

Eastern Himalaya

Quarterly newsletter of the ATREE Eastern Himalaya / Northeast Regional Office



Rangeet Valley Eastern Himalaya, PC- Sailendra Dewan

Economic Impacts of Climate Change and Environmental Uncertainties on Smallholders of Sittong Valley, Darjeeling

The global agricultural landscape is undergoing profound changes, with smallholder farmers at the forefront of confronting the impacts of climate change and environmental uncertainties. In the Darjeeling Himalaya smallholder farmers, form the backbone of the local economy and food production systems. They are grappling with unpredictable weather patterns, changing precipitation regimes, and the cascading effects on crop yields and soil health. As traditional knowledge systems struggle to keep pace with rapid environmental change, there is an urgent need to understand the complex interplay between climate, agriculture, and rural economies in these regions.



An agricultural landscape in Sittong

During my internship with ATREE Eastern Himalaya Office this summer, I analyzed the economic impacts of climate change and environmental uncertainties on the smallholders of 4 villages in Sittong valley in the Darjeeling district. I used a basic economic analysis framework to evaluate the investment, return, and profit patterns of smallholder farmers. This approach sought to quantify the impacts of climate change, wildlife crop depredation, and biodiversity loss on agricultural economics. However, a significant challenge emerged during the interviews: farmers lacked detailed financial records, offering only approximate figures for their annual investments, returns, and profits.

This lack of precise data made it challenging to accurately quantify the economic impacts of environmental changes on their livelihoods. Despite this limitation, the qualitative insights gathered provide valuable context for understanding the economic pressures faced by smallholders in the region.

Farmers consistently reported rising temperatures and changing rainfall patterns, which have significantly impacted their agricultural practices. Most notably, there has been a drastic decline in orange production, once their primary income source, leading to substantial economic losses. In response to these challenges, farmers are actively diversifying their income sources. Many have ventured into tourism (homestays), while others have adopted floriculture or implemented mixed cropping systems to spread risk. However, persistent challenges remain. Crop depredation by wildlife, particularly monkeys and peafowls, continues to be a significant problem, with current preventive measures like nets proving largely ineffective. The absence of a robust local market further compounds their economic difficulties. Farmers are often compelled to sell their produce in distant *mandis* (markets) in Siliguri, where they frequently face exploitation, receiving unfair prices for their goods.



Floriculture adapted by a local farmer in Shelpu



Focus Group Discussion with the famers

This situation highlights the need for interventions to strengthen local market infrastructure and ensure fair trade practices. Furthermore, the region grapples with the migration of human resources to urban areas in search of better earning opportunities, leading to labor shortages and, in some cases, agricultural abandonment. Despite these challenges, the farmers demonstrated remarkable resilience and adaptability, highlighting the need for targeted support to enhance their capacity to cope with environmental and economic pressures. This research underscores the complex interplay of climate change, economic pressures, and social dynamics affecting smallholder farmers, highlighting the urgent need for innovative and sustainable solutions to support these vulnerable communities and preserve their agricultural heritage.

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Ants as Indicators: Understanding Their Role in Pangolin Ecology and Conservation

Ants (Order Hymenoptera) are eusocial (colonial) insects that evolved from vespoid wasps, with over 22,000 known species. They dominate biomass in nearly every habitat worldwide, making their species composition a good indicator of ecosystem health. Ant diversity can provide valuable information for conservation planning due to their obligate interactions with other plants and animals.

Pangolins, also known as "Scaly ant-eaters," have an obligate diet of ants. Studies have identified 23 ant species in Pangolin diets. Our current research systematically samples ants from Pangolin habitats in the Mahananda Wildlife Sanctuary as part of a larger project on Pangolins in West Bengal's protected areas. This study aims to document ant species richness, diversity, and abundance in Pangolin habitats, providing a baseline for future research and conservation planning. It also explores whether ant species composition and abundance influence Pangolin habitat selection, occurrence, and distribution. Preliminary findings show 20 ant species in the Mahananda Wildlife Sanctuary's Pangolin habitats, with *Aphaenogaster* sp., *Pheidole* sp., and *Crematogaster* sp. being the most dominant. Previous studies have reported eight of these species in Pangolin diets.



Active sampling of ants from the mounds of MWLS.

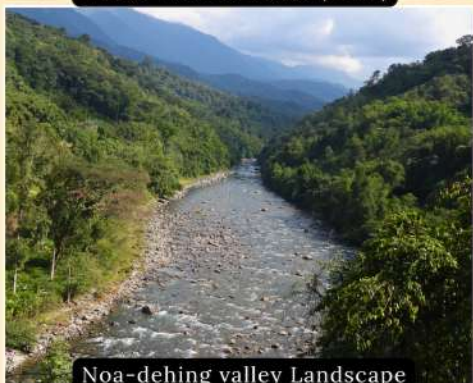


Aphaenogaster sp.

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White-bellied heron (WBH)



Noa-dehing valley Landscape

Conservation of White-bellied Heron in Arunachal Pradesh, India

The White-bellied Heron (WBH), a Critically Endangered species, is reported to have population levels insufficient for long-term survival. Key threats to the species are the dearth of information about its distribution, ecology, and behavior all critical to the conservation of the species. Habitat degradation, destruction, and occasional poaching are the other threats to the species. Arunachal Pradesh is a stronghold for the species, with 13-15 individuals spread across three river basins. During the 2023-24 season, systematic search, survey, and monitoring were conducted at prioritized and known WBH sites. 567 person-hours, covering 880 km along 17 transects resulted in 15 WBH sightings. Anthropogenic activities noted were forest conversion to agricultural land, river resource collection, and hunting of other species.

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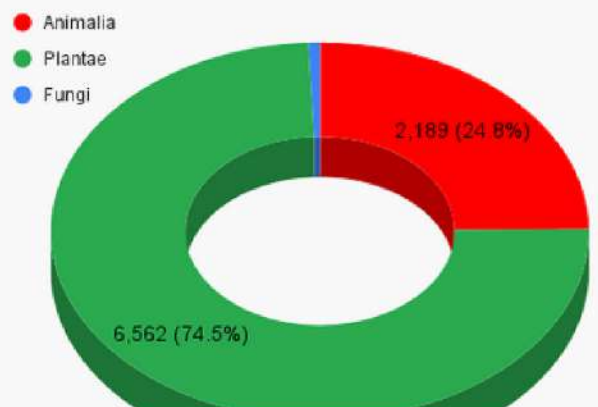
City nature challenge 2024 (April 26th-29th)



This year, ATREE Eastern Himalaya organized biodiversity documentation events in Darjeeling, Gangtok, and Dentam, West Sikkim as part of the City Nature Challenge 2024 (CNC). This international event, led by the California Academy of Sciences and the Natural History Museum of Los Angeles County, gathers cities worldwide for a four-day bioblitz every April. In Gangtok, 45 participants made 1,772 observations of 609 taxa and 284 species. Darjeeling recorded 5,704 observations of 1,151 taxa and 658 species by 37 users. Dentam had 23 users contributing 1,508 observations of 500 taxa and 304 species. Darjeeling ranked 5th, Gangtok 19th, and Dentam 23rd among Indian cities. Combined, we achieved 8,984 observations, identifying 1,797 taxa and 1,007 species. Most observations were of Plantae (6,562) and Animalia (2,189).

Notably, 25% of organisms were identified at the species level, 15% at the genus level, and 42% at the kingdom level. This year's CNC highlighted the importance of community science in conservation. Participants' dedication contributed valuable data to the global biodiversity database, showcasing our region's rich biodiversity and fostering appreciation and understanding for future conservation efforts.

Observations by Classification



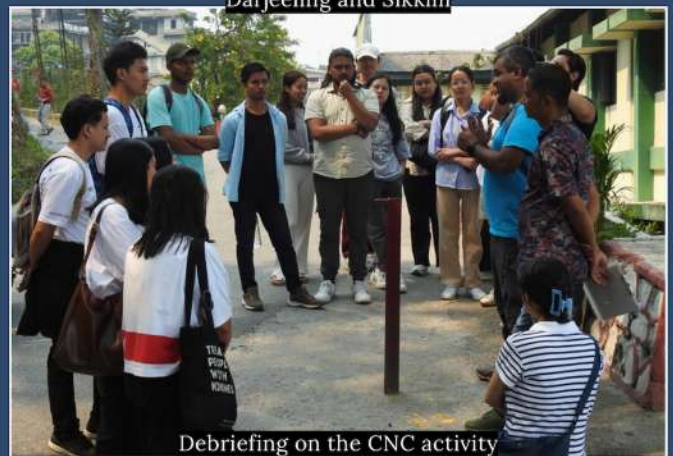
Classification of observation during CNC event 2024 from Darjeeling and Sikkim



Participants for CNC 2024 event, Gangtok



Participants for CNC 2024 event, Dentam



Debriefing on the CNC activity



Participants document biodiversity, Dentam

Institution building and community collaboration for driving livelihood related projects-insights from Sittong, Darjeeling

As part of a horticulture project supported by NABARD involving 250 ethnic/tribal members, ATREE adopted a new institutional arrangement to enhance community participation and decision-making.

A Project Implementing and Monitoring Committee (PIMC), consisting of ATREE staff a community member, and the District Development Manager of NABARD was established to oversee and plan the project's activities and performance. Under the PIMC, three Village Planning Committees (VPCs) with 7-11 members from the 250 beneficiaries from 3 villages were formed. The VPCs are responsible for planning, monitoring, and decision-making at the village level and mobilizing beneficiaries for project activities.

The VPCs also provide a platform for community members to voice concerns and give feedback, acting as liaisons between the PIMC and beneficiaries. In the future, these beneficiaries will be organized into a Farmers Producer Organization (FPO), for promoting agriculture entrepreneurship.



Avocado saplings ready for plantation

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Exploring value-added products from invasive alien plant species

As part of our Invasive Species Project, we organized two training sessions to develop products from invasive species, aiming to increase rural income.

1. Natural Dye Extraction Training: A two-day training focused on extracting natural dyes from invasive plant species such as *Ageratum conyzoides*, *Eupatorium adenophorum*, *Lantana camara*, *Mikania micrantha*, and *Chromolaena odorata*. The training covered six steps: degumming textile materials, treating materials with a mordant, extracting dye, dye fixing, and washing with soap.
2. Soap Making from Invasive Species: A two-day comprehensive training on soap making used invasive species like *Ageratum conyzoides* and *Eupatorium adenophorum*, known locally for their medicinal properties. The training involved collecting plant materials, including Aloe vera, boiling stems and leaves, extracting Aloe vera gel, melting the soap base, mixing plant extract and Aloe vera gel with essential oils for fragrance, and shaping the soap with silicone molds.



Dyes extracted from *Eupatorium adenophorum*



Eupatorium adenophorum herbal soap

Members of the Women Entrepreneurs Organization (WEO) from Sittong III, Kurseong Block, a registered body, participated as trainees. They will adopt these skills to scale up production as part of their enterprise development efforts targeting rural women.

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Inception meeting: “One health approach for disease surveillance in small mammals in the context of Scrub Typhus an emerging zoonotic threat in the Himalayan Region”

Scrub Typhus, caused by *Orientia tsutsugamushi* and spread by chigger larvae, is a major zoonotic threat in the Himalayas. A three-year project (2024-2027) supported by the National Mission for Himalayan Studies will use a 'One Health' approach to address this issue and an inception meeting was held on June 1st, 2024 at Gangtok, Sikkim. Dr. Sunita Pradhan presented an overview of the project, stressing on the role of wildlife in One Health approaches for zoonoses, while Dr. Shrijana Gurung, Department of Health and Family Welfare discussed the status, challenges, and concerns regarding Scrub Typhus in Sikkim.

Representatives from various organisations discussed various risk factors for Scrub Typhus in Sikkim. Key points included the role of diverse farming systems, with an emphasis on organic practices potentially facilitating vector spread. The impact of monoculture tea plantations in Darjeeling and anthropogenic factors like deforestation were highlighted. Sikkim's location within the Tsutsugamushi triangle, combined with high humidity and a rural lifestyle, were identified as significant contributors. Concerns were raised about disease surveillance, sporadic occurrence patterns, and hotspot identification, while the need for research on pathogen isolation, the effects of varying altitudes and organic farming, and the role of pet animals as vector carriers was emphasized.

To mitigate the disease's impact, socio-economic studies and public awareness campaigns were suggested.



Participants of the meeting

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The Himalaya Initiative (THI) Partners' Consultation Meeting

On May 2nd, 2024, ATREE held its THI Partners' Consultation Meeting in Gangtok, Sikkim, bringing together participants from academic, research institutes, and governmental and non-governmental agencies from across the Himalayas. The meeting aimed to gather feedback on thematic approaches, identify key partners, and highlight mountain-specific policies for the initial five years of the THI. Key feedback emphasized the need to target mountain-specific policies, trace bioresources, and their supply chains, and inform policymakers to promote sustainable tourism, waste management, conservation, sustainable infrastructure, gender equity, and inclusion of marginalized communities. Prioritized ecosystems included high-altitude rangelands and wetlands, along with policies to curb land conversion. Suggested approaches for ATREE included empowering individuals, enhancing institutional networks, improving communication strategies, offering financial incentives, incorporating traditional knowledge, developing threat scenarios, involving local communities, and mentoring smaller organizations.



Feedback session during the discussion



Collaboration opportunities focused on supplying high-quality data for conservation initiatives, action-oriented research, cross-border partnerships, strengthening Biodiversity Management Committees, consolidating knowledge from small organizations, establishing proficient communication channels, and documenting biodiversity knowledge in alignment with international environmental targets.

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Participation of ATREE-EH in the first Indian Wildlife Ecology Conference (IWECC)

The first Indian Wildlife Ecology Conference (IWECC) was held from June 14th to 16th at the National Centre for Biological Sciences, Bangalore. The event saw the participation of nearly 500 wildlife ecologists from over 40 institutions and 20 states. The conference featured 24 symposia, nearly 100 poster presentations, 8 Special Interest Group meetings, and four panel discussions.

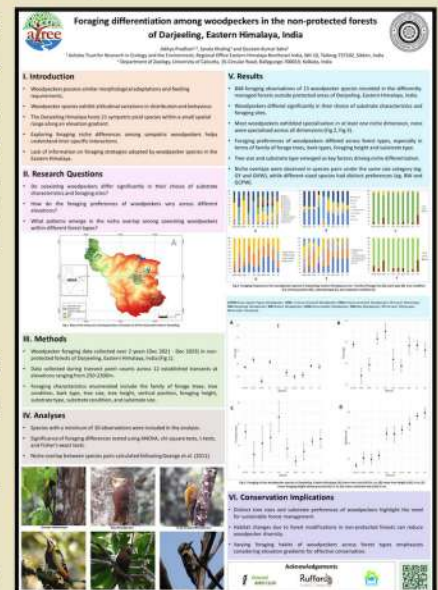
ATREE-EH Regional Office was well represented at the conference. Three research scholars presented posters on various topics:

- Foraging differentiation among woodpeckers in the non-protected forests of Eastern Himalaya
- Insights into the ecology and persistence of the Critically Endangered Chinese Pangolin
- Insights from camera trapping in the socio-ecological landscape of Darjeeling-Sikkim Himalaya

Dr. Sailendra Dewan, a Fellow in Residence at ATREE-EH, delivered a talk on beta diversity and range size patterns of butterflies along the elevational gradient in Eastern Himalaya. Additionally, Dr. Sunita Pradhan, a Visiting Fellow at ATREE-EH, co-chaired a symposium on the ecological underpinnings of human-wildlife interactions.

The conference served as an important platform to network and interact with peers from across India and to learn from research being carried out in different parts of the country.

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Obituary - in memory of Dr. A.J.T. Johnsingh

Dr. A.J.T. Johnsingh, a pioneering Indian wildlife scientist left passed 7th June 2024 at the age of 78. Renowned for his unwavering dedication to preserving the nation's diverse fauna, he spent decades researching and advocating for wildlife and conservation. His insightful studies and engagements reshaped conservation strategies. He received many awards and accolades including the Padma Sri for his efforts that influenced policy and inspired countless conservationists. He served many institutions including the Wildlife Institute of India, Dehradun where he retired as the Dean. We mourn his demise. However, his passion for wildlife will endure through the institutions he helped establish and the minds he inspired. He is survived by his loving family and a grateful community he built and inspired.

Picture Source: Wikipedia



New Staff: Saurabh Gurung, Research Associate, a native of Lebong, Darjeeling, completed his B.Sc. at Christ University, Bangalore, and his M.Sc. in Biotechnology at The Oxford College of Science (affiliated with Bangalore University). From 2021 to early 2024, he worked as a Field Assistant and then as a Junior Research Fellow on the "Red Panda Augmentation in Singalila National Park" project at Padmaja Naidu Himalayan Zoological Park. His research interests include Conservation Biology, Zoonoses, Vector-borne Diseases, Wildlife Health, and Integrated Health Surveillance.

Publications:

- Dewan, S., & Acharya, B. K. (2024). Rapoport's rule explains the range size distribution of butterflies along the Eastern Himalayan elevation gradient. *Biotropica*, e13311. <https://doi.org/10.1111/btp.13311>

Grants:

- 2nd Rufford Small Grant, the Rufford Foundation, UK, for the project "Promoting bird conservation through community engagement in Darjeeling, Eastern Himalaya, India." Received by Aditya Pradhan.

ATREE's mission is to promote socially just environmental conservation and sustainable development by generating rigorous interdisciplinary knowledge that engages actively with academia, policy makers, practitioners, activists, students and wider public audiences. ATREE's Northeast / Eastern Himalayas Programme has a direct presence in the Darjeeling and Sikkim Himalaya with a range of local partners in the other states of North East India.

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Yellow Swallowtail (*Papilio machaon*) PC: Sailendra Dewan