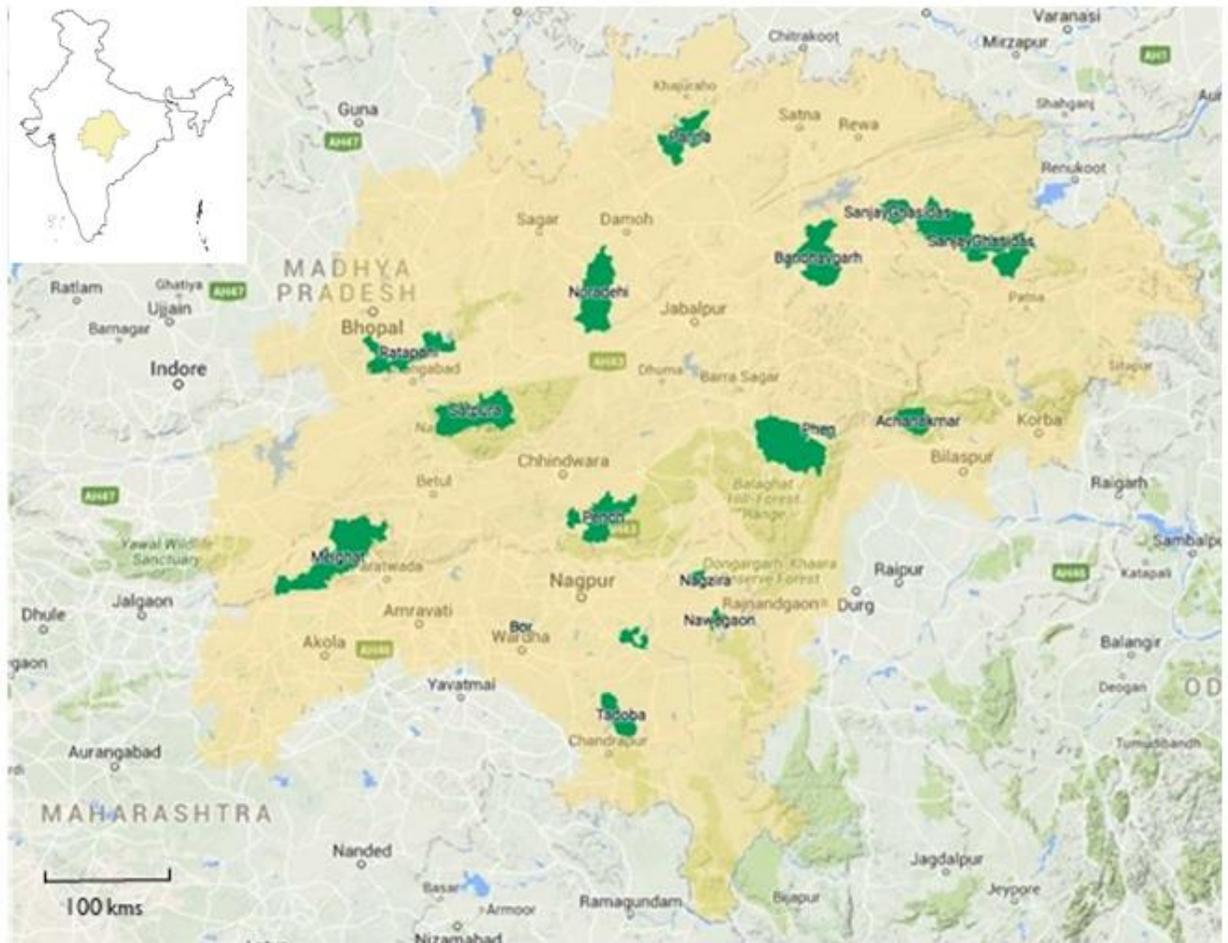




I. Background and Network Purpose

Mission: We are a network of researchers, NGOs and managers dedicated to conserving biodiversity, improving livelihoods, and fostering sustainable development in the landscapes of the Central Indian Highlands through evidence-based analyses. The network aims to foster dialogue among diverse stakeholders and to identify landscape-level analyses and projects that contribute to positive outcomes for conservation and people.

The Central Indian Highlands consists of a continuous landscape in Central India across the states of Madhya Pradesh, Chattisgarh, Maharashtra and Andhra Pradesh where tropical deciduous forests form a major land cover. This landscape includes several protected areas (Kanha, Satpuda, Pench, Melghat, Tadoba and Achanakmar) and forest corridors that are essential for wildlife movement and genetic continuity across the landscape. The Central Indian Highlands are particularly important for tiger (*Panthera tigris*) populations (they support 17% of the country's tiger population), as well as populations of leopard (*Panthera pardus*), sloth bear (*Melursus ursinus*), gaur (*Bos gaurus*), and swamp deer (*Cervus duvacelli*).



Map of the Central Indian Landscape

The landscape also serves as the headwaters to several rivers, including the River Narmada, which is one of seven major rivers in India, and is essential for meeting the irrigation, industrial and urban needs of the region. The forests in this landscape support local livelihoods: 60% of the income of local people in non-protected areas is based on these forests. Important forest products include fodder for cattle, tendu (*Diospyros melanoxylon*), mahua (*Madhuca indica*), awla (*Phyllanthus emblica*) and other ingredients essential for the herbal medicine industry. The people of this landscape live and support themselves through a range of activities, including agriculture, forest produce collection, tourism and urban activities. The landscape extends across the tribal belt of the country. People belonging to scheduled tribes comprise 30% of the population, with many ethnicities including *Gonds* and *Baiga* tribes. The *Gonds* are the second largest tribal people in India and the *Baiga* recognized as a Particularly Vulnerable Tribal Group (PVTG). The agricultural villages surrounding wildlife corridors and protected areas also have



high levels of human-wildlife conflict which is both carnivore predation on livestock and humans as well as crop depredation from wild herbivores.

This landscape has been the focus of recent development which includes introduction of new crops and development of new roads, rails, mines, tourism and other infrastructure.

Simultaneously, this region is highly vulnerable to climate change.

Science-based management of the landscape is needed to achieve a balance among multiple objectives in the present and the rapidly changing future, including improving the well-being of local communities; conserving habitat for wildlife; protecting watersheds; tourism; and accommodating development needs for improved infrastructure.

The Network for Conserving Central India (NCCI) is built on the understanding that conservation and improvements of livelihoods are intrinsically linked in the landscape and that one cannot succeed without the other. Based on this approach, NCCI has organized three symposia (Central India Landscape Symposium – CILS) in 2014, 2016 and 2019. This document summarizes the themes and actions identified at CILS in 2019 to serve as a work plan for NCCI until the next CILS in 2021.



II. Strategic Plan Priorities

NCCI has identified six themes to organize its activities in working groups:

INFRASTRUCTURE WORKING GROUP:

Guiding Query: Where and how can the landscape accommodate India's need for infrastructure?



Development of linear infrastructure has emerged as the single largest threat to the demographic viability of tigers and many other endangered species. The rapid pace of growth of linear infrastructure in India (22 kilometers of roads per day with plans to increase it to 41 kilometers/day) presents an immediate challenge which requires urgent solutions to preserve connectivity for wild animals.

ONE HEALTH WORKING GROUP:

Guiding Query: One Health: What actions would contribute to the understanding of and maintenance of inter-linked health of people, wildlife, livestock, and ecosystems?



'One Health', is an approach to design and implement research and policies that recognizes that the health of humans, livestock, wildlife and ecosystems is interconnected. Increasing human population, intensive agriculture and changing natural landscapes are altering functioning of natural ecosystems, increasing potential of zoonosis, and impacting human well-being.

Addressing these interconnected issues requires collaboration between physicians, veterinarians, ecologists, policy makers and many others.



CHANGING LIVELIHOODS WORKING GROUP:

Guiding Query: What approaches are effective to promote livelihoods that provide options for coexistence between people and wildlife in the landscape?



Livelihood options that promote sustainable use of forests can benefit both people and ecosystems in the long-term around multiple protected areas in the central Indian region. Diversification of rural livelihoods alongside the growing number of small towns and urbanization in the central Indian landscape potentially provide stable livelihood options. In efforts to reconcile development and conservation goals,

NCCI's livelihoods working group will work to assess and provide livelihood options that achieve long-term conservation and development. To address livelihood issues of the communities surrounding protected areas in central India and improve coexistence, we will focus on issues around commons, degraded lands, invasive species, livestock and agriculture (agri/agri-allied livelihoods).

FORESTS FOR WATER WORKING GROUP:

Guiding query: Central India as the water tower: Can forests benefit water supply?



Water resources are essential for the well-being of local populations as well as conservation in Central India. To date, research on the role of forests in sustaining water resources in the landscape has been limited.



HUMAN-WILDLIFE CONFLICT WORKING GROUP:

Guiding query: what management options could achieve mitigate conflict and achieve co-existence between people and wildlife in the landscape?



Human wildlife conflict causes major hardship for local people and poses threats to wildlife populations through retaliatory killings. This issue is challenging in India, especially in Central India due to combined factors of human population growth and encroachment of forest and other natural resources to meet development demands. Central India is

one of the hot-spots of large carnivores and ungulate conflicts with humans due to shared fragmented resources for both wildlife and people.

DATABASE WORKING GROUP: The NCCI database will freely provide access to data for working groups and associated partners for the central Indian region as an unparalleled resource. The database's utility was confirmed via an anonymous survey (n=50) at CILS3. 82% of the respondents "strongly agree" or "agree" that "Science & policy can be improved with a dedicated web space, such as a data dashboard, hosting data relevant to the Central Indian landscape." The need is also evident as 90% of the respondents, representing academia (49%), government (12%), non-government organizations (24%) and others (14%), expressed strong interest in such a data dashboard if it is freely accessible. Additionally, data collation and outcomes from working groups will fold into work led by Pinki Mondal (University of Delaware (UDel)), as a centralized NCCI database.



III. Action plans for working groups:

Under each theme, working groups will pursue the action plans described below.

INFRASTRUCTURE WORKING GROUP:

The infrastructure working group will focus on identifying the major problems and potential solutions to mitigate the negative impacts on connectivity. More importantly, we will try to have consensus on finding different ways to mainstream the solutions so that they are implemented effectively.

Actionable Science Goals: “One Connectivity Map”

Several researchers have published maps of landscape connectivity for tigers and other species. This effort aims to compare across these maps to identify areas of agreement about locations critical for maintaining connectivity. The map will serve as a single source of information for planning mitigation structures. The effort aims to avoid confusion and delays in planning due to multiple sources of information from the research community.

People involved:

One Map analyses (A tentative time-period for this is as soon as possible in April 2019) – Trishna Dutta (Goettingen University), Sandeep Sharma (Goettingen University), Bilal Habib (Wildlife Institute of India (WII)), Indranil Mondal (WII), Prachi Thatte (National Centre for Biological Sciences (NCBS)), Ruth DeFries (Columbia University (CU)), and Amrita Neelakantan (NCCI).

Kishor Rithe (Satpuda Foundation (SF)) is organizing the PWD meeting for this one connectivity map. The working group will discuss a tentative timeline for this meeting with Kishor once we have results but prior to January 2020.



ONE HEALTH WORKING GROUP:



The one health working group will address the challenges when public health, wildlife disease, food security and other aspects in the landscape interact with each other. We will identify challenges involved in adopting such an approach and identify research gaps and areas where managers can apply such approaches.

Actionable Science Goals:

Network database: A database of all current agencies and clinics that are equipped or ready to handle interacting public health issues – especially those with wildlife or food security (For example – a doctors / clinics network for rabies or malnutrition incidence around protected areas in central India). Abi Tamim Vanak (Ashoka Trust for Research in Ecology & the Environment (ATREE)), Prachi Thatte (NCBS), Kishor Rithe (SF) and Dr. Satav (MAHAN).

Tentative timeline TBD with further knowledge gaps identified in June 2019.

CHANGING LIVELIHOODS WORKING GROUP:

The changing livelihoods working group will study livelihoods around various protected areas in central India to understand what factors or policies have enhanced well-being alongside maintenance of natural resources and wildlife conservation. In essence, the working group's goal is to assess and provide livelihood options that lead to coexistence. The working group asks the question – “Are livelihood options providing alternatives that will lead to long-term wildlife conservation and development in communities surrounding protected areas?”

We will identify possible collaborations to further scientific pilots and activate our results on-the-ground.



Actionable Science Goals and Next Steps:

1. Pooja Chowksi (CU), Kishor Rithe (SF), Vidya Venkatesh (Last Wilderness Foundation), Manisha Ashraf (Wildlife Trust of India (WTI)), Amrita Neelakantan (NCCI): Action points on measuring if non-forest livelihood options are alleviating / managing forest resources as well as the number of available livelihood options around a PA need assessment. A working group for this effort will include Vidya (On-the-ground projects), Manisha (On-the-ground project), Pooja (CU student possibly working on this as art of her PhD), Kishor (Maharashtra village level data - microplans), Amrita (coordination). Measure on the ground changes in livelihoods, year-on-year change in respondents of programmatic projects compared to microplans. Consider the Forest Department's in charge of these protected areas as a stakeholder where our analyses provides a dipstick for Non-Governmental Organizations outcomes in protected area landscapes. Other organizations that might work in collaboration with this group could be – Abhinav Sen from Royal Bank of Scotland (RBS), Wildlife Conservation Trust (WCT). In Pench (Maharashtra) other issues (illegal grazing, poaching, fire, illicit felling etc.) might be affecting livelihoods and Satpuda Foundation (SF) will provide reports of the efficacy of their work. The overall outcome from this group may culminate as a study by Pooja Chowksi – “Importance of livelihood options to providing for long-term wildlife conservation and development”. Additionally, RBS would share their existing livelihood/coexistence models work from 255 villages of Kanha-Pench Corridor to understand how other NCCI partners may use these models.
Timeline for this action point is year on year (end 2019 then end 2020) but indicators to be finalized by individual projects by end of April 2019.

2. Case-study review of what we know about the FRA and WPA interacting. (Venkat Ramanujam (ATREE) & Amrita Neelakantan (NCCI) with guidance from Kishor Rithe (SF) and Pranav Chanchani (World Wide Fund for nature – WWF-India). Timeline as soon as possible in 2019 as the Indian supreme court has asked states to provide reports on their implementation and the on-the-ground consequences of the FRA. Initial case study, status report or remote sensing data search by Amrita in April 2019.



3. Rozgar Dhaba's efficacy in connecting jobs to job seekers near Kanha National Park– data report (Vinod Pandey – Founder Rozgar Dhaba). Report end of 2019 and every six months in 2020.

FORESTS FOR WATER WORKING GROUP

Actionable Science Goals: Ruth DeFries (CU), Jagdish Krishnaswamy (ATREE), Parul Gurjar (Barkatullah University), Amrita Neelakantan (NCCI). Additionally, Foundation for Ecological Security (FES) might join.

1. White paper or policy brief on a vision for CIL that secures water for humans and nature through ecological and hydrologic connectivity (Ruth & Jagdish, Parul & Amrita)
2. Mapping and rapid assessment of perennial streams and their hydrological status in CIL - riparian vegetation might be a way to look at this using remote sensing, Ishan Agarwal (FES) suggested a citizen science on the ground effort.

Next Steps – Working group requires to figure out requirements for the first action point of the white paper. Timelines TBD.

HUMAN-WILDLIFE CONFLICT WORKING GROUP:



The human-wildlife working group will build on the learnings from the past two symposia and discuss the way forward in reducing human-wildlife conflicts in Central India.

Actionable Science Goals: Members include - Pranav Chanchani (WWF-India), Amrita Neelakantan (NCCI), Sandeep Sharma (Goettigen University), Kishor Rithe (SF), Dr. Milind Watve (Indian Institute of Science Education and Research (IISER) Pune), Vidya Venkatesh (Last Wilderness Foundation).



1. Dr. Milind Watve uses game theory to work out compensation schemes that are less prone to corruption or manipulation for human-wildlife conflict. We will support on-the-ground experiments (Dr. Milind Watve) for coexistence, to move away from compensation but instead view conflict as a natural cost to proximity to wild areas and reward those who are able to be successful. The projects also highlight the higher costs of ungulate conflict when compared to carnivore conflict around protected areas.

2. Create database for publicly available data on conflict around protected areas: A student will be identified to work through publicly available data to create a database for central Indian protected area landscapes.

Next Steps -

One clear outcome is to collate information as a database of conflict information available and Pranav + Amrita will find a student by end of May 2019 to work out what sort of database this might be. Kishor could share the information from NBWL plans on species level damage in conflict. Vidya works towards reduction of these interactions between people and parks and will contribute accordingly.

DATABASE WORKING GROUP: In conjunction with all of the NCCI working groups the database working group will provide support to realize actionable science goals through tailored datasets for the central Indian region.

Actionable Science Goals: “NCCI Database”

In the CILS3 anonymous survey – when asked about the type of data they would require to enhance their research, 84% of the respondents mentioned GIS-compatible data (such as .shp files), closely followed by gridded data (such as GeoTIFF, NetCDF files) and tabular data (e.g. .csv, .xlsx files) mentioned by 71% and 67%, respectively. The respondents further identified land cover data including forest cover, cropped area, and perennial/seasonal water bodies (96%), weather/climate data such as daily rainfall and temperature, seasonal average, dry spell, and rainfall intensity (69%), and population/census data (61%) to be highly relevant to their research. The database working group will work towards providing such a platform with tailored dataset for the central Indian region.



People Involved:

The NCCI database working group is led by Pinki Mondal (UDel), with support from Ruth DeFries (Columbia University (CU)) and Amrita Neelakantan (NCCI).

IV. CONCLUSION

The past 6 years represented significant progress for the Network for Conserving Central India (NCCI), and the next 2 years will build on that groundswell by leveraging collaborations in a strategic and methodical manner for tangible outcomes from each working group. NCCI will continue to connect scientists, practitioners and decision makers based on the recognition that all partners are critical successful outcomes from local communities, development, and conservation. The NCCI leadership and growing number of partners remain deeply involved and committed to a shared vision for the central Indian highlands – one that includes sustainable development of people, their evolving cultures and conservation.



V. WORKING GROUPS: INDIVIDUALS AND AFFILIATIONS

Name	Affiliation	Working Groups
Abi Tamim Vanak	Ashoka Trust for Research in Ecology & the Environment	OneHealth
Jagdish Krishnaswamy	Ashoka Trust for Research in Ecology & the Environment	Forests for Water
Venkat Ramanujam	Ashoka Trust for Research in Ecology & the Environment	Changing Livelihoods
Parul Gurjar	Barkatullah University	Forests for Water
Pooja Chowksi	Columbia University	Changing Livelihoods
Ruth DeFries	Columbia University	Chair, NCCI
Ishan Agarwal	Foundation of Ecological Security	Changing Livelihoods
Sandeep Sharma	Goettingen University	Human Wildlife Conflict, Infrastructure
Trishna Dutta	Goettingen University	Infrastructure
Dr. Milind Watve	Indian Institute of Science Education and Research - Pune	Human Wildlife Conflict
Dr. Satav	MAHAN	OneHealth
Prachi Thatte	National Centre for Biological Sciences	OneHealth, Infrastructure
Amrita Neelakantan	Network for Conserving Central India	Coordinator, NCCI
Abhinav Sen	Royal Bank of Scotland	Changing Livelihoods
Vinod Pandey	Rozgar Dhaba	Changing Livelihoods
Kishor Rithe	Satpuda Foundation	Infrastructure, OneHealth, Changing Livelihoods, Human Wildlife Conflict
Vidya Venkatesh	Last Wilderness Foundation	Changing Livelihoods, Human Wildlife Conflict
Pinki Mondal	University of Delaware	Database, NCCI
Bilal Habib	Wildlife Institute of India	Infrastructure
Indranil Mondal	Wildlife Institute of India	Infrastructure
Manisha Ashraf	Wildlife Trust of India	Changing Livelihoods
Pranav Chanchani	World Wide Fund for nature – WWF-India	Human Wildlife Conflict, Changing Livelihoods