	-	1068.09	-	1068.09	1602.13	2,670.22
TOTAL	2670.22	-	-	-	2670.22	-	1068.09	-	1068.09	1602.13	2,670.22
GRAND TOTAL	**8262580.80**	**150000.00**	**70409.00**	**-**	**8482989.80**	**-**	**1259797.83**	**-**	**1259797.83**	**7223191.97**	**82,62,580.80**

(Baljeet Kaur)
Finance Officer

(Dr. Dhananjai Mohan)
Director

MONITORING OF RE-INTRODUCED GAUR IN BANDHAVGARH TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2449282.00	Manpower	981700.00
Interest Received	34227.00	Travel	44256.00
		Insurance Liability to researcher& field assistant	5105.00
		Vehicle & POL Maintenance	251564.60
		Contingency	31882.40
		Institutional Charges	354359.00
		Loan D/WII A/c No. 55760	500000.00
		Total Expenditure	2,826,013.50
		Outstanding :	
		Forest Advance	5692.00
		Total Expenditure	2174559.00
		Balance as on 31.03.2021 A/C No. 50629	308950.00
Grand Total	**2483509.00**	**Grand Total**	**2483509.00**

MONITORING OF RE-INTRODUCED TIGER IN SARISKA TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	356167.55		
Interest Received	11716.00		
		Total Expenditure	0.00
		Outstanding :	
		Balance as on 31.03.2020 A/C No. 55926	367883.55
Grand Total	**367883.55**	**Grand Total**	**367883.55**

RADIO COLLARING OF TIGERS IN SUNDERBANS TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2162.70		
Interest Received	68.00		
		Total Expenditure	0.00
		Balance as on 31.03.2020 A/C No. 55926	2230.70
Grand Total	**2230.70**	**Grand Total**	**2230.70**

RADIO COLLARING OF TIGER IN SUNDERBANS TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1408963.30	Manpower	1054263.00
Grant Received	800000.00	Travel Expenses	15469.00
Interest Received	39205.00	Contingency & Publication	7500.00
Advances for Expenses	2500.00	Interest Refund	27670.00
		Total Expenditure	**1104902.00**
		Outstanding :	
		Forest Advances	2500.00
		Balance as on 31.03.2021 A/C No. 50685	**1143266.00**
Grand Total	**2250668.30**	**Grand Total**	**2250668.30**

ECOLOGICAL MONITORING OF TIGER POPULATION IN PANNA LANDSCAPE (MP)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	744074.48	Manpower	701105.00
Grant received	1200000.00	Vehicle Hiring & Fuel	102300.00
Advances for Expenses	6276.00	Contingency/Misc.	99269.00
Interest Received	10261.00	Travel	24322.00
		Total Expenditure	**926996.00**
		Outstanding :	
		Forest Advances	175000.00
		Tour Advances	65.00
		Balance as on 31.03.2021 A/C No. 50908	**858550.48**
Grand Total	**1960611.48**	**Grand Total**	**1960611.48**

ECOLOGY OF CLOUDED LEOPARD (NEOFELIS NEBULOSA) IN AN EAST HIMALAYAN BIODIVERSITY HOTSPOT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	45593.50	Manpower	35960.00
Interest Received	1061.00		-
Advances for Expenses	200000.00	**Total Expenditure**	**35960.00**
		Outstanding :	
		Advance for Expenses	200000.00
		Balance as on 31.03.2021 A/C No. 55559	**10694.50**
Grand Total	**246654.50**	**Grand Total**	**246654.50**

RECONCILING DEVELOPMENT WITH CONSERVATION : DELINEATING HABITAT PATCHES AND CORRIDORS FOR GIR LIONS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	115432.19		
Interest Received	3583.00		
		Total Expenditure	**0.00**
			0.00
		Balance as on 31.03.2021 A/C No. 55692	**119015.19**
Grand Total	**119015.19**	**Grand Total**	**119015.19**

AN INVESTIGATION OF SPECIES OCCUPANCY PATTERNS AND NICHE DIFFERENTIATION AMONG SYMPATRIC CARNIVORES ACROSS VARYING AND USE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	182100.00	Consumables	162709.00
Grant Received	54199.00	Office Equipment	50097.00
Interest Received	4026.00		
		Total Expenditure	**212806.00**
		Outstanding :	
		Advance for Advance	25000.00
		Balance as on 31.03.2021 A/C No. 56377	**2519.00**
Grand Total	**240325.00**	**Grand Total**	**240325.00**

RESEARCH ON FLAGSHIP SPECIES IN DACHIGAM NATIONAL PARK
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1491180.00	Contigencies	98762.00
Interest Received	23448.00	Consumables	4800.00
		Interest Refund	11113.00
		Refund of Balance Grant	1398356.00
		Total Expenditure	1513031.00
		Balance as on 31.03.2021 A/C No. 55384	**1597.00**
Grand Total	**1514628.00**	**Grand Total**	**1514628.00**

STUDY ON DIVERSITY AND ECOLOGY OF HERPETOFAUNA OF PANNA TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3806.00		
Grant Received	30000.00		
Advances for Expenses	1,30,000.00		
Interest Received	257.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/C No. 55735	34063.00
Grand Total	**34063.00**	**Grand Total**	**34063.00**

WL WORKSHOP ONN CENSUS TECHNIC
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	14387.00.00	Manpower	2000.00
Interest Received	770.00	Stationery & Printing	2064.00
		Total Expenditure	**4064.00**
		Balance as on 31.03.2021 A/C No. 55756	**11093.00**
Grand Total	**15157.00**	**Grand Total**	**15157.00**

AUGMENTATION AND LONG TERM MONITORING OF TIGER IN BUXA TIGER RESERVE (W.B.)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	8181048.00	Manpower	1428596.00
Grant Received	1580000.00	Equipment	94788.00
Advances for Expenses	225509.00	Travel	75228.00
Interest Received	200316.00	Vehicle Hiring & Fuel	909634
		Contingency & Misc. Expenses	123512.00
		Home & DNA Analysis	94166.00
		Institutional Charges	1000000.00
		Total Expenditure	**3525924.00**
		Outstanding :	
		Forest Advance	120000.00
		Balance as on 31.03.2021 A/C No. 56209	**6340949.80**
Grand Total	**10186873.00**	**Grand Total**	**10186873.00**

DEVELOPING SPATIAL DATABASE ON THE STATUS, DISTRIBUTION AND ABUNDANCE OF UNGULATES IN AND AROUND THE FOREST DIVISION OF KULLU
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	23045.00	Manpower	23500.00
Interest Received	716.00		
		Total Expenditure	**23500.00**
		Outstanding :	
		Balance as on 31.03.2021 A/C No. 56366	**261.00**
Grand Total	**23761.00**	**Grand Total**	**23761.00**

PREPARATION OF STATE LEVEL STRATEGY FOR MITIGATION OF HUMAN - WILDLIFE CONFLICT IN KERALA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	127574.00	Cost of Travel	17527.00
Grant Received	1075250.00	Manpower	137470.00
Interest Received	20073	Institutional Charges	161288.00
		TA/DA for Tech. Assistant	200000.00
		Miscellaneous	10000.00
		Loan from A/c No. 57553	150000.00
		Total Expenditure	**676285.00**
		Outstanding :	
		Forest Advance	10000.00
		Balance as on 31.03.2021 A/C No. 56801	**536612.00**
Grand Total	**1222897.00**	**Grand Total**	**1222897.00**

TRAINING OF BLODIVERSITY MANAGEMENT COMMITTEE AND PREPARATION OF PEOPLES BLODIVERSITY REGISTER OF HARYANA STATE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	968957.00	Personnel	968018.00
IGrant Received	1898388.00	Travel, Boarding and Loading	135655.00
Interest Received	44044.00	Stakeholder Consultation	199482.00
Advance for Exenses	4000.00	Miscellaneous	34403.00
		Institutional Charges	444857.00
		Total Expenditure	**1782415.40**
		Balance as on 31.03.2021 A/C No. 57635	**1132973.60**
Grand Total	**2915389.00**	**Grand Total**	**2915389.00**

DEVELOPING OF INTERACTIVE AND DYNAMIC WEB PORTAL WII-UNODP SECURE HIMALAYA PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	4599965.00	Personnel Sarvices	5162722.00
Grant Received - 058	1367925.00	Travel & Accommodation	938381.00
Grant Received - HCVs	1977080.00	Stakeholder Workshop	331852.00
Grant Received - HWC	2192820.00	Miscellaneous	145562.00
Grant Received - LOA-CB	1730175.00	Communication	47457.00
Grant Received - MAP	1481200.00	Hosting Charges	150490.00
Grant Received - Printing Workshop	196000.00	Institutional charges	977162.00
Advances for Expenses	652216.00	Local Meeting	146300.00
		Prcurement GIS Layers	8500.00
		Printing	184745.00
		Sharping/Training Workshop	426063.00
		Outstanding Advances	15840.00
		Total Expenditure (B)	**8535074.00**
		Outstanding :	
		Balance as on 31.03.2021 A/C No. 56876	5778697.00
Grand Total	**14313771.00**	**Grand Total**	**14313771.00**

FEASIBILITY STUDY OF WILD BUFFALO REINTRODUCTION IN KAHNA TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	64799.00
Grant Received	1100000.00	Contingencoes	13735.00
Interest Received	18211.00	Travel Expenses	17574.00
		Vehicle Hiring/ POL	307822.00
		Institutional Charges	165000.00
		Total Expenditure	**568930.00**
		Outstanding :	
		Forest Advance	100149.00
		Balance as on 31.03.2021 A/C No. 57970	**449132.00**
Grand Total	**1118211.00**	**Grand Total**	**1118211.00**

NMHS-HIMALAYAN ALPINE BIODIVERSITY CHARACTERISATION AND INFORMATION SYSTEM NETWORK
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Equipment	46890.00
Grant Received	1381520.00	Manpower	78295.00
Interest Received	22500.00	Consumer / Field Gear	55800.00
		Total Expenditure	**234312.00**
		Balance as on 31.03.2021 A/C No. 57963	**1169708.00**
Grand Total	**1404020.00**	**Grand Total**	**1404020.00**

NCF FOR IMPLEMENTATION OF THE BIRD COMPONENT OF THE LONG TERM ECOLOGICAL OBSERVATORIES (LTEO) PROGRAMME IN THE NORTH WESTERN ARID ZONE OF INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Equipment	13349.00
Grant Received	315700.00	Overheads	118660.00
Interest Received	1486.00	Overheads	28700.00
		Total Expenditure	**160709.00**
		Balance as on 31.03.2021 A/C No. 58105	**156477.00**
Total	**317186.00**	**Total**	**317186.00**
Grand Total	**6565014.00**	**Grand Total**	**6565014.00**

NCF FOR IMPLEMENTATION OF THE BIRD COMPONENT OF THE LONG TERM ECOLOGICAL OBSERVATORIES (LTEO) PROGRAMME IN THE NORTH WESTERN ARID ZONE OF INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Equipment	90245.00
Grant Received	150700.00	Overheads	13700.00
Interest Received	709.00	**Total Expenditure**	**103945.00**
		Balance as on 31.03.2021 A/C No. 58104	**47464.00**
Total	**151409.00**	**Total**	**151409.00**
Grand Total	**6565014.00**	**Grand Total**	**6565014.00**

MOVEMENT IN SPACE AND TIME : ECOLOGY OF RED FOX IN UPPER TAWANG VALLEY, ESTERN HIMALAYAN INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00		
Grant Received	1398356.00		
Interest Received	32272.00		
		Total Expenditure	**0.00**
		Outstanding :	
		Balance as on 31.03.2021 A/C No. 58007	**1430628.00**
Grand Total	**1430628.00**	**Grand Total**	**1430628.00**

AITEP 2017-19/MSTRIPS/GENETIC CONNECTIVITY PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1287315.51	Fellowship	14427378.00
Grant AITEP	8463000.00	POL & eh Hiring	831975.00
Grant MSTrIP	7500000.00	Travel Exp.	721291.00
Grant-Dibang	156800.00	Contingencies	2034064.00
Grant-Genetic	1500000.00	Field Equipment	2130597.00
Other Receipt	1500000.00	Printing/Publication	2249608.00
Interest on Saving	275483.00	Generic Analysis	654965.00
Advance for Expenses	2495398.00	Interest Refund	447281.00
Loan from D/WII A/c No. 55367	1500000.00		
Loan from D/WII A/c No. 52366	400000.00		
Withdrawak FD	9500000.00		
		Total Expenditure	**23497159.00**
		Outstanding :	
		Forest/Tour Advance	3468576.00
		Bank UBI-50968	7612261.43
Grand Total	**34577996.51**	**Grand Total**	**34577996.51**

WII-TIGER CELL & PALAMAU TIGER PRIJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	5827814.25	Manpowr	4402412.00
Grant Received	8629079.00	POL & eh Hiring	18757.00
Interest Received	168068.00	Refund of Loan A/c No. 50968	3000000.00
		Advance for CCU (Building)	2583700.00
		Total Expenditure	**10004869.00**
		Bank UBI-55367	**4620092.25**
Grand Total	**14624961.25**	**Grand Total**	**14624961.25**

WII-LONG TERM MONITORING OF TIGER IN TADOBA ANDHARI TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL, 2020 TO 31 MARCH, 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	10666943.00	Fellowship	588081.00
Grant Received	3367442.00	Travel Exp.	1158580.00
Interest Received	214153.00	Contingencies	1549451.00
Advance for Expenses	392545.00	POL& Hiring of Vehicle	908482.00
Grant from CAMPA	10000000.00	Field Equipment	6117030.00
Grant from Pench TR	1000000.00	**Total Expenses**	15614361.00
Grant from Melghat TR	124611.00	Advance for Expenses	702224.00
		Total Expenditure	**16316585.00**
		Bank UBI - 53431	**10570509.09**
Grand Total	**26887094.09**	**Grand Total**	**26887094.09**

WII - GLOBAL TIGER FORUM SNOW LEOPARD PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	207847.25		
Interest	6454.00		
		Grand Expenditure	**0.00**
		Bank UBI - 55366	**214301.25**
Grand Total	**214301.25**	**Grand Total**	**214301.25**

WII - ECOLOGICAL IMPACT ASSESSMENT AND ROAD INFRASTRUCTURE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL, 2020 TO 31 MARCH, 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	208397.00	Fellowship	533105.00
Grant Received	1500000.00	Refund of Interest	158148.00
Interest Received	4253.00	Loan from D/WII A/c No. 56459	1000000.00
Advance for Expenses	35791.00		
Loan from A/c No. 53431	300000.00		
Loan from A/c No. 54196	200000.00		
		Total Expenses	**1691253.00**
		Tour Advance	35791.00
		Grand Total	**1727044.00**
		Outstanding :	
		Bank UBI - 55338	**521397**
Grand Total	**2248441.00**	**Grand Total**	**2248441.00**

WII - RE-INTRODUCTION OF CHEETAH PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	21023.19	Fellowship & Wages	233160.00
Grant Received	5000000.00	Base Cam Expenses	26558.00
Interest Received	3044.00	POL & Main. of Vehicle	23359
Loan from A/c No.-50968	5,00,000.00	Contigencies	23151.00
		Advance for Expenses	605000.00
		Loan from A/c No. 50968	400000.00
		Total Expenditure	1311228.00
		Bank UBI - 52366	**4112839.19.00**
Grand Total	**5424067.19**	**Grand Total**	**5424067.19**

WII - M.Sc. DESERTATION
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	5589.00	Misc. & cont. Expenses	94.00
Interest Received	544.00		
		Total Expenditure	**94.00**
		Bank UBI - 57095	**6133.00**
Grand Total	**6133.00**	**Grand Total**	**6133.00**

WII - GIB JAISLMER : RAJASTHAN GOVT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	957242.00		
Interest Received	24631.00		
		Total expenditure	0.00
		Bank UBI - 57520	**981873.00**
Grand Total	**981873.00**	**Grand Total**	**981873.00**

HABITAT IMPROVEMENT & CONSERVATION BREEDING OF THE INDIAN BUSTARD
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	55295593.19	Staff Engagement	10372922.00
Grant from CAMPA	28639000.00	Conservation Breeding	12780099.00
Advance Expenses	17651847.00	Applied Research	12741333.40
Interest Received	37785.00	Capacity Building & Awareness	823599.00
FDR Interest	1017013.00	Pilot Habita Management	170633.00
Rifle KMST Model	28000.00	**Total Expenditure**	**38424286.40**
		Outstanding:	
		Forest Advance	1740768.00
		Tour Advance	285048.00
		Adv to Addl PCCF	1000000.00
		Adv to CPWD Jaisalmer	35312090.00
		Balance as on 31.03.2020 A/C No. 55292	**25907045.79**
Grand Total	**102669238.19**	**Grand Total**	**102669238.19**

DEVELOPMENT OF CONSERVATIONN PLAN FOR RIVER DOLPHIN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	5140310.64	Manpower Engagement	12933446.00
Grant Received	27600000.00	Capacity Building & Awareness	20277.00
Advances for Expenses	5848196.00	Research	8812337.00
Interest Received	33982.00	Misc/contigency	544456.00
Interest on FDR	82926.00	POL Expenses	281096.00
		Field Equipment	935444.580
		Total expenditure	**23527056**
		Outstanding:	
		Forest Advance	1550971.00
		Tour Advance	614283.00
		Balance as on 31.03.2020A/C No.55293	**13013104306**
Grand Total	**38705414.64**	**Grand Total**	**38705414.64**

PROJECT MANAGEMENT UNIT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	948512.00	Manpower	2451709.40
Loan from A/c No. 55292/93/94 & 95	2000000.00	Contingency	100000.00
Interest Received	30260.00		
Advances for Expenses	25532.00		
		Total expenditure	**2551709.00**
		Outstanding:	
		Forest Advance	20000.00
		Tour Advance	5532.00
		Balance as on 31.03.2019 A/C No. 55357	**427062.60**
Grand Total	**3004304.00**	**Grand Total**	**3004304.00**

ECOLOGY AND CONSERVATION OF MAJOR CAMLVORS SEME-ARID GRASSLAND SCRUB-AGRO-SYSTEM KARNATAKA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Fellowship & Wages	284722.00
Grant Received	5000000.00	Stipend	12000.00
Interest Received	91704.00		
		Total Expenditure	**296722.00**
		Outstanding:	
		Forest Advance	385000.00
		Tour Advance	90000.00
		Balance as on 31.03.2019 A/C No. 55357	**4319982.00**
Grand Total	**5091704.00**	**Grand Total**	**5091704.00**

WII MANAGEMENT EFFECTIVENESS EVALUATION (MEE) OF PROTECTED ARESS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2019 TO 31 MARCH 2020

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	8354346.07	Travel Expenses	140965.00
Interest Received	356880.00	Per Diem to Evaluation Team	119462.00
Interest Received from FDs	1227350.00	Project Initiation Cost	79812.00
Refund of Loan	800000.00	Project Management Cost	627159.00
FD Matured No. -1	5000000.00	Misc. & Unforeseen Expenses/Overheads	5295299.00
		MEE Expenditure	**6242697.00**
		MEE of ZOOs	**31764.00**
		Total Expenditure	**6274461.00**
		Bank Balance A/C No. 62	**9464115.07**
Grand Total	**15738576.07**	**Grand Total**	**15738576.07**

PROJECT TIGER CO-PREDATOR, PREY & HABITAT PHASE IV
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	115614.00	Transfer to Corpus Funds	119205.00
Interest Received 2019-20	3591.00		
		Total Expenditure	**119205.00**
		Bank Balance A/c No. - 50673	**0.00**
Grand Total	**119205.00**	**Grand Total**	**119205.00**

PREPARING AND UPDATING STUD BOOKS OF 34 ENDANGERED SPECIES (14 OLD AND 20 NEW)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1075.48	Transfer to Corpus Funds	1090.48
Interest Received 2019-20	15.00		
		Total Expenditure	**1090.48**
		Bank Balance A/C No. 53274	**0.00**
Grand Total	**1090.48**	**Grand Total**	**1090.48**

PATTERN OF BLOMASS PRODUCTION BY WETLANDS AND ITS USE BY WILD UNGULATES IN KAZIRANGA LANDSCAPE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	221973.00	Transfer to Corpus Funds	229882.00
Interest Received 2019-20	7909.00		
		Total Expenditure	**229882.00**
		Bank Balance A/C No. 53439	**0.00**
Grand Total	**229882.00**	**Grand Total**	**229882.00**

BLACK KITE PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1937982.00	Manpower Wages to FD Asst	1165070.00
Interest Received 2019-20	45846.00	Telemetry Equipment from Ebos	505057.51
Grant Received for Project from RRCF, Mumbai	57997.00	Travel	23146.00
Advance for Expenses	53000.00	Base Camp Rent	76000.00
		Consumable	19735.00
		Miscellaneous	41999.00
		Total Expenditure	**1831007.51**
		Bank Balance A/C No.- 55500	**263817.49**
Grand Total	**2094825.00**	**Grand Total**	**2094825.00**

WII - GIZ - HWC PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	743189.02	Salary of Staff	2607032.00
Grant Received from GIZ, New Delhi	5101398.30	Transport/Travel Cost	385987.00
Interest Received 2019-20	20813.00	Training Cost	1149508.00
Advance for Expenses	4000.00	Procurement of goods, Equipment, Consumeables	4316.15
		Supporting/Adm Cost	511203.00
		Advance for Expenses	180.00
		Total Expenditure	**4658226.15**
		Bank Balance A/C No. 54145	**1247174.17**
Grand Total	**5905400.32**	**Grand Total**	**5905400.32**

ASSESSMENT AND CONSERVATION PRACTICES OF POLLINATORS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	790379.84	Manpower Wages to FD Asst	946560.00
Interest Received	34459.00	Travel	580141.00
Grant Received from GB Pant National Instt.	2255899.00	Consumeables	54846.00
Advance for Expenses	55000.00	Contingencies	68104.00
		Activities and other Project Cost	795055.00
		Equipment	2000.00
		Total Expenditure	**2446706.00**
		Bank Balance A/C No.- 56376	**689031.84**
Grand Total	**3135737.84**	**Grand Total**	**3135737.84**

TAXONOMIC AND ECOLOGICAL STUDIES ON ARACHINDS OF TRANS AND WESTERN HIMALAYAS, INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2019 TO 31 MARCH 2020

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Grant Received from MOEFCC(CS-1) Division New Delhi	10,614,127.00	Salary and Wages	467480.00
Interest Received	17622.00	Field Assistants	22700.00
		Travel	30883.00
		Contingencies	79607.00
		Refund of Interest	5124.00
		Total Expenditure	**605794.00**
		Bank Balance A/C No. - 57780	**144228.00**
Grand Total	**750022.00**	**Grand Total**	**750022.00**

WII MANAGEMENT EFFECTIVENESS EVALUATION (MEE) OF 210 PROTECTED ARESS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Grant received from MOEFCC (WL) Division New Delhi	20000000.00	Travel Expenses	538841.00
Interest Received	231090.00	Per Diem to Evaluation Teams	21919.00
		Project Initiation and Completion Workshop	652400.00
		Project Management Cost	1657656.00
		Misc. & Conts. Expenses	18126.00
		Refund of Interest	1644.00
		Total Expenditure	**2890586.00**
		Bank Balance A/C No. - 57943	**17340504.00**
Grand Total	**20231090.00**	**Grand Total**	**20231090.00**

WII-ENVIS PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1260208.75	Fellowship and Wages	1548069.00
Interest Received	28526.00	Contigency	28458.00
Grant Received	2047709.00	Advance for Expenses	198064.00
Other Grants	1590741.00	Payable Salary	130967.00
Advances for Expenses	484570.00	CZA Trainig & Workshop	500660.00
		Certificate Course in Bird Identification and Basic	336733.00
		Certificate Course in Wildlife Management Using Geospatial Tech.	553095.00
		GSDP-Wildlife Management Using Geo Tech.	30168.00
		Refund Balance	90934.00
		Total Expenditure	**3417748.00**
		Bank Balance A/C No. - 32	**1994606.75**
Grand Total	**5411754.75**	**Grand Total**	**5411754.75**

WII-UNESCO PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2677993.41		
Interest Received	83438.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No. -44	**27161431.41**
Grand Total	**2761431.41**	**Grand Total**	**2761431.41**

WII-DGH SEATURTLE TELEMETRY PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	903837.52		
Interest Received	28065.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No. - 59	**931902.52**
Grand Total	**931902.52**	**Grand Total**	**931902.52**

TIGER RESPONSE TO PRAY HUMAN DISTURBANCE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1726084.30		
Interest Received	53597.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No.- 60	**67,72,055.92**
Grand Total	**1779681.30**	**Grand Total**	**1779681.30**

ISRO-GBP PROJECT ON LULC DYNAMICS & BIOFIN PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	400664.21		
Interest Received	12441.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No.- 60	**413105.21**
Grand Total	**413105.21**	**Grand Total**	**413105.21**

INTERRATED DEVELOPMENT OF WILDLIFE HABITATS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	61088.00		
Interest Received	1898.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No. 51240	**62986.00**
Grand Total	**62986.00**	**Grand Total**	**62986.00**

I U C N CELL
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	865297.39	Travel Expenditure	26796.00
Interest Received	27171.00	Advance for Expenses	110.00
Membership Fee	50000.00		
Advance fro Expenses	110.00		
		Total Expenditure	**26906.00**
		Bank Balance A/C No. 41	**915672.39**
Grand Total	**942578.39**	**Grand Total**	**942578.39**

WESTERN TRAGOPAN PORJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1628843.00	Office Furniture & Fixture	57629.00
Interest Received	50435.00	Advance for Expenses	20000.00
Advance fro Expenses	20000.00		
	110.00		
		Total Expenditure	**77629.00**
		Bank Balance A/C No. 52465	**1621649.00**
Grand Total	**1699278.00**	**Grand Total**	**1699278.00**

ASSESSMENT OF ECOLOGICAL SETTING AND BIODIVERSITY VALUE OF PAPIKONDA NATIONAL PARK AND INDIRA SAGAR (POLAVARAM) MULT. PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	678021.00		
Interest Received	21054.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No. - 53223	**699075.00**
Grand Total	**699075.00**	**Grand Total**	**699075.00**

ECOLOGICAL AND CONSERVATION OF SEA TURTLE OFF COAST OF THE SINDHUDURY USING SATELLITE TRACKING TECHNIQUES & DEVELOPMENT OF INTERGRATED MANAGEMENT PLAN OF THE THANE CREEK FLAMINGO SANCTURY
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	895427.00		
Interest Received	27804.00		
		Total Expenditure	**0.00**
		Bank Balance A/C No. - 54273	**923231.00**
Grand Total	**923231.00**	**Grand Total**	**923231.00**

WII-UNESCO C 2 C PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	29794330.50	Salaries	7781952.00
Grant Received	6000000.00	Travel Expenditure	1568298.00
Interest Received	911879.00	Boarding & Lodging	2126856.00
Misc. Receipt	379200.00	Office Equipment	13547.00
Advance for Expenses	844761.00	Database Development & Maintenance	173699.00
Madhya Pradesh Tourism Development	349349.00	Activity Budgets	2423938.00
Mountcraft	914530.00	Misc. & Cont. Expenses	1232945.00
		Furniture & Fixture	145137.00
		Stragtic Marketing, Ddun	175000.00
		Advance for Expenses	170054.00
		Total Expenditure	**15811426.00**
		Bank Balance A/C No. - 54034	**23382623.50**
Grand Total	**39194049.50**	**Grand Total**	**39194049.50**

WII - THE UNIVERSITY OF BRITISH COLUMBIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	69164.38	Contigencies	371.44
Grant Received	75242.00		
Interest Received	3839.00		
		Total Expenditure	**371.44**
		Bank Balance A/C No. - 55061	**147873.94**
Grand Total	**148245.38**	**Grand Total**	**148245.38**

WILDLIFE INSTITUTE OF INDIA FOREIGN CONTRIBUTION ACCOUNT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
UBI A/c No. 5185022222010000010	19838146.14	Fellowship & Wages	4446809.00
Interest Received	579950.00	Travel Expenditure	96998.00
Fund Received		Contigencies	522189.24
ZXL-UKFD on Tiger Conservation Project	6492838.69	Office Equipment	25000.00
Sumitomo Mitsui Banking Corp-Japan	274454.00	Workshop/Awareness Camp	1852105.00
Advance for Expenses	126038.00	Corpus Funds	877912.00
		Misc. Receipt-Payment	3487061.00
		Advance for Payment	218963.00
		Total Expenditure	**11527037.24**
		Bank Balance A/C No. - 518502010000010	**15784389.59**
Grand Total	**27311426.83**	**Grand Total**	**27311426.83**

NATIONAL GEOGRAPHC SOCIETY
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	905382.00	Salary & Wages	920420.00
Grant Received	3492250.00	Contigencies	52858.95
Interest Received	42152.00	Hiring of Vehhicle	64331.00
Advance for Expenses	245331.00	Institutional Charges	523838.00
		Purch. of Chemicals	22260.00
		Travel Expenses	36815.00
		Lab Equipment	427410.00
		Advance for Expenses	17575.00
		Total Expenditure	**1680807.95**
		Bank Balance A/C No. - 57149	**3004307.05**
Grand Total	**4685115.00**	**Grand Total**	**4685115.00**

UNDP-DEVELOPMENT AND CONSERVATION OF FOREST CORRIDORS IN SIKKIM PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1327115.00	Fellowship & Wages	19200.00
Interest Received	41145.00	Base Camp Expenses	26276.00
Advance for Expenses	145635.00	Travel Expenditure	8020.00
		Contigencies	94.00
		Advance for Expenses	95635.00
		Total Expenditure	149225.40
		Bank Balance	**1364670.20**
Grand Total	**1513895.60**	**Grand Total**	**1513895.60**

WII - C2C EXTERNALLY FUNDED PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	999905.60	Salary & Wages	90000.00
Grant Received	1615694.00	Travel Expense	214395.00
Interest Received	22565.00	Boarding & Lodgining	178743.00
		Office Equipment	15882.00
		Internship	9000.00
		Misc. & Cont. Expenses	77577.00
		Advance for Expense	59496.00
		Total Expenditure	**645093.00**
		Outstanding:	
		Bank Balance A/C No.- 57750	**1993071.60.00**
Grand Total	**2638164.60**	**Grand Total**	**2638164.60**

WII - UNESCO C2C MSc. COURSE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Transfer Balance Amount	932305.60	TA/DA & Honorarium	559815.00
MSc. Course Fees	1527400.00	Stipend	189000.00
Interest Received	19225.00	Cont. & Misc. Expense	8724.00
		Advance for expense	268492.00
		Total Expenditure	**1026031.00**
		Bank Balance A/C No. 57750	**142899.60**
Grand Total	**2478930.60**	**Grand Total**	**2478930.60**

ECOLOGY TAXONOMY AND CONSERVATION OF FISH DIVERSITY IN SUBANSIRI RIVER BASIN OF ARUNACHAL PREDESH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	168531.00		
Interest Received	5233.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/C No. 53803	**173764.00**
Grand Total	**173764.00**	**Grand Total**	**173764.00**

KAILASH SACRE LANDSCAPE CONSERVATION AND DEVELOPMENT INSTITUTION (KSLCDI)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	998060.13	Miscellaneous Expenses	2000.00
Advance for Expenses	15000.00		
Interest Received	32801.00		
Misc. Grant	200000.00		
Loan from A/c No. - 56472	150000.00		
		Total Expenditure	**2000.00**
		Outstanding :	
		Forest Advance	15000.00
		Loan to D/WII A/c No. 56472	150000.00
		Balance as on 31.03.2021 A/C No. 53475	**12288661.13**
Grand Total	**1395861.13**	**Grand Total**	**1395861.13**

POPULATION GENETIC STRUCTURE AND GENE FLOW IN BROWN BEAR POPULATION IN INDIA AND ASSESS EXTENT OF GENE FLOW BETWEEN POPULATION OF INDIA & PAKISTAN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	13128.00		
Interest Received	404.00		
Loan from D/WII A/c No. - 55352	582800.00		
Loan from D/WII A/c No. - 55157	72561.00	**Total Expenditure**	**0.00**
		Outstanding :	
		Loan from D/WII A/c No. - 55157	72561.00
		Loan from D/WII A/c No. - 55352	582800.00
		Balance as on 31.03.2021 A/C No. 55018	**13532.00**
Grand Total	**668893.00**	**Grand Total**	**668893.00**

GENETIC ASSESSMENT OF SAMBER RUSA UNICOLOR POPULATION IN NORTH-EAST INDIA
RECEIPT AND PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	47811.00	**Non Recurring**	
Advances for Expenses	362.00		
Interest Received	1485.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/c No. 54947	**49658.00**
Grand Total	**49658.00**	**Grand Total**	**49658.00**

MARINE TURTLE PROJECT ALONG THE COAST OF PUDUCHERY & KARAIKAI REGION
RECEIPT AND PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	275679.00		
Loan to A/c No. 55701	100000.00		
Interest Received	8560.00		
		Total Expenditure	**0.00**
		Outstanding	
		Loan to A/c No. 55701	100000.00
		Balance as on 31.03.2021 A/c No. 54917	**284239.00**
Grand Total	**384239.00**	**Grand Total**	**384239.00**

MAPPING LANDUSE/LANDCOVER PATTERNS IN ARAVALLIS, HARYANA WITH SPECIAL REFERENCE TO STATUS OF KEY WILDLIFE SPECIES LONG TERM MONITORING OF LEOPARDS AND ITS PREY IN KALESAR NATIONAL PARK HARYANA
RECEIPT AND PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	510619.83	Manpower	629888.00
Grant Received	3910000.00	Consumables	5565.00
Interest Received	40457.00	Contingency	4970.00
		Loan to D/WII A/c No. 55338	200000.00
		Field equipment	50,84,564.63
		Total expenditure	**840423.00**
		Balance as on 31.03.2021 A/c No. 54196	**3620653.83**
Grand Total	**4461076.83**	**Grand Total**	**4461076.83**

POPULATION GENETIC STRUCTURE OF NILGIRI TAHR IN WESTERN GHATS, INDI CONSERVATION & FORENSIC IMPLICATIONS & DBT-STIPEND FOR DBT-RA
RECEIPT AND PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	18059.77		
Advance for Expenses	494.00		
Interest Received	563.00		
Loan from D/WII A/c No. 55018	72561.00		
		Total Expenditure	**0.00**
		Outstanding :	
		Loan from D/WII A/c No. 55018	72561.00
		Balance as on 31.03.2021 A/c No. 55157	**19116.77**
Grand Total	**91677.77**	**Grand Total**	**91677.77**

CONSERVATION OF MANIPUR BROW ANTLERED DEER OF SANGHAI AN INTEGRATED APPROACH
RECEIPT AND PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2610622.47	Manpower	4634679.00
Advances for Expenses	914858.00	Infrastructure and Equipment	626184.00
Interest Received	97532.00	Research & Monitoring	1777669.00
FDR Interest	1570776.00	Capacity Development	170871.60
FDR Withdrawal	10000000.00	Conservation Education & Awareness	64713.00
Advance to M/s Ashish Chandola	1311750.00	Habitat Recovery Plan at KLNP	304511.00
		Vetrinary Action Plan	183298.00
		Refund of Interest to MoFE & CC	939568.00
		Total Expenditure	**8701493.60**
		Outstanding :	
		Forest Advance	1121896.00
		Tour Advance	168535.00
		Advance to M/s Ashish Chandola	1311750.00
		Balance as on 31.03.2021 A/c No. 55295	**5201863.87**
Grand Total	**16505538.47**	**Grand Total**	**16505538.47**

RECOVERY OF DUGONGS AND THEIR HABITATS IN INDIA AN INTEGRATED PARTICIPATORY APPROACH RECEIPT AND PAYMENT FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	20951896.32	Manpower Engagement	7823042.00
Grant Received	16036000.00	Capacity Building & Awarness	1689034.00
Advance for Expenses	1508696.00	Research Monitoring Species and Habitat	6394416.00
Bank Interest	504351.00	Participatory Management	1110500.00
		Marine Mammal Rescue and Rehab	521511.00
		Refund Interest to MoEF & CC	65526.00
		Total Expenditure	**17604029.00**
		Outstanding :	
		Forest Advance	1304410.00
		Tour Advane	305000.00
		Balance as on 31.03.2021 A/C No. 55294	**19787504.32**
Grand Total	**39000943.32**	**Grand Total**	**39000943.32**

NTCA-E-BIRD TECHNOLOGY FOR TIGER CONSERVATION DEVELOPMENT AND INTEGRATION OF UN-MANNED AERIAL VEHICLES AS A SURVEILLANCE AND MONITORING TOOL FOR RECEIPT & PAYMENT FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1305286.00	Manpower	984111.00
Advance for Expenses	284875.00	Travel	401248.00
Grant Received	1000000.00	Administrative Cost @15%	150000.00
Interest Received	33380.00	Miscellaneous	48730.00
Misc. Grant	1000000.00	Contingencies	32072.00
		Refund of Interest to MoEF & CC	36703.00
		Total Expenditure	**1652864.00**
		Outstanding :	
		Forest Advances	25690.00
		Tour Advances	37354.00
		Balance as on 31.03.2021 A/C No. 55580	**1907633.00**
Grand Total	**3623541.00**	**Grand Total**	**3623541.00**

PRIORITIZATION AND PREPARATION OF BRIEF DOCUMENT FOR NOTIFICATION UNDER WETIANDS RULES, 2010 IN CHHATTISGARH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	98190.00	Travel Costs	15648.00
Interest Received	2886.00		
Advance for Expenses	20000.00		
Loan from D/WII A/c No. 56991	200000.00		
		Total Expenditure	**15648.00**
		Outstanding:	
		Tour Advances	20000.00
		Loan from D/WII A/c No. 56991	200000.00
		Balance as on 31.03.2021 A/C No. 55688	**85428.00**
Grand Total	**321076.00**	**Grand Total**	**321076.00**

10 DAYS ORIENTATION TRAINING ON WILDLIFE MANAGEMENT WITH SPECIAL REF. TO HEALTH MANAGEMENT FOR FIELD VETERINARIAN OF UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2351437.00	Veterinary Supplies	43320.00
Interest Received	81663.00	Grant Transfer to D/WII A/c No. 58081	2668000.00
Misc. Grant	2668000.00	Transfer to Corpus Fund	2389780.00
		Total Expenditure	**5101100.00**
		Balance as on 31.03.2021 A/C No. 55709	**0.00**
Grand Total	**5101100.00**	**Grand Total**	**5101100.00**

BIODIVERSITY ASSESSMENT OF GAURAM BUDHA WILDLIFE SANCTUARY IN HAZARIBAGH AND GAYA DISTRICT
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3202683.00	Manpower	143128.00
Advance for Expenses	20000.00	Equipment	411000.00
Interest received	98063.00	Miscellaneous + Report Printing	175675.00
		POL	14555.00
		Travel	18142.00
		Vehicle Hiring	44149.00
		Total Expenditure	**806649.00**
		Outstanding :	
		Tour Advances	25000.00
		Balance as on 31.03.2021 A/C No. 55784	**2489097.00**
Grand Total	**3320746.00**	**Grand total**	**3320746.00**

SPATIO-TEMPORAL AND THERMAL ECOLOGY ON INDIAN PYTHON IN MOYAR RIVER
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	205882.75	Manpower	427851.00
Grant Received	1100000.00	Travel	13805.00
Advances for Expenses	67599.00	Consumables	27618.00
Interest Received	9603.00	Contingencies	13329.00
Advance Caution Money to S. Karthy	25000.00	Other Costs	29040.00
Misc. Receipt	6915.00	Refund of Loan to D/WII A/c No. 62	800000.00
		Total Expneture	**1311643.00**
		Outstanding :	
		Forest Advances	40868.00
		Tour Advances	12836.00
		Advance Caution Money to S. Karthy	25000.00
		Balance as on 31.03.2021 A/C No. 55725	**24652.75**
Grand Total	**1414999.75**	**Grand total**	**1414999.75**

STUDY OF ECOLOGY AND SOCI-ECONOMIC IMPACT OF INVASIVE SPECIES TAMILNADU
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01.04.2020 TO 31.03.2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	25449.25	Loan from D/WII A/c No. 62	100000.00
Interest received	790.00	Loan from D/WII A/c No. 54919	100000.00
Loan from D/WII A/c No. 62	100000.00	Loan from D/WII A/c No. 55294	250000.00
Loan from D/WII A/c No. 54919	100000.00		
Loan from D/WII A/c No. 55294	250000.00		
		Total Expenditure	**450000.00**
		Balance as on 31.03.2021 A/C No. 55701	**26239.25**
Grand Total	**476239.25**	**Grand total**	**476239.25**

ASSESSMENT OF HABITAT USE BY BLACK NECKED CRANE (GRUS NIGRICOLLIS) AND EFLOWS OF NYAMIJANG CHU HYDRO PROJECT IN TAWANG DISTRICT, ARUNACHAL
Receipt & Payments
For the period of 01.04.2020 to 31.03.2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	54963.00	Manpower	45000.00
Advance for Expenses	9440.00		
Interest received	944.00		
		Total Expenditure	**45000.00**
		Balance as on 31.03.2021 A/C No. 55742	**20347.00**
Grand Total	**65347.00**	**Grand Total**	**65347.00**

MOVEMENT ECOLOGY OF TIGER FOR CONFLICT PREDICTION & LANDSCAPE MANAGEMENT IN SATHYAMANGALAM NILGIRI BLOSPHARE COMPLAX, SOUTHERN INDIA
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01.04.2020 TO 31.03.2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1075695.80	Manpower	242396.00
Advance for Espenses	65800.00	Equipments	34043.00
Interest received	25750.00	Travel & Lodging	7378000.00
Loan from A/c No. - 56403	1000000.00	Contingency	53333.00
Caution Money	25000.00	Miscelleneous	3761.00
		Refund of Interest to MoEF & CC	99170.00
		Total Expenditure	**800803.00**
		Outstanding :	
		Forest Advance	50000.00
		Tour Advances	43300.00
		Caution Money	25000.00
		Loan from A/c No. - 56403	1000000.00
		Balance as on 31.03.2021 A/C No. 56403	**273142.00**
		Bank Balance A/C No - 54145	7,43,189.02
Grand Total	**2192245.80**	**Grand Total**	**2192245.80**

ASSESSMENT OF THE KOTDWAR - RAMNAGAR KANDI ROAD AND REVIEW OF THE FEASIBLE OPTION TO PROMOT GREEN INFRASTRUCTURE TO ADDRESS THE IMPACTS ON WILDLIFE
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01 April 2020 TO 31 March 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	99210.00	Technical Manpower Charges	687100.00
Advance for Expenses	217720.00	Field Logistics	55421.00
Interest received	3837.00	Study Equipments	42393.00
Loan from A/c No. - 57217	662600.00	Miscellianeous	11931.00
Loan from A/c No. - 56389	2860000.00		
Loan from A/c No. - 62	1582000.00	**Total Expenditure**	**796845.00**
Loan from A/c No. - 56211	367216.00	**Outstanding :**	
		Forest Advance	155.00
		Tour Advances	13000.00
		Loan from A/c No. - 56389	2860000.00
		Loan from A/c No. - 62	1582000.00
		Loan from A/c No. - 56211	367216.00
		Balance as on 31-03-2021 A/C No -56409	**173367.00**
Grand Total	**5792683.00**	**Grand Total**	**5792683.00**

MINSTREAMING LANDSCAPE APPROCH FOR BIODIVERSITY CONSERVATION, IMPROVED LIVEIIHOOD & ECOSYSTEM HEALTH IN KAILASH SACRED LANDSCAPE PART IN INDIA
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	58046.00	Manpower	29000.00
Advance for Expenses	10363.00		
Interest received	1424.00		
Loan from A/c No. - 53475	150000.00		
		Total Expenditure	**29000.00**
		Outstanding	
		Forest Advance	253.00
		Tour Advances	10110.00
		Loan from A/c No. - 53475	150000.00
		Balance as on 31-03-2021 A/C No - 56472	**30470.00**
Grand Total	**219833.00**	**Grand Total**	**219833.00**

DEVELOPMENT OF MANAGEMENT ACTION PLAN TO MITIGATE HUMAN CROCODILE CONFLICTS IN ANDAMAN & NICOBAR ISLANDS - NITI AYOG
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2019 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	540829.00		
Intt.Received	16790.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 56756	**557619.00**
Grand Total	**557619.00**	**Grand Total**	**557619.00**

KAILASH SECRED LANDSCAPE CONSERVATION AND DEVELOPMENT INITIATIVE PHASES II ICIMOD
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2019 TO 31 MARCH 2020

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	46314.00		
Interest Received	1635.00		
Advances for Expenses	83154.00		
		Total Expenditure	**0.00**
		Outstanding :	
		Forest Advance	50000.00
		Tour Advance	20000.00
		alance as on 31-03-2021 A/C No - 56932	**61103.00**
Grand Total	**131103.00**	**Grand Total**	**131103.00**

LANDSCAPE SUSTAINABILITY CHALLENGE IN PROPOSED SIMLIPAL - SATKOSIA CORRIDOR REGION DUE TO COLLECTIVE MINING REGIME : WILDLIFE HABITAT LINKAGE AND IMPACT
RECEIPT & PAYMENTS
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3924712.00	Manpower	2307715.00
Grant Received	329244.00	Consumables	486356.00
Interest Received	104402.00	Travel	57739.00
		Equipment & Capital	10800.00
		Operational	180214.00
		Total Expenditure	**3042824.00**
		Outstanding :	
		Forest Advance	224781.00
		Tour Advances	124305.00
		Balance as on 31-03-2021 A/C No - 57182	**856448.00**
Grand Total	**4358358.00**	**Grand Total**	**4358358.00**

10 DAYS ORIENTATION TRAINING ON WILDLIFE MANAGEMENT WITH SPECIAL REF. TO HEALTH MANAGEMENT FOR FIELD VETERINARIAN OF UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Learning Material	352857.00
Grant Received	2668000.00	Boarding & Lodging	788436.00
Interest Received	19099.00	Travel During Workshop	547375.00
		Veterinary Supplies	165737.00
		Tuition Fees	75500.00
		Institution Charges	348000.00
		Total Expenditure	**2277905.00**
		Balance as on 31-03-2021 A/C No - 58081	**409194.00**
Grand Total	**2687099.00**	**Grand Total**	**2687099.00**

ASSESSMENT OF THE ECOLOGICAL STATUS OF SELECT INDIAN RIVERS FOR CONSERVATION PLANNING (NRCD) PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00		
Grant Received	5000000.00		
Interest Received	25479.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 58069	**5025479.00**
Grand Total	**5025479.00**	**Grand Total**	**5025479.00**

POPULATION ESTIMATION AND HOME SITE SELECTION BY WOLVES IN HUMAN DOMINATED LANDSCAPE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	44222.00	Travel	16747.00
Advance for Expenses	10000.00		
Interest Received	2246.00		
		Total Expenditure	**16747.00**
		Balance as on 31-03-2020 A/C No - 55281	**39721.00**
Grand Total	**56468.00**	**Grand Total**	**56468.00**

GENETIC ASSESSMENT OF WILD CAUGHT LEOPARD IN THE STATE OF MAHARASHTRA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	205982.00		
Interest Received	6396.00		
Interest Received	25479.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 55280	**212378.00**
Grand Total	**212378.00**	**Grand Total**	**212378.00**

STUDY IN SHIVALIK AND ARAVALI AREAS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	30306.00	Field Assistant	12576.00
Advance for Expenses	40000.00	Travel	20965.00
Interest Received	937.00	Contingency & Report Preparation	6674.00
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 55257	**31028.00**
Grand Total	**71243.00**	**Grand Total**	**71243.00**

CONSERVING GREAT INDIAN BUSTARD LANDSCAPES
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	590962.00	Travel	94862.00
Interest Received	19624.00		
Advance for Expenses	200000.00		
		Total Expenditure	**94862.00**
		Balance as on 31-03-2021 A/C No - 55339	**715724.00**
Grand Total	**810585.00**	**Grand Total**	**810585.00**

ECOLOGY OF WOLVES WITH EXPHASES ON DISPERSAL IN A HUMAN DOMINATED LANDSCAPES
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	223453.00	Manpower	47947.00
Interest Received	5594.00		
		Total Expenditure	**47947.00**
		Balance as on 31-03-2021 A/C No - 55480	**181100.00**
Grand Total	**229047.00**	**Grand Total**	**229047.00**

GEF-UNDP-GOI MUNNAR LANDSCAPE PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	410802.00		
Interest Received	12757.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 55075	**423559.00**
Grand Total	**423559.00**	**Grand Total**	**423559.00**

SWAMP DEER - FUNDED BY UTTARAKHAND FOREST DEPARTMENT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	5652556.00	Manpower	402514.00
Interest Received	165339.00	Field Assistant	478500.00
Advance for Expenses	320050.00	Trave; & Accomodation	391345.00
		Equipment	31964.00
		Contingency	687133.00
		Miscelleneous	19428.00
		POL	9450.00
		Institutional Charges	312000.00
		Total Expenditure	**2332334.00**
		Outstanding :	
		Forest Advances	50000.00
		Balance as on 31-03-2021 A/C No - 55350	**3755611.00**
Grand Total	**6137945.00**	**Grand Total**	**6137945.00**

EVALUATION OF WALLS AND OTHER BARRIERS USED FOR STOPPING CROP DEPREDATION BY ELEPHANTS & WILD PIGS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	623368.00	Hiring of Vehicle	115434.00
Interest Received	17909.00	Base Camp Expenses	3900.00
Advance for Expenses	85000.00	Misce;;ameous	78185.00
		Total Expenditure	**197519.00**
		Balance as on 31-03-2021 A/C No - 55351	**528758.00**
Grand Total	**726277.00**	**Grand Total**	**726277.00**

ASSESSMENT OF IMPACTS ON WILDLIFE OF KEDARNATH VALLEY DUE TO HELICOPTER SERVICES
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	435079.00		
Interest Received	13509.00		
Advance for Expenses	110000.00		
		Total Expenditure	**0.00**
		Outstanding :	
		Forest Advances	110000.00
		Balance as on 31-03-2021 A/C No - 55282	**448588.00**
Grand Total	**558588.00**	**Grand Total**	**558588.00**

CONCEPT ON TECHNOLOGY INTERVENTION FOR MOUNTAIN ECOSYSTEM (TIME) FOR COORDINATION (HESCO)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	261489.00	Manpower	480010.00
Grant Received	1000000.00	Travel	21571.00
Interest Received	4664.00	Refund of Loan to D/WII A/c No. 55293	700000.00
		Return of Interest	5941.00
		Total Expenditure	**1207522.00**
		Balance as on 31-03-2021 A/C No - 55700	**58631.00**
Grand Total	**1266153.00**	**Grand Total**	**1266153.00**

ETALIAN HYDRO PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	35123.00		
Interest Received	1105.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 56211	**36228.00**
Grand Total	**36228.00**	**Grand Total**	**36228.00**

DEVELOPING GENETIC DATABASE TO UNDERSTAND METAPOPULATION DYNAMICS & CONNECTIVITY OF TIGERS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	147454.00	Manpower	487200.00
Interest Received	12407.00	Field Assistant	150000.00
Advance Expenses	60000.00	Laboratory Reagents & Consumables	43699.00
Loan from A/c No. - 56459	1000000.00	Travel	66562
		Insurance & Medical	5105.00
		Contingency	11461.00
		Base Camp Expenses	2000.00
		Total Expenditure	**766027.00**
		Outstanding	
		Forest Advances	75000.00
		Balance as on 31-03-2021 A/C No - 55479	**378834.00**
Grand Total	**1219861.00**	**Grand Total**	**1219861.00**

STUDYING THE DISPERSAL OF TIGERS ACROSS THE EASTERN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	21106.89		
Interest Received	902.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 55244	**22011.89**
Grand Total	**22011.89**	**Grand Total**	**22011.89**

UNDERSTANDING POPULATION DYNAMICS SPACE USE, MOVEMENT AND DIET OF LEOPARDS IN JUNNAR TALUKA, MAHARASHTRA FOR HUMAN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1563998.00	Fellowship & Wages	1022378.00
Advance for Expenses	120000.00	Vehicle POL & Travel	136439.00
Interest Received	27224.00	Field Equipment	162867.00
		Miscellaneous	11550.00
		Total Expenditure	**1333234.00**
		Outstanding :	
		Forest Advance	80000.00
		Tour Advance	17000.00
		Balance as on 31-03-2021 A/C No - 56960	**280988.00**
Grand Total	**1711222.00**	**Grand Total**	**1711222.00**

DEVELOPING A COLLABORATIVE MANAGEMENT STRATEGY FOR CONSERVATION OF TIGERS IN NORTH INDIA, COMPONENT 1 : STATUS AND CONSERVATION OF TIGERS AND THEIR
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	709636.00	Manpower	2192501.00
Advance for Expenses	720000.00	Consumables	122021.90
Grant Received	800000.00	Equipment & Capital	15000.00
Interest Received	15887.00	Operational	41883.00
Loan from A/c No. - 56896	800000.00	Travel	397578.00
		Institutional Chrages	0.00
		Total Expenditure	**2768983.90**
		Outstanding :	
		Forest Advance	25000.00
		Balance as on 31-03-2021 A/C No - 56991	**251539.10**
Grand Total	**3045523.00**	**Grand Total**	**3045523.00**

AN INTEGRATED APPROACH FOR CONSERVATION OF TAKIN (BUDORCAS TAXICOLOR) IN NORTH INDIA : LINKING SPECIES ECOLOGY AND TRADITIONAL ECOLOGICAL KNOWLEDGE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2442893.00	Manpower	403142.00
Grant Received	650328.00	Equipment	1067194.00
Interest Received	57600.00	Consumables	148811.00
Advance for Expenses	47500.00	Contingecy	126614.00
		Travel	17332.00
		Refund of Interest	70780.00
		Total Expenditure	**1833873.00**
		Outstanding :	
		Forest Advances	47500.00
		Tour Advance	25000.00
		Loan to D/WII A/c No. - 56991	800000.00
		Balance as on 31-03-2021 A/C No - 56896	**491948.00**
Grand Total	**3198321.00**	**Grand Total**	**3198321.00**

ASSESSMENT OF DISEASE PREVALENCE IN UNGULATES IN PROTECTED AREAS IN MIZORAM
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2850242.00	Contingecy	7389.00
Grant Received	1202376.00	Equipment	66286.00
Advance for Expenses	190000.00	Field Wages	155701.00
Interest Received	89030.00	Travel	167398.00
		Refund of Interest	94373.00
		Total Expenditure	**491147.00**
		Outstanding :	
		Forest Advances	280000.00
		Tour Advance	40000.00
		Balance as on 31-03-2021 A/C No - 56903	**3520501.00**
Grand Total	**4331648.00**	**Grand Total**	**4331648.00**

ASSESSMENT FINE SCALE DISTRIBUTION PATTERN AND HABITAT STATUS OF NORTHERN SWAMP DEER (RUCERVUS DUVAUCELL) ACROSS UPPER GANGETIC PLAINS OF
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2518949.60	Manpower	580529.00
Grant Received	132339.00	Contingecy	9707.00
Interest Received	72631.00	Radio Collar	949515.00
		Refund of Interest	85155.00
		Total Expenditure	**1624906.00**
		Outstanding :	
		Forest Advances	200000.00
		Balance as on 31-03-2021 A/C No - 56892	**899013.60**
Grand Total		**Grand Total**	**2723919.60**

PROMOTING COMMUNITY PARTICIPATION IN CONSERVATION AND CONFLICT RESOLUTION IN THE FRINGE VILLAGES OF KAZIRANGA TIGER
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	895639.00	Manpower	570527.00
Advances for Expenses	115000.00	Consumables	228532.00
Grant Received	500000.00	Operational	58047.00
Interest Received	28172.00	Refund of Interest	69351.00
Loan from D/WII A/c No. 57180	1000000.00		
Loan to D/WII A/c No. 56411 (Refund)	400000.00		
		Total Expenditure	**926457.00**
		Outstanding :	
		Forest Advance	170000.00
		Tour Advance	7000.00
		Balance as on 31-03-2021 A/C No - 56990	**1835354.00**
Grand Total	**2938811.00**	**Grand Total**	**2938811.00**

MANAGEMENT OF INVASIVE SPECIES IN KANZIRANGA TIGER RESERVE, ASSAM (COMP-02)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1771876.00	Manpower	631786.00
Grant Receive	500000..00	Consumables	40071.00
Advance for Expenses	45000.00	Operational	12000.00
Interest Received	30725.00	Travel & Field Visit	16594.00
Loan from A/c No.- 57180	1000000.00	Refund of Interest	61915.00
		Refund of Loan to D/WII A/c No.- 56411	400000.00
		Total Expenditure	**1162366.00**
		Outstanding :	
		Forest Advance	120000.00
		Tour Advance	20000.00
		Balance as on 31-03-2021 A/C No - 56411	**2045235.00**
Grand Total	**3347601.00**	**Grand Total**	**3347601.00**

DEVELOPING A COLLABORATIVE MANAGEMENT STRATEGY FOR CONSERVATION OF TIGERS IN NORTH EAST INDIA, CONNECTING THE DOTS : FINDING DISPERSAL CORRIDORS FOR TIGERS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1374468.00	Manpower	1101804.00
Advance for Expenses	215000..00	Operational	58429.00
Interest Received	32934.00	Consumables	5963764000
Grant Received	500000.00	Travel	10329.00
Loan from A/c No.- 57180	1000000.00	Refund of Interest	82607.00
		Total Expenditure	**1849545.40**
		Outstanding :	
		Forest Advance	290000.00
		Tour Advance	25000.00
		Balance as on 31-03-2021 A/C No - 56992	**97856.60**
Grand Total	**3122402.00**	**Grand Total**	**3122402.00**

REVOLING FUND FOR GUEST HOUSE MAINTENANCE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	8347482.00	Operational Expenses	8324306.00
Rent Chares Received	2917976..00	Office Equipment	156156.00
Hostel Accomodation Charges	1418955.00		
Food Bill Charges	294111.00		
Interest Credited by UBI	286793.00		
		Total Expenditure	**8480462.00**
		Bank Balance at UBI	**8480462.00**
Grand Total	**13569562.00**	**Grand Total**	**13569562.00**

ECOLOGY OF SLOTH BEAR IN AND AROUND RATANMAHAL JAMBUGHODA SANCTUARIES & UNPROTECTED AND FRAGMENTED
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	4477512.00		
Bank Interest	13903..00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 53632	**461654.00**
Grand Total	**461654.00**	**Grand Total**	**461654.00**

EVALUATION OF PREY AVAILABILITY AND HABITAT SUITABILITY FOR TIGER AND ITS RANGING PATTERNS IN SANJAY TIGER RESERVE, MADHYA PRADESH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	185868.00		
Bank Interest	5771.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 54159	**191639.00**
Grand Total	**191639.00**	**Grand Total**	**191639.00**

ECOLOGY OF ENDANGERED ASIATIC LIONS USING SATELLITE & GPS TELEMETRY
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	405487.00	Express	400000.00
Bank Interest	8107..00		
		Total Expenditure	**400000.00**
		Balance as on 31-03-2021 A/C No - 53583	**13594.00**
Grand Total	**413594.00**	**Grand Total**	**413594.00**

NMCG -BIODIVERSITY CONSERVATION AND GANGA RAJUVENATION PART -1 (COMPONENT 1, 3 & 4)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	6159879.84	Component 1	
Grant Received	0.00	Manpower	109743.00
Opening Balance of Advance (C1)	105000.00	Equipment	833175.00
Opening Balance of Advance (C3)	15000.00	Operational Expenses	3884545.00
Opening Balance of Advance (C4)	25000.00	Travels	16598.00
Bank Interest	184444.00	Other Expenses	19099.00
		Total Expenditure (A)	**4863160.00**
		Component 3	
		Manpower	22029.00
		Travels	8868.00
		Total Expenditure (B)	**30897.00**
		Component 4	
		Manpower	42503.00
		Travels	17099.00
		Total Expenditure (C)	**59602.00**
		Total Expenditure (A+B+C)	**4953659.00**
		Balance as on 31-03-2021 A/C No - 55526	**1535664.84**
Grand Total	**6489323.84**	**Grand Total**	**1535664.84**

CSIR - AN ASSESSMENT OF BREEDING, FORAGING AND HABITAT USE PATTERNS OF A THREATENED PISCIVIROUS COLONIAL NESTING WATERBIRD, ORIENTAL DARTER AT BHITARKANIKA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	10397.25	Contigencies	11543.00
Bank Interest for F.Y. 2019-20	450.00	Travel	13375.00
Advance for Expenses	220000.00		
		Total Expenditure	**24918.00**
		Balance as on 31-03-2021 A/C No - 55104	**7929.00**
Grand Total	**32847.25**	**Grand Total**	**32847.25**

NMCG -BIODIVERSITY CONSERVATION AND GANGA RAJUVENATION PART -2 (COMPONENT 2, 5 & 6)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	9950434.82	Component 2	
Grant Received	0.00	Manpower	177611.00
Opening Balance of Advance (C2)	263207.07	Equipment	157899.00
Opening Balance of Advance (C5)	387927.00	Operational Expenses	141943.00
Interest	311946.00	Travels	137513.00
		Advance	6479.07
		Total Expenditure (A)	**621445.07**
		Component 5	
		Manpower	159581.00
		Operational Expenses	134007.00
		Travel	242804.00
		Other Expenses	2454.00
		Total Expenditure (B)	**538846.00**
		Component 6	
		Manpower	19143.00
		Equipment	239117.00
		Operational Expenses	668106.00
		Other Expenses	295.00
		Interest Return All Components	7326999.00
		Total Expenditure (C)	**8253660.00**
		Total Expenditure (A+B+C)	**9413951.07**
		Balance as on 31-03-2021 A/C No - 55526	**1499563.82**
Grand Total	**10913514.89**	**Grand Total**	**10913514.89**

TIGER RECOVERY STRATEGY AND LONG TERM MONITORING IN SAHAYADRI TIGER RESERVE, MAHARASHTRA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2775542.00	Manpower	821166.00
Grant Received	1000000.00	Contingency	392461.00
Bank Interest	98682.00	Equipment	228966.00
Advance for Expenses	360000.00	Vehicle Hiring & Fuel	151091.00
		Total Expenditure	**1593684.00**
		Outstanding :	
		Forest Advance	282500.00
		Tour Advance	550000.00
		Balance as on 31-03-2021 A/C No - 55541	**2303050.00**
Grand Total	**4234234.00**	**Grand Total**	**4234234.00**

A RAPID STATUS SURVEY FOR THE GLOBALLY THREATENED YELLOW WEAVER PLOCEUS MEGARHYNCHUS IN UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	28985.00	Travel Expenses	3000.00
Bank Interest	834.00		
		Total Expenditure	**3000.00**
		Balance as on 31-03-2021 A/C No - 55693	**26819.00**
Grand Total	**29819.00**	**Grand Total**	**4234234.00**

CONSERVATION MANAGEMENT OF ELEPHANTS IN CHHATTISGARH : CAPACITY BUILDING INITIATIVE ON THE DISPERSAL & RANGING PATTERNS OF ELEPHANTS FOR EFFECTIVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1585493.79	Manpower	1074647.00
Bank Interest	51868.00	Accommodation & Food	157791.00
Advance for Expenses	180000.00	Equipment & Field Gears	220000.00
Advance for Other Advance	873335.17	Supplies & Materials	32964
Loan to A/c No. 50629	500000.00	Travel	241154.00
		Capacity Building Workshop	5820.00
		Total Expenditure	**1732376.00**
		Outstanding :	
		Forest Advance	80000.00
		Other Advance	873335.17
		Balance as on 31-03-2021 A/C No - 55760	**504985.79**
Grand Total	**3190696.96**	**Grand Total**	**3190696.96**

GENETIC ASSESSMENT OF THE NON-DESCRIPT PIG BREEDS ACROSS SELECTED REGIONS OF UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	65318.00	**Recurring (General)**	
Grant Received	560000.00	Fellowship	521942.00
Bank Interest	1449.00	Consumables	29359.00
		Interest Return to Funding Agency	10696.00
		Total Expenditure	**561997.00**
		Balance as on 31-03-2021 A/C No - 56925	**64770.00**
Grand Total	**626767.00**	**Grand Total**	**626767.00**

SERB - NATIONAL POST DOCTORAL FELLOWSHIP (NPDF) -RESOLVING TAXONOMIC UNCERTAINTY AMONG INDIAN GOURAMI (PERCIFORMES : OSPHRONEMIDAE) USING MOLECULAR
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	502077.00	Fellowship	385000.00
Bank Interest for F.Y. 2019-20	15590.00	Contingencies	83000.00
Advance for Expenses	100000.00	Travel Expenses	89712.00
		Total Expenditure	**557712.00**
		Balance as on 31-03-2021 A/C No - 57001	**59955.00**
Grand Total	**617667.00**	**Grand Total**	**617667.00**

PROMOTE GANGA RESTORATION BY INVOLVING GANGA PRAHARIS DURING KUMBH MELA PROGRAMME
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	336869.00		
Grant Received	0.00		
Bank Interest	10418.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No - 56944	**347287.00**
Grand Total	**347287.00**	**Grand Total**	**347287.00**

A COMPREHENSIVE BIODIVERSITY ASSESSMENT STUDY IN SURGUJA -LEMURU FORESTS WITH REFERENCE TO HASDEO ARAND COAD FIELDS IN THE STATE OF CHHATTISGARH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1922378.00	Manpower	686572.00
Grant Received	0.00	Accommodation Food Charges	87344.00
Bank Interest	37832.00	Camera Trap	248810.00
Advance for Expenses	222000.00	Contingency	12058.00
Loan from A/c No. 57924	300000.00	Field Assistant	168000.00
		Field Equipments	414297.00
		Hiring of Field Vehicle	384425.00
		TA/DA of WII Faculty	149271.00
		Total Expenditure	**2150777.00**
		Outstanding :	
		Forest Advance	130000.00
		Tour Advance	10000.00
		Balance as on 31-03-2021 A/C No - 57002	**191433.00**
Grand Total	**2482210.00**	**Grand Total**	**2482210.00**

ELEPHANT CELL PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	7128083.00	**Elephant Cell :**	
Grant Received from Elephant Cell	800000.00	Manpower	3842097.00
Bank Interest	185141.00	WII Overheads & Gratuity	616048.00
Advance for Expenses	86281.00	Publications	23520.00
		Captive Elephant Survey	220300.00
		Office Space, Furniture, Operational Expenses (GIS lab)	40000.00
		Travel Allowances of Staff	26396.00
		Equipment	106890.00
		Trainings/Workshops/Meetings	1209942.00
		Miscellaneous	426345.00
		Preparation of Video & Documentary	247800.00
		Travel (Contractual Staff)	308421.00
		Total Expenditure (A)	**7067759.00**
		Elephant Day Celebration Fund (B)	1500.00
		East-Central Landscape Project (C)	34291.00
		Total Expenditure (A+B+C)	**7103550.00**
		Outstanding :	
		Elephant Cell "	
		Tour Advance	20000.00
		Forest Advance	55000.00
		Balance as on 31-03-2021 A/C No - 57002	**1020955.00**
Grand Total	**8199505.00**	**Grand Total**	**8199505.00**

MITIGATION OF HUMAN ELEPHANT CONFLICT IN AND AROUND RAJAJI TIGER RESERVE WITH EMPHASIS ON MITIGATION STRATEGIES DURING KUMBH 2021
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	500000.00	Manpower	584081.00
Grant Received	7062000.00	Travel Expenses	316983.00
Bank Interest	68368.00	POL & Vehicle Hiring	691711.00
		Base Camp Expenses	188070.00
		Contigencies	112715.00
		Immobilization/Drug Accessories	271211.90
		Miscellaneous	137818.00
		Loan to A/c No. 57002	300000.00
		Total Expenditure	**2602589.90**
		Balance as on 31-03-2021 A/C No - 57924	**5027778.00**
Grand Total	**7630368.00**	**Grand Total**	**7630368.00**

NMCG -BIODIVERSITY CONSERVATION AND GANGA REJUVENATION PHASE -2
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	215497764.06	Manpower	36751074.00
Grant Received	0.00	Equipment	6806428.39
Bank Interest	6436151.00	Central Laboratory	13557500.00
Loan to A/c No. 55350	400000.00	Operational Expenses	19136421.00
		Travels	3687182.00
		Other Expenses	569674.60
		Advance for Expenses	6302606.00
		Total Expenditure (A)	**86810885.99**
		Loan to A/c No. 55350	400000.00
		Loan to A/c No. 56411	1000000.00
		Loan to A/c No. 56990	1000000.00
		Loan to A/c No. 56992	1000000.00
		Balance as on 31-03-2021 A/C No - 57180	**135756029.07**
Grand Total	**225966915.06**	**Grand Total**	**225966915.06**

WILDLIFE STUDIES & MITIGATION MEASURES WITH RESPECT TO DEVELOPMENT OF DELHI-DEHRADUN HIGHWAY (NHAI)
RECEIPT & PAYMENT FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	106935.00
Grant Received	1248000.00	Equipment	61020.00
Bank Interest	6436151.00	Data Computation % Report Writing	21348.00
Loan to A/c No. 55350	7703.00	Hiring of Vehicle & Maintenance	289780.00
		Office Maintenance	311070.00
		Travels	52800.00
		Institutional Charges	300000.00
		Total Expenditure (A)	**1142953.00**
		Balance as on 31-03-2021 A/C No - 58020	**112750.00**
Grand Total	**1255703.00**	**Grand Total**	**1255703.00**

SITE ASSESSMENT ALONG THE THREE LINES IN KHARSIA TO DHARAMJAIGARH RAILWAY ALIGNMENT TO SUGGEST MITIGATION STRUCTURES FOR ELEPHANT IN THE SATE OF
RECEIPT & PAYMENT FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Vehicle Hiring	46047.00
Grant Received	999925.00	Institutional Charges	141000.00
Bank Interest	11600.00		
		Total Expenditure (A)	**187047.00**
		Loan to A/c No. 56409	662600.00
		Balance as on 31-03-2021 A/C No - 58019	**161878.00**
Grand Total	**1011525.00**	**Grand Total**	**1011525.00**

MITIGATION MEASURES TO PREMEABILITY FOR WILDLIFE ACROSS THE INDO-NEPAL BORDER ROAD, UTTAR PRADESH
RECEIPT & PAYMENT FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	316487.00
Grant Received	5938600.00	Field Logistics	299853.00
Bank Interest	4356.00	Miscellaneous	50733.00
		Study Material & Equipment	62389.00
		Institutional Charges	1287750.00
		Advance for Expenses	145000.00
		Total Expenditure (A)	**2162212.00**
		Balance as on 31-03-2021 A/C No - 58176	**3780744.00**
Grand Total	**5942956.00**	**Grand Total**	**5942956.00**

UNDERSTANDING THE IMPACTS OF MINING AREAS OF WESTERN COALFIELDS LIMITED (WCL) AND CHANDRAPUR THERMAL POWER PLANT, CHANDRAPUR FOR EFFECTIVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	105850.00
Grant Received from WCL	1729672.00		
Grant Received from CTPP Mahageno	1869914.00		
		Total Expenditure (A)	**105850.00**
		Balance as on 31-03-2021 A/C No - 58302	**3493736.00**
Grand Total	**3599586.00**	**Grand Total**	**3599586.00**

ECOLOGY AND RECOVERY OF CRITICALLY ENDANGERED VULTURE SPECIES IN PONG DAM PROJECT AREA (PA) AND ITS ECO SENSITIVE ZONE (ESZ) IN HIMACHAL PRADESH (A/C)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3132625.00	Salary & Wages	314170.00
Interest Received	97059.00	Travel Expenditure	24685.00
		Contigencies	64686.00
		Interest Refund	113136.00
		Total Expenditure	**516677.00**
		Balance as on 31-03-2021 A/C No - 56901	**2713007.00**
Grand Total	**3229684.00**	**Grand Total**	**3229684.00**

SECURING HABITAT FOR THREATENED MOUNTAIN UNGULATES THROUGH ROBUST POPULATION ASSESSMENT AND CONSERVATION PLANNING (A/C-56895)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	4032813.00	Salary & Wages	230336.00
Grant Received	1160893.00	Equipment	810478.00
Interest Received	120953.00	Consumables	301483.00
		Contingencies	270255.00
		Travel Expenditure	62770.00
		Base Camp Expenses	36774.00
		Grant Refund	1035884.00
		Interest Refund	142306.00
		Total Expenditure	**3020286.00**
		Balance as on 31-03-2021 A/C No - 56895	**2294373.00**
Grand Total	**5314659.00**	**Grand Total**	**5314659.00**

PA NETWORK TRAINING & WORKSHOP
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Grant Received	2078000.00	Boarding & Loading	10397.00
Interest Received	30.00	TA/DA & Honorarium	14000.00
		Office Equipment	5599.00
		Consumable & Misc.	30153
		Total Expenditure	**60149.00**
		Balance as on 31-03-2021 A/C No - 58173	**2017881.00**
Grand Total	**2078030.00**	**Grand Total**	**2078030.00**

STAFF WELFARE FUND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	88,611.00	Staff Welfare Fund Expenses	54,690.00
WII Official Contribution	63,335.00		
Bank Interest for F.Y. 2020-21	3,259.00		
		Total Expenditure	**54,690.00**
		Balance as on 31-03-2021 A/C No -6009	**100515.00**
Grand Total	**155205.00**	**Grand Total**	**155205.00**

DEVELOP THEMETIC MAPS FOR KOCHI AND DEVELOP POLICY RECOMMENDATION FOR THE CITY AUTHORITIES UNDER THE INTEGRATED SUB
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	488750.00	Fellowship	431625.00
Interest Received	9213.00		
		Total Expenditure	**431625.00**
		Balance as on 31-03-2021 A/C No -57845	**66338.00**
Grand Total	**497963.00**	**Grand Total**	**497963.00**

MONITORING FISH TAXA IN SELECTED LANDSCAPE ACROSS INDIA UNDER THE LONG TERM ECOLOGICAL OBSERVATION (LTEO) INDIA PROGRAMME
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	6000000.00	Fellowship	710881.00
Grant Received	500000.00	Consumables	113434.00
Interest Received	130367.00	Equipment	847012.00
		Workshop Training & Travel	1035870.00
		Advance for Expense	95000.00
		Total Expenditure	**2802197.00**
		Balance as on 31-03-2021 A/C No -57802	**3828170.00**
Grand Total	**6630367.00**	**Grand Total**	**6630367.00**

ESTIMATION OF ECONOMIC LOSSES IN REAL TERM PER HACTARE BASIS DUE TO FOREST FIRE IN UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3583000.00	Fellowship	104946.00
Interest Received	49280.00	Consumables	31066.00
		Contingencies	1320.00
		Equipment	405486.00
		Institutional Charges	514000.00
		Advance for Expense	196500.00
		Total Expenditure	**1253318.00**
		Balance as on 31-03-2021 A/C No -57829	**2378962.00**
Grand Total	**3632280.00**	**Grand Total**	**3632280.00**

HEM CHAND MAHINDRA FOUNDATION INTERNATIONAL SYMPOSIA - REG
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	450000.00	Advance for Expense	50000.00
Interest Received	11401.00		
Advance for Expenses	50000.00		
		Total Expenditure	**50000.00**
		Balance as on 31-03-2021 A/C No -57913	**461401.00**
Grand Total	**511401.00**	**Grand Total**	**511401.00**

BASIS STUDY DESIGH OF BIODEVERSITY ASSESSMENT FOR HIMACHAL PRADESH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	3758055.00	Manpower	110937.00
		TA/DA	6950.00
		Misc. & Contingencies	2200.00
		Equipment	24990.00
		Vehicle Hiring	5100.00
		Consumable	44902.00
		Total Expenditure	**195079.00**
		Balance as on 31-03-2021 A/C No -57829	**3562976.00**
Grand Total	**3758055.00**	**Grand Total**	**3758055.00**

DEVELOPMENT OF LANDSCAPE MANAGEMENT PLAN AND MONITORING WITH REFERENCE TO KEN-BETWA ROVE LINK PROJECT IN PANNA TIGER RESERVE, MADHYA PRADESH
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	16214397.00	Manpower	11429422.00
Grant Received	27018160.00	Contingencies	2910059.00
Interest Received	491917.00	Travel	4745126.00
Advance for Expeses	612000.00	Equipment	11593840.00
		Total Expenditure	**30678447.00**
		Outstanding :	
		Forest Advance	802840.00
		Tour Expenses	138000.00
		Loan to A/c No. 50908	1200000.00
		Paid Due Taxes (CSGT/SGST)	1586.00
		Balance as on 31-03-2021 A/C No -57829	**11515601.00**
Grand Total	**44336474.00**	**Grand Total**	**44336474.00**

UTTARAKHAND STATE WILDLIFE POPULATION ESTIMATION HIMALAYAN ZONE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Grant Received	7184000.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No -57829	**7184000.00**
Grand Total	**7184000.00**	**Grand Total**	**7184000.00**

NICE SELECTION AND MESOPREDATOR IN HIGH ALTITUTE ECOSYSTEM
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Grant Received	2100000.00		
		Total Expenditure	**0.00**
		Balance as on 31-03-2021 A/C No -57829	**2100000.00**
Grand Total	**2100000.00**	**Grand Total**	**2100000.00**

WII - GRATUITY OF CONTRIBUTION
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2349361.27	Final Payment	522102.00
Gratuity of Fund	2619282.00		
Interest Received	87784.00		
		Total Expenditure	**522102.00**
		Balance as on 31-03-2021 A/C No -55326	**4534325.27**
Grand Total	**5056427.27**	**Grand Total**	**5056427.27**

DST - INSPIRED FACULTY FELLOW & DST FUNDED : METAPOPULATION DYNAMICOF TIGER IN TERAI ARC LANDSCAPE PROJECT & POPULATION GENETICS OF SWAMP DEER
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	207703.78	Manpower	2704696.00
Advance for Expenses	152000.00	Contingency	192154.00
Grant Received - Inspired	2846271.00		
Interest Received	21855.00		
		Total Expenditure	**2896850.00**
		Outstanding:	
		Forest Advance	80000.00
		Balance as on 31.03.2021 A/C No. 54269	**250979.78.00**
Grand Total	**3227829.78**	**Grand Total**	**3227829.78**

WCT PANTHERA FUNDED : METAPOPULATION DYNAMIC OF TERAI ARC LANSCAPE PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2218053.55	Manpower	141523.00
Advance for Expenses	75000.00	Field, Vehicle Hiring, Maintenance and Logistics	10952.00
Interest Received	64604.00	Contingency	337030.00
		Lab Reagents	491700.00
		Total Expenditure	**981205.00**
		Balance as on 31.03.2021 A/C No. 54992	**1376452.55**
Grand Total	**2357657.55**	**Grand Total**	**2357657.55**

IMPLEMENTING RHINO DNA INDEXING SYSTEM TO COUNTER RHINO POACHING THREAT AND AID POPULATION MANAGEMENT IN INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	698744.00	Manpower	444423.00
Advance for Expenses	96919.00	Contingency	96919.00
Grant Received	247117.00	Lab Reagents	95063.00
Interest Received	20973.00		
		Total Expenditure	**636405.00**
		Balance as on 31.03.2021 A/C No. 55585	**427348.00**
Grand Total	**1063753.00**	**Grand Total**	**1063753.00**

NATIONAL MISSION ON HIMALAYAN STUDIES (NMHS) - HUMAN WILDLIFE CONFLICT PROJECT (PROJECT-1)
NATIONAL MISSION ON HIMALAYAN STUDIES (NMHS) - FELLOWSHIP PROJECT (PROJECT-2)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	6772055.92	Manpower	1502058.00
Advance for Expenses :		Consumables	691823.00
Advances (Human Wildlife Conflict) :		Contingency	771269.00
Forest Advance	1546465.00	Travel	674345.00
Tour Advance	483592.00	Equipment	890750.00
Advances (Fellowship) :		Loan to Other Project	582800.00
Forest Advance	310275.00		
Tour Advance	96237.00		
Other Advances	60781.00		
Grant Received NMHS Treeline Project	759091.00		
Interest Received	251080.00		
Refund of Loan from Ac/ No. 54272	3000000.00		
		Total Expenditure (A)	**5113044.00**
		Balance as on 31.03.2021 A/C No. 55352	**8166532.92**
Grand Total	**13279576.92**	**Grand Total**	**13279576.92**

DST - NMSHE PROGRAMME PROJECT - MICRO FLORA AND FAUNA & WILDLIFE ANIMAL POPULATION
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	139423.87	Manpower	4359517.00
Advance for Expenses	20725089.00	Equipment	0.00
Grant Received from DST	7500000.00	Travel & Field Work	674610.00
Grant Received from Inspire	7989791.00	Consumables	674610.00
Interest Received	81244.00	Contingency	19020823.00
		Transfer Amount to DST - INSPIRE - 54269	7979791.00
		Loan Returned to A/c No. 55352	300000.00
		Total Expenditure	**35709351.00**
		Balance as on 31.03.2021 A/C No. 54272	**716196.87**
Grand Total	**36425547.87**	**Grand Total**	**36425547.87**

DST - NMSHE TEK PORJECT (JNU)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	534992.00	Manpower	146167.00
Advance for Expenses	111217.00	Travel & Field Work	111217.00
Interest Received	15192.00		674610.00
		Total Expenditure	**257384.00**
		Balance as on 31.03.2021 A/C No. 55746	**404017.00**
Grand Total	**661401.00**	**Grand Total**	**661401.00**

ASSESSMENT OF CLIMATE CHANGE IMPACTS ON SOIL HEAL THROUGH MICROBIAL AND PLANT COMMUNITIES IN ALPINE ECOSYSTEM OF THE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1874026.73	Manpower	375223.00
Advance for Expenses	46594.00	Equipment	92997.00
Grant Received	167725.00	Travel	35311.00
Interest Received	53384.00	Recurring Expenses	83526.00
		DNA Squencing Charges	48599.00
		Total Expenditure	**635656.00**
		Outstanding :	
		Forest Advance	50000.00
		Balance as on 31.03.2021 A/C No. 56589	**1456073.73.00**
Grand Total	**2141729.73**	**Grand Total**	**2141729.73**

ECOLOGICAL RESPONSES OF FLORA AND FAUNA TO CLIMATE CHANGE IN THE TRANS-HIMALAYAN LANDSCAPES WITH SPECIAL REFRENCE TO VULNERABILITY AND ADAPTATIONS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1486801.00	Manpower	483600.00
Grant Received	177680.00	Travel	14434.00
Advance for Expenses	84000.00	Recurring Expenses	108924.00
Interest Received	41275.00	Equipment	20310.00
		Total Expenditure	**627268.00**
		Balance as on 31.03.2021 A/C No. 57062	**1162488.00**
Grand Total	**1789756.00**	**Grand Total**	**1789756.00**

INVENTORIZATION OF FLORA & FAUNA OF CONSERVATION SIGNIFICANCE SHAILA PATTAN RANJIT SAGAR WETLANDS AND LALWAN COMMUNITY
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	565985.50	Consumables / Contingency	10000.00
Opening Balance of Advance	10000.00	Institutional Charges	198840.00
Interest Received	15727.00		
		Total Expenditure	**208840.00**
		Balance as on 31.03.2021 A/C No. 56712	**382872.50**
Grand Total	**591712.50**	**Grand Total**	**591712.50**

RADIO TELEMETRY STUDIES ON ELEPHANTS IN ROURKELA & SUNDERGARH FOREST DIVISION ODISHA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	571761.00		
Interest Received	17754.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/C No. 57114	**589515.00**
Grand Total	**589515.00**	**Grand Total**	**589515.00**

BIOGEOGRAPHY OF EASTERN BORDERLAND IN INDA : EVIDENCE FROM ECOTHERMS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	421810.00	Manpower	442027.00
Grant Received	1200000.00	Contingency	70425.00
Interest Received	10114.00	Travel	37165.00
Advance for Expense	58336.00		
		Total Expenditure	**549617.00**
		Balance as on 31.03.2021 A/C No. 57130	**1140643.00**
Grand Total	**1690260.00**	**Grand Total**	**1690260.00**

ANALYSIS OF SCATS (SNOW LEOPARD & WOLF) AND WHOLE GENOME SEQUENCING OF SNOW LEOPARD DNA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	4651787.00	Manpower	2048002.00
Grant Received	0.00		
Interest Received	126979.00		
		Total Expenditure	**2048002.00**
		Balance as on 31.03.2021 A/C No. 57115	**1140643.00**
Grand Total	**4778766.00**	**Grand Total**	**4778766.00**

MANAGEMENT PLAN PREPARATION AND POPULATION MONITORING OF TURTLES IN SURINSAR MANSAR WETLANDS, JAMMU & KASHMIR BY WILDLIFE INSTITUTE OF INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1172846.00	Fellowship	610676.00
Interest Received	27797.00	Travel	196111.00
Advance for Expense	160000.00	Equipment	97672.00
		Consumables	173450.00
		Institutional charges	280000.00
		Total Expenditure	**1357909.00**
		Balance as on 31.03.2021 A/C No. 57552	**2734.00**
Grand Total	**1360643.00**	**Grand Total**	**1360643.00**

NATIONAL MISSION ON HIMALAYAN STUDIES (NMHS) TREELINE PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	365274.00	Manpower	290000.00
Advance for Expense	37000.00	Contingency	19110.00
Interest Received	5432.00	Travel	77845.00
		Total Expenditure	**386955.00**
		Balance as on 31.03.2021 A/C No. 57509	**20751.00**
Grand Total	**407706.00**	**Grand Total**	**407706.00**

PROPOSAL FOR RAPID ASSESSMENT AND STATUS OF WILDLIFE BETWEEN KOTA BARRAGE AND JAWAHAR SAGAR DAM
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1000425.00	Travel	48014.00
Grant Received	0.00	Contingency	39752.00
Advance for Expense	20000.00		
Interest Received	29363.00		
		Total Expenditure	**87766.00**
		Outstanding :	
		Tour Advance	15000.00
		Balance as on 31.03.2021 A/C No. 57793	**947022.00**
Grand Total	**1049788.00**	**Grand Total**	**1049788.00**

ASSESSING THE FUNCTIONING AND EFFICACY OF TIGER CONSERVATION FOUNDATIONS AND JAWAHAR SAGAR DAM
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	366329.00	Manpower	57000.00
Interest Received	13172.00	Travel	85361.00
Refund of Loan	150000.00	Contingency	1390.00
		Report Writing	7592.00
		Institutional Charges	100000.00
		Total Expenditure	**251343.00**
		Outstanding :	
		Tour Advance	19000.00
		Forest Advance	40000.00
		Balance as on 31.03.2021 A/C No. 57752	**219158.00**
Grand Total	**529501.00**	**Grand Total**	**529501.00**

FOUNDATION ECOLOGICAL SECURITY (FES)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	600427.00		
Interest Received	18645.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/C No. 57768	**619072.00**
Grand Total	**619072.00**	**Grand Total**	**619072.00**

ECOLOGICAL IMPACTS OF MAJOR INVASIVE ALLEN PLANTS (IAPS) ON NATIVE FLORA IN RAJAJI TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	148036.00
Grant Received	895350.00	Travel	16050.00
Interest Received	12180.00	Contingency	30141.00
		Total Expenditure	**194227.00**
		Outstanding :	
		Tour Advance	15000.00
		Forest Advance	20000.00
		Balance as on 31.03.2021 A/C No. 57788	**678123.00**
Grand Total	**907530.00**	**Grand Total**	**907530.00**

LANDSCAPE SCALE ASSESSMENT OF HABITAT POPULATION AND GENETIC STRUCTRUCTURE OF HISPIDUS IN THE HIGHLY FRAGEMENTED TERAL GRASSLAND OF INDIA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Institutional Charges	81667.00
Grant Received	1150000.00		
Interest Received	22719.00		
		Total Expenditure	**81667.00**
		Balance as on 31.03.2021 A/C No. 57746	**678123.00**
Grand Total	**117219.00**	**Grand Total**	**117219.00**

RESPONSE TO ANTHROPOCENE AND CLIMATE CHANGER : MOVEMENT ECOLOGY OF SELECTED MAMMAL SPECIES ACROSS THE HIMALAYAN REGION
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	200245.00
Grant Received	67966770.00	Contingency	1215.00
Interest Received	76158.00		
		Total Expenditure	**201460.00**
		Balance as on 31.03.2021 A/C No. 58039	**6671368.00**
Grand Total	**6872828.00**	**Grand Total**	**6872828.00**

UNDERSTANDING THE RECOVERY OF COASTAL VEGETATION AND SOIL PROCESSES AT THE UPLIFTED SITES OF ANDAMAN ISLANDS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	0.00
Grant Received	591375.00	Travel	84105.00
Interest Received	0.00	Contingency	47689.00
		Total Expenditure	**131794.00**
		Balance as on 31.03.2021 A/C No. 58200	**459581.00**
Grand Total	**591375.00**	**Grand Total**	**591375.00**

DIVERSITY DISTRIBUTION AND ECOLOGY OF WILD BEE (HYMENOPTERA) APOIDEA COMMUNITIES ALONG THE ELEVATIONAL GRADDIENT IN WESTERN HIMALAYA
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	0.00
Grant Received	591368.00	Travel	38157.00
Interest Received	0.00	Contingency	31556.00
		Total Expenditure	**69713.00**
		Outstanding :	
		Forest Advance	116000.00
		Balance as on 31.03.2021 A/C No. 58199	**405655.00**
Grand Total	**591368.00**	**Grand Total**	**591368.00**

CREATION OF ECO - SENSITIVE AREAS (SHINDHUDURG)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	186722.00
Grant Received	5800000.00	Equipment/GIS	1560125.00
Interest Received	47678.00	Field Logistics	223470.00
		Total Expenditure	**1970317.00**
		Outstanding :	
		Forest Advance	25000.00
		Tour Advance	30000.00
		Balance as on 31.03.2021 A/C No. 57131	**3597361.00**
Grand Total	**5847678.00**	**Grand Total**	**5847678.00**

ASSESSING THE IMPACTS OF POWER - LINES ON AVIAN SPECIES IN THE ARID PLAINS OF WESTERN GUJRAT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	166718.80	Manpower	315089.00
Grant Received	459745.00	Travel	223722.00
Interest Received	6051.00	Accommodation	49000.00
Advances for Expenses	345000.00	Contingency	19605.00
		Miscellaneous	18487.00
		Total Expenditure	**625903.00**
		Outstanding :	
		Forest Advance	30000.00
		Tour Advance	55158.00
		Balance as on 31.03.2021 A/C No. 56170	**266453.80**
Grand Total	**977514.80**	**Grand Total**	**977514.80**

DST FUNDED - WOMEN SCIENTIST (WoS) PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	18225.00	Consumables	154587.00
Interest Received	1211.00	Refund Interest	4493.00
Advances for Expanses	10000.00		
Loan from A/c No. 56401	200000.00		
		Total Expenditure	**159080.00**
		Outstanding :	
		Tour Advance	10000.00
		Balance as on 31.03.2021 A/C No. 55926	**60356.80**
Grand Total	**229436.00**	**Grand Total**	**229436.00**

POPULATION GENETIC STRUCTURE IN TRACKING POACHING CASES OF INDIAN PANGOLIN(MANIS CRASSICUDATA)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	33755.00		
Interest Received	1047.00		
Advances for Expanses	40000.00		
		Total Expenditure	**0.00**
		Outstanding :	
		Forest Advances	35000.00
		Tour Advance	5000.00
		Balance as on 31.03.2021 A/C No. 56111	**34802.00**
Grand Total	**74802.00**	**Grand Total**	**74802.00**

FORENSIC CELL REVOLVING FUND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	11046405.51	Contingency	394346.00
Forensic Income	1766500.00	Travel	6165.00
Interest Received	327711.00	Salary (Grant-In-Aid)	4000000.00
Interest Received on Loan to A/c -1	93705.00		
Advances for Expanses	19000.00		
		Total Expenditure	**4400511.00**
		Outstanding :	
		Forest Advances	25005.00
		Tour Advance	4000.00
		Balance as on 31.03.2021 A/C No. 53911	**8823805.51**
Grand Total	**13253321.51**	**Grand Total**	**13253321.51**

CAUSES OF AVIAN DIVERSITY GRADIENTS ALONG THE HIMALAYAS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	27861.91		
Interest Received	866.00		
		Total Expenditure	**0.00**
		Balance as on 31.03.2021 A/C No. 53582	**28727.91**
Grand Total	**28727.91**	**Grand Total**	**28727.91**

ECOLOGICAL RECONNAISSANCE AND CONSERVATION ASSESSMENT OF AVIFAUNA IN SAHYADRI TIGER RESERVE
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	5641.00	Contingency / Miscellaneous	10092.00
Interest Received	134.00	POL Vehicle Hiring	5000.00
Advances for Expenses	10000.00		
		Total Expenditure	**15092.00**
		Balance as on 31.03.2021 A/C No. 55467	**682.00**
Grand Total	**15774.00**	**Grand Total**	**15774.00**

UNDERSTANDING THE AMUR FALCON FALCO AMURENSIS, THEIR STOP OVER SITES IN NAGALAND AND THEIR MIGRATORY ROUTES FOR BETTER
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	449489.22	Satellite Data Location	87129.93
Loan from A/c No. 56401	500000.00	Manpower	255903.00
Interest Received	13478.00	Travels	24691.00
Advances for Expenses	60000.00	Satellite Tagging	79164.00
		Miscellaneous	41005.00
		Hire of Vehicle, POL	14546.00
		Total Expenditure	**502438.00**
		Outstanding :	
		Forest Advance	6000.00
		Balance as on 31.03.2021 A/C No. 55510	**460528.29**
Grand Total	**968967.22**	**Grand Total**	**968967.22**

AUGMENTATION AND RECOVERY OF TIGER POPULATION IN SATKOSIA TIGER RESERVE, ANGUL
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	2215348.50	Manpower	949221.00
Advances for Expenses	67000.00	Equipment	6199.00
Interest Received	56120.00	Vehicle Hiring and Fuel	153500.70
		Travel	213500.00
		Contingency	82591.30
		Base Camp Exp.	95175.00
		Total Expenditure	**1500187.00**
		Outstanding :	
		Forest Advance	890.00
		Tour Advance	7000.00
		Balance as on 31.03.2021 A/C No. 56377	**830391.50**
Grand Total	**2338468.50**	**Grand Total**	**2338468.50**

POPULATION MANAGEMENT OF SPECIES INVOLVED IN HUMAN - WILDLIFE CONFLICT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	58879466.84	Engagement of Proj. Scientist & Res. Scholars	10697738.53
Advances for Expenses	1328000.00	Lab Facility & Animal Housing,	
		Lab Set up & Lab Running Cost	24453658.40
Interest Received	756374.00	Field Equipment	5342605.00
Interest Received on Loan	658625.00	Field Implementation	4653879.60
		Total Expenditure	**45147881.53**
		Outstanding :	
		Forest Advance	518643.47
		Tour Advance	259650.00
		Due Taxes (CGST/SGST) Paid	3202.00
		Balance as on 31.03.2021 A/C No. 56389	**15693088.84**
Grand Total	**61622465.84**	**Grand Total**	**61622465.84**

ASSESSMENT OF IMPACTS OF THE PROPOSED NAGPUR - MUMBAI SUPER COMMUNICATION EXPRESSWAY, MAHARASHTRA, SAMRIDDHI CORRIDOR ON
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1565595.79	Manpower	5861825.00
Grant Received	11379000.00	Field Logistics	1787148.00
Advance Expenses	147000.00	Study Equipments & Data/Imagery/ Base Camp, Infrastructure etc.	414994.00
Interest Received	86764.00	Miscellaneous	138841.00
Interest Received on FDR	1097194.00	Field I Camping	378035.00
FDR Encashment	10000000.00		
Loan from A/c No. 57120	11615.00		
Taxes Due	456.00		
Loan to A/c No. 55338 Refund	10000000.00		
		Total Expenditure	**8580843.00**
		Taxes Due (CGST/SGST)	472.00
		FDR	700000.00
		Outstanding :	
		Forest Advance	300393.00
		Tour Advance	6875.00
		Balance as on 31.03.2021 A/C No. 56459	**15699041.79**
Grand Total	**25287624.79**	**Grand Total**	**25287624.79**

RESEARCH AND MONITORING OF AMUR FALCONS AT TAMENGLONG DISTRICT OF MANIPUR UNDER APO ON CSS
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1029424.00	Satellite Tracking Charges	165806.00
Advance Expenses	55000.00	Travel Expenses	52050.00
Interest Received	20081.00	Contingency	113244.00
		Total Expenditure	**331100.41**
		Outstanding :	
		Forest Advance	2406.00
		Loan to A/c No. 55510	500000.00
		Loan to A/c No. 55926	200000.00
		Balance as on 31.03.2021 A/C No. 56401	**70998.59**
Grand Total	**1104505.00**	**Grand Total**	**1104505.00**

ASSESSMENT OF BIODIVERSITY FOR EFFECTIVE MANAGEMENT & EVALUATION OF ECOTOURISM POTENTIAL OF FOUR PROJECTED AREAS IN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	208993.00	Researcher Engagement	35000.00
Interest Received	6309.00	Travel	2658.00
Advance Expenses	6000.00		
		Total Expenditure	**37658.00**
		Balance as on 31.03.2021 A/C No. 56435	**183644.00**
Grand Total	**221302.00**	**Grand Total**	**221302.00**

ELEPHANT PROJECT, UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	6461090.00	Improvement of Elephant	1090575.00
Interest Received	206952.00		
		Total Expenditure	**1090575.00**
		Balance as on 31.03.2021 A/C No. 56402	**5577467.00**
Grand Total	**6668042.00**	**Grand Total**	**6668042.00**

"WILD TIGERS OF SIMILIPAL : A STUDY ON SPATIAL DISTIBUTION, ABUNDANCE & POPULATION GENETICS " IN SIMILIPAL TIGER RESERVE - REG
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	1936447.50	**Recurring compnent**	
Interest Received	55636.00	Research Personnel Salary (Manpower)	524828.00
Advances for Expenses	175000.00	Field Assistant	326773.76
		Travel	174083.24
		Consumables	2725.00
		Miscellaneous	50931.00
		Total Expenditure	**1079341.00**
		Outstanding :	
		Forest Advance	93.00
		Tour Advance	40000.00
		Balance as on 31.03.2021 A/C No. 56412	**1047649.00**
Grand Total	**2167083.50**	**Grand Total**	**2167083.50**

CURRENT DISTRIBUTION POPULATION STATUS & THREATS TO INDIAN PANGOLIN (MANIS CRASSICAUDATA) IN TERAI ARC LANDSCAPE, UTTARAKHAND
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	19394.49	Travel, Lodging & Boarding	3750.00
Interest Received	842.00	Contingency	5120.00
Advances for Expenses	50000.00	Miscellaneous	42000.00
		Total Expenditure	**50870.00**
		Balance as on 31.03.2021 A/C No. 567132	**19366.49**
Grand Total	**70236.49**	**Grand Total**	**70236.49**

PREPARATION OF UTTAR PREDESH STATE BIODIVERSITY STRATEGY AND ACTION PLAN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	506814.00	Personnel	305223.00
Interest Received	11318.00		
		Total Expenditure	**305223.00**
		Balance as on 31.03.2021 A/C No. 567132	**19366.49**
Grand Total	**518132.00**	**Grand Total**	**518132.00**

TIGER TRANSLOCATION AND MONITORING IN RAJAJI TIGER RESERVE - REG
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	317654.00	Manpower	93856.00
Interest Received	9893.00	Travel	28872.00
Advances for Expenses	120000.00	POL & Maintenance of Vehicle	79200.00
		Contingency	3567.00
		Base Camp	2027.00
		Total Expenditure	**207522.00**
		Outstanding :	
		Tour Advance	10000.00
		Balance as on 31.03.2021 A/C No. 56977	**230025.00**
Grand Total	**447547.00**	**Grand Total**	**447547.00**

JEWAR INTERNATIONAL AIRPORT PROJECT
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	208994.00	Manpower	1139229.00
Interest Received	57066.00	Field Logistics	218177.00
Interest Received ON FDR	604624.00	Field Equipments	2759887.00
Opening Balance of Advance	80000.00	Miscellaneous	373468.00
FDR Returned	10000000.00		
		Total Expenditure	**4490761.00**
		Outstanding :	
		Forest Advance	11615.00
		Tour Advance	1000000.00
		Balance as on 31.03.2021 A/C No. 57559	**5443330.00**
Grand Total	**10950684.00**	**Grand Total**	**10950684.00**

PLANING, DESIGNING AND DEVELOPMENT OF A GREENFIELD AIRPORT AT CHANDRAPUR : WILDLIFE STUDY (MADC)
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	816151.00	**Field Logistics**	
Interest Received	86120.00	Field Camping Charges	143271.00
		Total Expenditure	**143271.00**
		Outstanding :	
		Taxes Due Paid	10920.00
		Balance as on 31.03.2021 A/C No. 57554	**748080.00**
Grand Total	**902271.00**	**Grand Total**	**902271.00**

DETERMENT OF BIOTECHNOLOGY (DBT) PROJECT LINKING PROJECTED AREAS NETWORK & NEAR "RAIN BIRD" LOCATIONS WITH IBIN
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	31931.00	Manpower	572417.00
Interest Received	19892.00	Consumables	68429.00
Grant Received	2111253.00	Contingency	66969.00
Advances for Expenses	60000.00	Equipment	16066.00
		Travel	41977.00
		Institutional Charges	100000.00
		Total Expenditure	**865858.00**
		Due to Taxes (Paid)	126.00
		Interest Refund	1446.00
		Outstandings :	
		Forest Advance	50983.00
		Tour Advance	24000.00
		Balance as on 31.03.2021 A/C No. 56141	**1280663.00**
Grand Total	**2223076.00**	**Grand Total**	**2223076.00**

MANGROVES RESPONSES TO SEA LEVEL CHANGE ALONG A GRADIENT OF TECTONIC SUBDUCTION
RECEIPT & PAYMENT
FOR THE PERIOD OF 01 APRIL 2020 TO 31 MARCH 2021

RECEIPT	AMOUNT (In Rs.)	PAYMENT	AMOUNT (In Rs.)
Opening Balance	0.00	Manpower	2826051.00
Grant Received	4682000.00	Contingency	118841.00
Interest Received	16172.00	Equipment	138019.00
Advances for Expenses	0.00	Travel	119409.00
		Total Expenditure	**3202320.00**
		Balance as on 31.03.2021 A/C No. 57731	**1495852.00**
Grand Total	**4698172.00**	**Grand Total**	**4698172.00**

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

SARASWATI PRESS | 7055053333