ZOO'S PRINT

Communicating science for conservation

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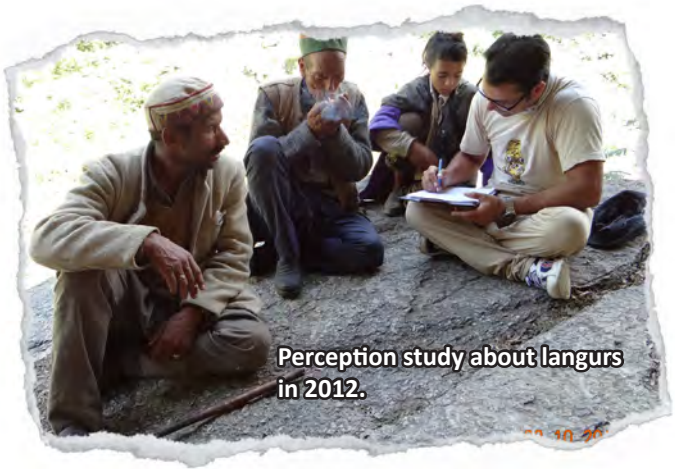
Cover photo: Common Banded Peacock (*Papilio crino*) in poster colours, adapted from H. Byju. © Pooja Ramdas Patil.

HLP Team Langur distribution survey 2012.

Of Sacred Langurs and Degraded Forests in Chamba - A Rewilding Journey

From a young age, I've been captivated by trees, wildlife, and the forests that enveloped my home in Chamba Valley, Himachal Pradesh. After obtaining my Master's Degree in Botany, I followed my passion for conservation. In 2012, having obtained the support from CLP along with a team of two others, Martina Anandam and Tariq Shah, we embarked on a study to gather baseline data on the distribution of the Himalayan Grey Langur, also known as the Chamba Sacred Langur under the mentorship of Dr. Sanjay Molur of WILD/ZOO. Our objective was to map human-wildlife interaction zones and document conservation challenges in Chamba. This study marked the inception of our rewilding project, aimed at fostering human-animal coexistence in Chamba Valley.

Engaging in the Ground Work: The majority of communities living near the Kalatop-Khajjiar Wildlife Sanctuary are farmers. Over time, as farming areas expanded, uncontrolled cattle grazing, and unsustainable use of forest-based resources took a toll on the pine-oak mixed forests near villages, leading to severe degradation. In 2014, we conducted a follow-up study in 12 highly conflict-prone villages surrounding the wildlife sanctuary. This study helped us understand how local residents


Perception study about langurs in 2012.

perceived crop depredation and loss, and it allowed us to document potential ways to mitigate human-animal negative interactions based on local insights. Since 2016, I stayed on as the only core member of our group to continue working on the project with the support and guidance of Dr. Molur until date. In 2016, another study I conducted in 43 villages revealed that wildlife, including Himalayan Black Bears, Rhesus Macaques, Chamba Sacred Langurs, and Himalayan Porcupines, caused farmers to lose a significant portion (57.17%) of their expected yield due to depredation. This explained the presence of numerous abandoned terraced farmlands in the region. During our questionnaire survey, my team and I also learned that encounters with Himalayan Black Bears had turned fatal for some locals, exacerbating fear and hostility towards certain wildlife species in the area.

Connecting the Dots: Empowered by these findings, we posed a fundamental question: Why do wild animals risk their lives to depredate when they have abundant food in the forests? Between 2017 and 2019, I compared the floral diversity and distribution


Crop damage assessment 2016.


Botanical exploration in 2018.

"I work at the nursery to raise saplings for plantations in degraded forests to create food resources for wildlife. I hope that eventually, our crops will be saved from degradation as wildlife will have access to their food".
-- Shakti Pal, Farm owner and permanent staff at the nursery.

within the wildlife sanctuary to that of the fragmented forest patches around villages. Additionally, my documentation of the diet preferences of the Chamba Sacred Langur and other wildlife led to the understanding that: a) Wildlife ventured into farmlands in search of food resources. b) Degraded habitats within fragmented forests lacked sufficient native flora, which constituted the food base for wildlife. These findings underscored the critical role of native flora in maintaining a harmonious human-wildlife relationship in Chamba.


Crop damage assessment in Kakeda village 2016.


Planting in Gajnui 2020.

"At a time when locals were continuing to incur economic loss due to depredation and facing fatal attacks from wild animals, convincing them to save wild animals and forests was not easy. But with consistent efforts and outreach a lot of people are now understanding the root cause of the problem and are accepting rewilding as a possible solution". – Vishal Ahuja.

Rewilding as a Social and Ecological Process:
Drawing from more than eight years of scientific studies, continuous interactions with locals, and numerous field visits, my team and I became convinced that restoring native flora within severely degraded and fragmented forest patches was one of the most crucial steps to mitigate negative human-wildlife interactions in Chamba. It intuitively made sense to approach the issue in a manner that mirrors nature's gradual restoration process, slowly replenishing native flora for the region's wildlife.


2022 Planting.

Shakti and his assistant sowing *Prunus cerasoides* seeds in the native plant nursery established in 2022.

At the outset of our project in 2020, I engaged in one-on-one conversations (while adhering to COVID-19 restrictions) with locals, sharing details about our rewilding project. However, most of my days were spent addressing people's hesitations and building acceptance for non-local volunteers who would eventually work on the project in the coming months. Two years into the project, I learned that saplings planted on privately-owned lands thrived and grew better compared to those planted on open forest lands, where they withered due to a lack of care and protection from livestock grazing. This emphasized the importance of community support, which also served as a buffer against additional costs for purchasing plant protectors/guards, significantly impacting the project's overall budget.

Additionally, forging a camaraderie with the Chamba Forest Department through active participation in department-led activities, such as annual bird counts, enabled me to advocate for a research-based approach to rewilding the degraded forests in the region. In October 2022, after two years of planning based on field conditions and coordinating with the Forest Department, I led a 21-member team in conducting the first-of-its-kind census of the Chamba Sacred Langur. This census will inform the long-term conservation plans for the shy endemic primate and, in turn, impact the approaches of our rewilding project.

Rewilding Chamba - A Work in Progress:
Just as the process of rewilding is slow but deliberate, the journey to choose rewilding as the suitable conservation approach for a region should be intentional and gradual, based on sound science. I have firsthand

> "What started as curiosity for me in 2003 to understand the status of the Chamba Sacred Langur, took shape on the ground in 2012 as the Himalayan Langur Project, and through the scientific works and interactions with the community in Chamba has seen a primate species conservation project grow organically into a stakeholder driven restoration and rewilding effort in the region". – Sanjay Molur, Executive Director, Zoo Outreach Organisation and Founder, WILD.

RHATC 2nd batch graduates and interns working with Shakti in the native plant nursery

experience that gaining the support and participation of the local community is the next most crucial factor that ultimately determines the impact and success of a long-term endeavor like rewilding. This entails adjusting plans based on field conditions, community sentiments, and the cooperation of the local Forest Department.

I've also focused on staying updated with the latest research and approaches to build a well-informed rewilding plan for my home valley. In June 2022, I spent 20 days working with and learning from experts at the Nature Conservation Foundation in Valparai, Tamil Nadu, as well as Pitchandikulam Forest in Puducherry and Nilgiri Biosphere Nature Park in Anaikatti. I learned techniques to restore degraded forests and aspects of raising nurseries of native plants.

Between 2020 and 2022, with support from Sanctuary's Mud on Boots Project and the participation of local farmers from Rathiyar Panchayat, I planted over 1,500 saplings of native trees on degraded forest and abandoned terrace farms. In January 2023, with generous funding from Astral Foundation, I leased an area of 752 m^2 in Dugli Village, Rathiyar Panchayat, Chamba District, and realized my decade-long dream of establishing a nursery of native plants. Here, using my extensive knowledge of the local flora's ecologies, my team and I have successfully raised over 1,600 saplings from seeds and cuttings.

The Road Ahead: Since 2020, I've been single-handedly leading all aspects of the rewilding project in Chamba. Dr. Sanjay Molur and I are currently exploring further funding opportunities to sustain the native plant nursery. Our team is concentrating on working in Rathiyar Panchayat but hopes to expand to additional areas in the next five years. We are now focused on designing outreach programs with support from active and interested members, collaborating with the local district administration, and partnering with the Forest Department to further our project's goals.

Vishal Ahuja, Himalayan Langur Project, Zoo Outreach Organisation / Wildlife Information Liaison Development Society, Coimbatore.

Plantation in Randoh Village.

Behaviours of Wild Residents

First things first

My initial visit to the enchanting Chamba Valley in Himachal Pradesh was a truly remarkable experience. Everything about the place, from the sight of the Ravi River gracefully flowing through the town to the majestic mountain ranges that cradled it, left me in awe. Perhaps it's my personal inclination toward mountains, or perhaps it's the innate charm of the region. It took me some time to familiarize myself with the landscape, directions, and local places. During the initial days, I dedicated my time to examining herbarium sheets prepared by our principal investigator, Vishal Ahuja.

A playful Chamba Sacred Langur on a rock. © P. Kritika.

Injured adult male sitting on a tree. © P. Kritika.

I frequented the nursery, acquainting myself with the species there, assisting with seed sowing and collection, and making visits to the wildlife sanctuary. I was eagerly anticipating commencing my study on the behavior of the Chamba Sacred Langur (*Semnopithecus ajax*). Then, the day arrived – March 21, 2023 – a day I would always remember. I saw these incredible ajax langurs in the wild for the very first time. I observed them perched on a dried-up tree, but they swiftly darted away as I exited the car. That moment made me ponder how I would habituate myself with these langurs if they were so wary of humans. Nevertheless, I set aside that concern for the time being. On my way back, I encountered another group of langurs near a garbage dump, showing no signs of fear when we approached. That day, I witnessed two contrasting behaviors of these majestic creatures – one in their natural state and the other influenced by human presence, highlighting how human impact alters their natural behavior.

Ongoing chapter

As time progressed, I began to opportunistically collect whatever data I could. I initially believed that I could habituate at least a group or two and identify individuals by their morphological features, as is typically done in primate behavioral ecology studies. However, I soon realized that this was an exceedingly challenging task, both due to my newcomer status in the field and the rugged terrain. Tracking langurs in the complex landscape proved to be much more difficult than I had anticipated.

Ajax sitting in a farm land. © P. Kritika.

A grooming pair of juvenile langurs. © P. Kritika.

In farmlands, it was somewhat easier to follow a troop to a certain extent, especially as these fields were surrounded by degraded forest patches or abandoned agricultural fields where bear sightings had occurred. Navigating these areas required me to keep this information in mind. In the wildlife sanctuary, the situation was entirely different. I considered myself fortunate if the langurs moved only a short distance, as there were virtually no trails for me to follow if they ventured far away.

When I began my observations, I received guidance from my mentor, Dr. Sanjay Molur, on how to proceed. Input from field researchers who specialize in primate behavior studies in various parts of the country also contributed to my understanding. While I had studied the sampling techniques (Altmann 1974) and related papers in theory, adapting and experimenting to determine which methods best suited our study was a significant process that took time. Data collection remains opportunistic, but I can confidently say that I have learned to identify the age and sex classes of the animals and observe their actions and resting patterns. I've witnessed the unpredictable nature of fieldwork; there have been days when I couldn't spot a single langur during an entire day of field visits, and there have been times when I didn't expect to encounter a troop but was pleasantly surprised.

Thanks to the langurs, I've also developed the ability to identify several plant species in the landscape, as sometimes I need to determine which new plants they are feeding on and which parts they prefer. This has helped expand

the list of plant species favored by the Chamba Sacred Langur. Currently, I'm working on a comparative study of the behaviors of these langurs in their natural habitat versus the human-dominated degraded habitat.

Apart from behavior

Amidst all these activities, I had the opportunity to design an information pamphlet, along with my fellow interns, to raise awareness among tourists visiting the wildlife sanctuary. This project was undertaken in collaboration with the Himachal Pradesh Forest Department. Additionally, I participated in the langur census of 2023, conducted in conjunction with the Forest Department to estimate the langur population. This census will aid in my behavior studies and contribute to population monitoring in the area.

Over the past few months, I've learned a great deal as a part of this project, not only about behavioral studies but also about working in a nursery, identifying plant species, interacting with local communities to understand their perspectives, and collaborating with the Forest Department. As I mentioned, I've encountered various real-life challenges in the field, such as having to cancel observations due to adverse weather conditions, struggling with poor visibility caused by monsoon mist, and facing road closures due to landslides. While I know I have a long journey ahead, these past months have provided me with valuable experience, both in terms of challenges and the joys of fieldwork.

Personal note

During my observations, I have observed firsthand the challenges that these primates face in human-dominated landscapes. They struggle to inhabit their natural habitat peacefully due to a high influx of tourist vehicles during the holiday season. Additionally, their foraging opportunities are limited due to degraded forest patches with very few native food trees. They also encounter negative interactions with local communities, including people pelting stones at langurs near their farms and being chased by dogs. In today's rapidly changing world, projects like HLP (Himachal Langur Project) are crucial, focusing on developing strategies to help and conserve endangered species facing such challenges.

Acknowledgements

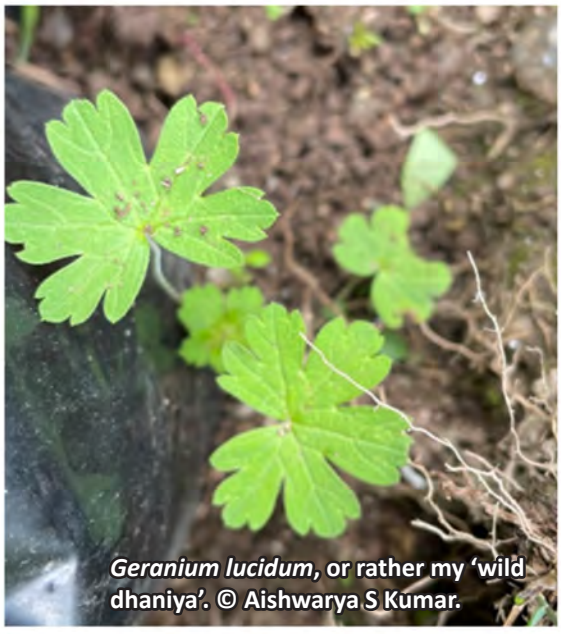
First and foremost, I would like to express my deepest gratitude to Dr. Sanjay Molur, who provided me with the opportunity to be part of the HLP and offered invaluable guidance. Secondly, I would like to thank Vishal Ahuja for his patience and kindness during our field visits, Mohammed Ismail Mohammed Rafi and Sarmistha Ojha for guiding me through the initial data collection process, Shakti for promptly informing me whenever he spotted a troop near his farm. Lastly, I extend my gratitude to my fellow interns, Aishwarya S. Kumar, Arunima Sengupta, and Namita Nalamala, for their support during our field visits.

P. Kritika, Zoo Outreach Organisation / Wildlife Information Liaison Development Society, Coimbatore.

Memoirs of a *Pahadi* Adventure

While the left hill is full of the non-native forest fire prone Chir pines (*P. roxburghii*), fields (some used and most abandoned) and forest remnants are seen on the right hill. © Aishwarya S Kumar.

The first task assigned by Sanjay Molur was to familiarize myself with the plant names before starting my study on non-native species. Memorizing these names proved to be quite challenging, as it often happens with human memory. So, in my frustration, I began giving them my own names. For instance, I called *Geranium lucidum* "wild dhaniya" due to its leaves' striking resemblance to coriander leaves. However, now, with six months into the internship, I have gradually learned and can recall many of the plant names. Yet, I must admit that confusion still occasionally creeps in – a very human thing, I suppose.



Geranium lucidum, or rather my 'wild dhaniya'. © Aishwarya S Kumar.

For my assignment, I began by acquainting myself with various plant species in our nursery, which served as my primary learning ground. It overlooks misty mountains and a region inhabited by bears, langurs, and elusive pheasants, of which we've caught only fleeting glimpses so far. Here, I learned the delicate art of sowing seeds. Every plant demands meticulous care until it can sustain itself – not unlike caring for a human child. Monitoring their growth and

A massive chunk of eroded land due the recent July landslides in Gajnoi, Chamba. The fields here are all abandoned, and the plantations are of the non-native Chir pines. These have very poor soil-binding capacity making the place very prone to landslides- Another reason why planting the right plant at the right place is very important! © Aishwarya S Kumar.

transferring them to larger bags reminded me of the days when I used to change my baby cousin's diapers. The joy of witnessing them sprout and develop into saplings is truly indescribable. However, as is common in fieldwork, fluctuations do occur. The untimely and incessant rains in July, followed by landslides, were a trying time for both the seedlings/saplings and myself and my fellow interns. Leaving them unattended resulted in waterlogged and overgrown plants, which complicated the weeding process. Nevertheless, time and experience have taught me to master this art. And you know what the best part of working in the nursery is? Endless hours of playing with soil after work, with no one to stop you from doing so.

Phaphru (*Fagopyrum esculentum*), a local delicacy which I no longer have the heart to taste after learning that the plant's invasive. © Aishwarya S Kumar.

"Flawless!" That was my initial impression upon seeing the Chamba Valley. Sprawling green landscapes and trees everywhere – exactly what any layperson would see. However, Sanjay urged us to observe the patterns closely. Gradually, we began to understand how grave the situation is and how cleverly concealed the dangers are. Expansive fields cut through the forests, leaving only sporadic

patches of the latter. Some secondary forests do exist, all dominated by native oak trees *(Quercus leucotricophora*), which delighted me. Then, Sanjay encouraged us to examine the forest floor more closely. A simple Google search for the definition of a forest would lead you to "a large area covered chiefly with trees and undergrowth". But what we noticed here was predominantly oak leaf litter, with very few shrubs or herbs. The forest has been extensively utilized.

Compounding the problem are the prevalent non-native plant species (often referred to as foreign plants), some of which have been identified as invasive in our primary research. What exacerbates the situation is the local dependence on these plants. For instance, *Fagopyrum esculentum* (or 'Phaphru', as it's called in Chambyali, the local dialect) holds cultural significance and is used to make a local delicacy. Noteworthy are the exotic Chir pines (*Pinus roxburghii*), which, due to the haphazardly cut roads, are highly susceptible to landslides. This issue, however, extends beyond plants. I was astonished by the vast number of non-native carps in Khajjiar Lake. Despite signs warning against feeding the fish and imposing fines for rule violations, no one seems to pay heed. Thus, outreach becomes the only solution.

The more time I spend here, the better I understand the landscape. At times, it can be disheartening and leaves me feeling hopeless. However, when I reflect on how far the project has come, and how many locals, including the Pradhan (Chief of the Panchayat), have come to understand the situation and show interest, it serves as a constant source of encouragement. Their consistent support motivates us to keep moving forward and never give up!

Unmethodically cut hill to broaden roads. The Chir pines stand dangling on the edges. The Chir pine on the extreme right could fall anytime. © Aishwarya S Kumar.

From a recent meeting with the Pradhan of the Panchayat. © Trisa Bhattacharjee.

Also, did you notice a pattern in my writing? I intentionally followed one. I understand that ignorance can be bliss, but taking a closer look at anything can reveal a wealth of truth.

Acknowledgments: Sanjay Molur, thank you for always igniting my curiosity and encouraging me to ask questions and think creatively. Your wealth of knowledge and unwavering support always leave me overwhelmed. You make learning so enjoyable! To our project lead, Vishal Ahuja, your support is deeply appreciated. I'd also like to thank my fellow interns for making this journey so eventful. And of course, to the Chambyals, I extend my gratitude and affection!

Aishwarya S. Kumar, Zoo Outreach Organisation / Wildlife Information Liaison Development Society, Coimbatore.

Conservation and Co-existence in the Forests of Chamba

Three months ago, I embarked on my journey as a field intern for the Himalayan Langur Project (HLP) in Chamba, Himachal Pradesh. During my time here, I have had the opportunity to conduct community and bird surveys, study the behavioral ecology of Himalayan langurs, and learn to identify a plethora of native flora species. Being a part of this project has opened many avenues for me as a budding conservationist.

As a recent postgraduate with an MSc in Global Wildlife Health and Conservation from the University of Bristol, I was eager to apply the theoretical knowledge I acquired through my academic studies. My passion lay in being part of a project that prioritized holistic conservation and awareness as key factors in its agenda.

After spending a considerable amount of time in the field, learning, and participating in Zooreach's various HLP initiatives, including outreach programs, perception studies, reforestation programs, and more, I can confidently say that my expectations have been profoundly met.

A Day In My Life: The field station is located in Gajnoi, a remote area approximately 30 km away from Chamba town, where I live with three other interns. The view here is nothing short of breathtaking as we get to marvel at the mountains merging with heavenly clouds painted on a bright, blue sky from our bedroom window. The sounds of cicadas buzzing, birds chirping, and the water streams outside the building have now grown familiar to my ears.

View from the field station taken on my first day here. © Namita Nalamala.

A typical day in my life in Chamba is distinct in its own way. We have various field days planned with separate itineraries, including traveling to the Khajjiar-Kalatop Wildlife Sanctuary, visiting our native plant nursery, and walking or hiking into villages to conduct surveys. No two days are alike. On days with unfavorable weather conditions, such as heavy rainfall, we tend to stay back in the field station and complete our work here instead.

The Chamba Itinerary

Native Plant Nursery: One of the major conservation issues plaguing the forests of Chamba, as in many forests worldwide, is

Native plant nursery located in Dugli. Namita and Shakti working in the field. © Aishwarya S. Kumar.

fragmentation and land degradation, leading to a rise in human-wildlife negative interactions. To address this crisis, Zooreach has initiated a reforestation project by establishing a plant nursery housing several plant species native to Chamba. The nursery is being developed in Dugli, on land leased from Shakti, a nearby farmer.

So far, a total of 12 species have been planted since early February this year. Some of these include European nettle, soapnut, horse chestnut, wild pear, walnuts, and Himalayan cherry.

A typical day for us in the nursery includes creating larger beds, planting dried seed specimens, transferring saplings into bigger bags, clearing up mud and de-weeding.

Behavioral Ecology Studies: We also have weekly visits to the wildlife sanctuary to study the behavior of Himalayan Grey Langurs. At times, we observe groups of them sitting atop the trees, jumping from one to another, and munching on leaves and fruits.

Behavior studies *in situ* always involve an element of uncertainty. There were days when we ventured out into the field hoping to spot at least a single individual, albeit in vain. Conversely, there are random days when we happened to find several groups of langurs swinging and swaying atop the tree branches, much to our joy.

In June, we conducted an annual langur census to estimate the population in the sanctuary. Four surveyors, along with the local forest guards, set out to observe sightings for three days. Unfortunately, we could not find many, as the langurs were likely feeding in farms during this time of the year.

Biodiversity Learning: As someone who struggles with memorizing names (especially scientific ones), taxonomy has never really been my strong suit.However, since my time here, I have been unable to deny the curiosity that bubbles inside me every time I see a new and vibrant plant, bird, or butterfly species. It urges me to stop, ponder, and inquire.Thanks to the knowledge of my supervisor and peers, I have been able to learn and identify a variety of species over time.

Namita Nalamala and P. Kritika observing langur behaviour. © Sanjay Molur.

Pahadi woman carrying fuelwood. © Namita Nalamala.

This has led me to the epiphany that there is a stark difference between learning taxonomy through textbooks in a practical lab versus learning taxonomy in the field, surrounded by living, breathing organisms that make up our biodiversity.

Forest Dependency Surveys: A significant part of my conservation interests lies in creating awareness through understanding the role of local communities as key stakeholders. This includes conducting perception studies targeting the perspectives, reliance, and resilience of local communities toward their environment as a first step.

Through collaboration and assistance from my supervisor, Mr. Vishal Ahuja, my colleagues, and Dr. Sanjay Molur, I designed a forest dependency survey to identify the most consumed forest resources by local people and investigate the extent of their consumption in individual households. I also wanted to identify any potential household determinants that could impact the level of dependency.

An additional component of this survey was to investigate people's perceptions of crop raiding and mitigative strategies, following up on a previous crop raiding study conducted in 2016 in and around the Khajjiar-Kalatop area. Our study site included the 28 villages of Rathiar panchayat in Chamba district. So far, we have completed 23 of these surveys. We are a total of five surveyors led by our supervisor and cover an average of 5–7 km on foot for each village.

Initially, when I started hiking and walking longer distances, I felt rather dejected after discovering how unfit my body was and how difficult it was for me to keep up with my fellow interns. However, with time, continual efforts, and constant support from my team, I have become more acclimated to this terrain and the challenges that come with it.

Himalayan Azure Sapphire spotted at our nursery in Dugli © Namita Nalamala.

Community and Conservation: My Thoughts: Before working on this project, I believed that community engagement is a boon for effective biodiversity conservation and habitat management. Now, I see that it is a necessity.

In my process of conducting this study, I became aware of some of the most vital concepts of community conservation. In particular, the deeply interlinked relationship of local communities with the forest; whose components essentially revolve around the use of forest resources, land degradation, and human-wildlife negative interactions.

Firstly, it should be noted that the main form of occupation here is farming. For certain families, it is their sole source of income. Secondly, the people depend on the forest for two major resources – fuelwood and fodder. Individuals venture out into the forest every day for livestock grazing and collection. They tend to walk in groups to avoid being injured by the Asiatic Black Bears, which inhabit these regions.

We have also come across survivors of bear attacks who have shared their stories and noted a considerable increase in these occurrences over the past few years.

Another major human-wildlife issue here is crop raiding. Rhesus Macaques, Chamba Sacred Langurs, and Asiatic Black Bears are the three most common crop raiders seen every harvest season. The adversities faced by these communities were more than evident through our conversations with them.

From a community perspective, one can see how the rise in wildlife crop raiding and bear attack incidents has directly impacted people's livelihoods and contributed to antagonistic attitudes toward wildlife and conservation.

On the other hand, there is a lack of knowledge and communication on the reasons behind this rise in negative interactions, the ongoing degradation of forest land, and the role of climate change in accelerating these processes. I recall an interview where an individual believed that the reason behind the rise in crop raiding was because the local government chose to release troops of monkeys into the forest. Interviewee's mitigative solutions included species relocation, and in some cases extermination.

The data obtained from these perception studies can help ascertain appropriate conservation actions and mitigative strategies which not only prioritize habitat protection and management but also focus on capacity building through awareness and education, creating alternative sustainable livelihoods, and raising the standard of living for local communities. I believe that at the end of the day, conservation sustenance lies in 'People for Conservation and Conservation for People.

Having the opportunity to experience and grow on a personal and professional level through this internship makes me indebted towards Zooreach, Dr Molur and the team.'

Namita Nalamala, Intern, Himalayan Langur Project, Chamba, Himachal Pradesh.

Perception about perception studies and biodiversity in Chamba, Himachal Pradesh

Chamba, in Himachal Pradesh is a district that lies in the heart of Himalayas. The 6522 sq. kms. hold the very urban environment and also harbours the remote villages. The district has an elevation from 2000 to 2100 feet with totally a mountainous landscape. Chamba has a special place in my heart as it is extensively beautiful. I started as an intern with Zoo Outreach Organisation in Chamba district from the month of July, still now the journey is very interesting. We are a team of 4 members – Arunima Sengupta, Namita Nalamala, P. Kritika, Aishwariya S. Kumar, guided by our supervisor Vishal, working to try on bridging the gaps in conservation in this different landscape. Our field station is not in main town of Chamba, but a bit away from all the hustle- bustles of the town, in Gajnoi. It is a small picturesque village on the Chamba- Dalhousie Road, surrounded all by the mountains and clouds, a number of other villages and a box full pacifying silence.

Our team is mainly working on

- Perception studies on people of Rathiar Panchayat (a panchayat of Chamba district) about the forest dependency and the farming;
- Maintaining a nursery of indigenous plants looking forward to minimize the human – black bear conflicts;
- Reforestation of native plant species in the area (from the nursery);
- Observing Bird and Butterfly diversity of the area (Rathiar Panchayat and Khajjiar Kalatop Wildlife Sanctuary);

A snapshot of house in Rakhela village (Rathair Panchayat). © Arunima Sengupta.

Picture showing landscape of village in the Panchayat. © Arunima Sengupta.

A maize farm. © Arunima Sengupta.

A cowshed in a house (surveyed). © Arunima Sengupta.

An ongoing survey in a village. © P Kritika.

Woman carrying wood from the forests and nearby areas. © Arunima Sengupta.

Kaniska Canace Butterfly. © Arunima Sengupta.

- Study of invasive plants in Khajjiar Kalatop Wildlife Sanctuary;
- Studying the behaviour of Himalayan Langur or Chamba Sacred Langur (*Semnopithecus ajax*);
- Monthly carrying out outreach programs with the community here and the self-help groups.

I am personally very interested in bird and butterfly diversity and the perception studies. We all together carry out the tasks mentioned above, which saves time, increases the efficiency and also enlightens us with the different perspectives we all hold in any matter and it also makes us easier to learn to take decisions in any field.

Perception Study:

The perception study is mainly being conducted in the Rathiar Panchayat of the Chamba district. We are looking on how people are dependent on the forests from their kitchen to their livelihoods; how is factor like wildlife (mainly the black bear – human conflict) is affecting their farming and forest dependency.

From all these data we are trying to figure out what can be the mitigating measures for the problems they are facing and also how to protect the naive wildlife and also the community here. The lives of the people here flow on very thin yet smooth flow of demands. They are mostly in farming, though some people have other occupations. They mainly plant maize as their major crop. Some people plants vegetables like potatoes, beans, chilli, radish, etc. Maize is called as the golden grain of Himachal Pradesh. It grows well in al most all soils from sandy to loamy and needs a proper drainage. The terrace farming and the

Some of the birds and butterflies observed here are listed below:

Birds	Butterflies	Moths
Slaty-headed Parakeet	Chocolate Pansy	Atlas Moth
Gray Treepie	Indian Cabbage White	Luna Moth
Yellow-billed Blue-Magpie	Common Peacock	Tiger Moth
Rock Pigeon	Lemon Pansy	Buff Ermine Moth
Common Myna	Spangle Butterfly	Cyana
Oriental Turtle-Dove	Common Windmill	Erebidae
Spotted Dove	Kaniska Canace	Arctiinae
Egyptian Vulture	Sorrel Sapphire	Geometridae
Himalayan Griffon	Snowflats	*Macrobrochis* sp.
Black Kite	Common Mapwing	*Lymantria* sp.
Great Barbet	Spotted Rustic	*Toccolosida* sp.
Himalayan Woodpecker	Common Nawab	
Eurasian Jay	Indian Tortoiseshell	
Blue Whistling-Thrush	Tree browns	
Gray-winged Blackbird	Other Swallowtails	
Large-billed Crow	Other whites and yellows	
Spotted Forktail	Other Blues and Coppers	
Himalayan Bulbul	Wall browns	
Black Bulbul	Coppers and blues	
Barn Swallow		
Streaked Laughingthrush		
Rusty-cheeked Scimitar Babbler		
Yellow-breasted Greenfinch		

N.B – Many of the birds, butterflies and moth are mentioned in their family or genus names, as they are yet to be identified and confirmed.

Chamba Sacred Langur. © Arunima Sengupta.

Indian Tortoiseshell Butterfly. © Arunima Sengupta.

Common Mapwing Butterfly. © Arunima Sengupta.

Barn Swallow. © Arunima Sengupta.

slanting hills facilitated the crop's growth. But on the other hand, the maize is one of the most preferred foods for the Black Bear, Langurs and Rhesus Macaques and also many birds. So, these people despite of having low income and putting much efforts, suffer a heavy loss due to these raids. But also, we are seeing and facing the consequences of the forest cover loss globally, the scenario is not much different here too. The wild animal's habitats and foods are lost and they are forced to raid the lands, which has increased much in the recent years.

A question might peep into our mind that if they suffer such loss why do they grow maize only? There are several answers to this- I am trying to put some of them we got from the perception survey:

- They have tried growing something else, but most crops are not very easily grown in this landscape;
- The uncertain rainfall has forced some people to grow maize over paddy and also the drainage of the farms is good, so both less rainfall and more rainfall conditions would not affect the maize production as it would affect the other crops. Maize needs 1200 lts of water for sowing while rice needs 3400 lts;
- The drastic changes in temperatures have also affected the wheat production in Himachal, forcing them to grow maize again;
- The improved yield varieties of maize +-are also excellent adaptors and climate-resilient;
- The Mehla Block has been declared as a backward block by the government, under which falls the Rathiar Panchayat. In some of the villages like Sau, many people shifted from agriculture and farming to other occupations of daily wages, because the village is on the road side and has an easy access of communication. Many villages have little people as they are suffering from the emigration issues. The world is loud and vocal over one issue in the recent decades, which is not an exception – the gender inequality. The Indian Himalayan Region has been facing this issue for long. The females of the family raise their kids, go to the forest for woods and fodder and also are a main part of the farming. I would always like to address this issue to bring a balance in a holistic approach.

Also, the women here are married off within an average of 21- 25 years and do not pursue higher studies. There is no blame game to be played here. There are a lot of factors that can be the reason for this kind of situation like – the

A discussion with team in the Nursery. © Trisha Bhattacharjee.

economic status, accessibility to communication and facilities, less knowledge about education and its processes, employment and many. I feel this is a grave problem, because education is the weapon that can change the perspective of a person in a positive way. This landscape is very different, from having steep slopes to landslides, uncertain rainfall, fluctuating temperatures, gender inequality, problems of emigration, etc. In order to mitigate any of these issues or human-wildlife conflict, reforestation or any other conservation related problems there is no other way but to involve the communities. It would be difficult to mitigate these until and unless people are educated about these. The outreach programs should be organised more frequently to make people accustomed with the problems, concepts and mitigation ideas.

The district has lush green forest to gushing Ravi rivers. The climate of the district varies from semi-tropical to semi-arctic, so many migratory birds too visit the area. Gajnoi in the district has villages as well as forests and also holds the main Chamba – Dalhousie Road. A variety of birds are seen here from the raptors to the warblers. The secluded places are flooded with their calls and they add a pomp to the places. The bright butterflies take my soul on their wings. We have noticed a large number moths in the nights flying seamlessly loving the darkness.

Apart from all the avian or arthropod fauna observed, there a lot of other taxa can be observed here like mammals (the Chamba Sacred Langurs, Rhesus Macaque, Barking Deer (in Khajjiar-Kalatop Wildlife Sanctuary)), amphibians, reptiles, etc.

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Arunima Sengupta, Intern, Himalayan Langur Project, Chamba, Himachal Pradesh.

A case of mummification in Indian Flying Fox

Mummification is exceptional in monotocous species like sheep, goat and cattle, often observed in polytocous species like swine, bitch and cat wherein single or multiple fetuses can undergo mummification without much effect on developing fetuses (Roberts 2004). Mummification can be manifested as papyraceous type with dry, stiff feto-placental unit without any exudates as reported in dogs, cats, cattle, buffalo, and sharks (Barder 1996; Windsor 2016) or can be haematic or chocolate type characterized by presence of viscous adhesive material over fetal mummy perceived in cattle, buffalo, and dogs (Sandoval-Castillo & Villavicencio-Garayzar 2008).. The present case put on a record of mummification in the Indian Flying Fox *Pteropus medius* in the wild.

Female Indian Flying Fox *Pteropus medius* with mummified fetus. © Pranav Vaghashiya.

Dry mummified fetus having chocolate colour. © Pranav Vaghashiya.

The Indian flying fox is a polygynandrous species, and breeds yearly from July to October. Births occur from February to May. Gestation period is typically 140–150 days. The average birth number is 1 to 2 pups (Nowak 1990). Among members of the genus *Pteropus*, pups are carried by the mother for the first few weeks of life, with weaning occurring around five months of age. Males do not participate in parental care. Young bats learn to fly at approximately 11 weeks of age. Reproductive maturity occurs at 18–24 months (Nowak 1990).

Junagadh Agriculture University campus has a large communal roosting colony of Indian Flying Fox *Pteropus medius*. Here, an adult female fruit bat was rescued from

a residential area located in the outskirts of Junagadh City, Gujarat, India, on 10 February 2019 by a volunteer of Vasundhara Nature Club. The animal was unable to fly and was hanging in its natural position outside of a window. Fruits and honey juice slurry was offered to animal with tube feeding. Next morning on 11 February animal expulsed a dead mummified fetus. The fetus was dry and had dark chocolate colour. By the evening the animal also died.

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First record of the boxer mantis *Hestiasula brunneriana* in Assam, India

The Mantis species *Hestiasula brunneriana* Saussure 1871, is found almost all over the Indian sub-continent including the neighbouring countries- Bangladesh, Nepal, Pakistan, and Sri Lanka (Schwarz & Shcherbakov 2017). In India, it is known from the states of Andhra Pradesh, Bihar, Goa, Kerala, Maharashtra, Meghalaya, Odisha, and West Bengal (Mukherjee et al. 1995; Ghate et al. 2019). A detailed morphological description of the male and female specimen of this species has been provided with illustrations by Ghate et al 2001. The biology of the species has been described by Ahmad et al. (1985) for the first time from India.

This species was first recorded at Rani in Kamrup District of Assam, during 2018. Subsequently it was observed in same areas till

Nymph of *Hestiasula brunneriana* displaying the fore femoral pattern. © Sachin Ranade.

Freshly emerged Adult *Hestiasula brunneriana* with last moult. © Sachin Ranade.

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2021 confirming the stable population. In June 2018 two nymphs were sighted. The male was bright brown coloured while the female individual was darker. Both these nymphs were observed and their final moulting was noted. The male moulted into an adult on 4 July and female on 12 July 2018. The favoured habitat of the nymphs was branches of the broad-leaved trees-*Gmelina arborea* and *Mallotus paniculatus*.

Generally, the members of the genus *Hestiasula* are known as Boxer Mantis due to the movements of their forelegs for threat display and/or communication (Schwarz & Shcherbakov 2017). This behaviour not only attracts its conspecific but also photographers, amateur biologists and entomologists. Earlier recorded from only a few states in India, this species has now been reported from additional five states within a decade—Maharashtra (Ghate et al. 2001), Kerala (Vyjayandi 2007), Odisha (Sureshan et al. 2007), Bihar (Sureshan & Sambath 2009), and Goa (Vyjayandi et al. 2010).

This could be the result of increased use of the photographic records in scientific publications; for example, 23 new records of mantids were described with photographic evidences recently (Mukherjee et al. 2017).

The colour pattern on the inner surface of the forefemur is species specific in the genus *Hestiasula*, although a slight variation has been recorded in *H. brunneriana* such as presence or absence of a small black spot at the midportion of forefemur (Mukherjee et al. 1995; Schwarz & Shcherbakov 2017). In the specimen photographed from Assam, the black spot is clearly visible. The specimens were not collected. This photographic record of the species is the first record in the state of Assam in India.

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Predation of a whip scorpion by a Pantropical Huntsman Spider

The Sparassid genus *Heteropoda* Latreille, 1804 is a highly speciose group of large, nocturnal and cursorial huntsman spiders, currently comprising of 189 recognized species (World Spider Catalog 2023), most of which are non-web building ambush predators specialized in incapacitating their prey through envenomation (Turner 2010; Zhang et al. 2015).

An adult *Heteropoda venatoria* feeding on a whip scorpion. © Aditya Karmakar.

They are exclusively distributed throughout tropical Asia as well as Australia with the exception of the cosmopolitan/ cosmotropical *H. venatoria* (Linnaeus 1767) (Edwards 1979; Sethi & Tikader 1988) which is known to feed on a wide range of invertebrates ranging from cockroaches to other arthropods as well as scorpions and even smaller vertebrates including frogs,

The same adult Whip scorpion that was dropped by the spider after consuming the body fluids from its cephalothorax region. © Aditya Karmakar.

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tadpoles, lizards (particularly geckos) and occasionally bats (Bhattacharya 1941; Shukla & Lele 2008; Quah et al. 2022).

Moreover, apart from their large body size, these arachnids can surprisingly fit into small crevices due to their flattened body structure, enabling them to adapt frequently in and around human habitations, houses, barns, sheds, under boards on the ground and in other sheltered areas (Edwards 1979). Herein, we report an observation of predation by a Pantropical Huntsman Spider *Heteropoda venatoria* on a whip scorpion from Tripura, northeastern India.

On 11 September 2019 in Udaipur, Chanban, Tripura (23.5366 N, 91.4854 E), at around 2000 h, we sighted a Huntsman Spider *Heteropoda venatoria*, measuring approximately 11 cm in length including leg span, having no emboli on pedipalps, indicating the specimen to be a female which was identified using Mondal et al. (2020) clinging to a tin wall as it was feeding on a partially moving whip scorpion (*Labochirus* sp.) (approx. 5 cm in length).

Upon closer observation, we found that the spider was sucking the body fluids from the cephalothorax region of its prey, leaving behind the opisthosoma (abdominal portion which contains strong acetic acid glands) and eventually dropped it about 10 minutes later.

The fact that these hunstman spiders feed on other arachnids in particular does not stand out or sound peculiar compared to its ability to take down larger vertebrate prey. But novel observations like these help us to understand the dietary ecology of the species, since very limited natural history records are available for the members of the genus *Heteropoda* (Zhang et al. 2015).

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Distribution of hoverfly *Eupeodes corollae* from eastern India: new record from the states of Assam and Odisha

Hoverflies are dipteran insects under the family Syrphidae. From a taxonomic prospect, they share the common characteristic of possessing a spurious vein (unattached longitudinal vein) in the wing that bisects the radio-medial cross veins, cell cup closed near the margin of the wing, apex of vein R_{4+5} makes a C-shape, vein M strongly bends near the wing margin to end in vein R_{4+5} forming an apical crossvein, body generally with yellow or orange markings (Vockeroth & Thompson 1987). Hoverflies have pronounced ecological importance in terms of the spectrum of services it provides, which includes both pollination and predation, by virtue of which it influences the floral and faunal composition of its habitat (Jiang et al. 2022). The species *Eupeodes* (*Metasyrphus*) *corollae* (Fabricius 1794) under the subfamily Syrphinae, tribe Syrphini, is distributed in Afghanistan, Africa, Bhutan, China, Germany, Japan, Pakistan and Europe (as a whole). The Indian distribution of the species includes Arunachal Pradesh, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Punjab, Uttarakhand, and West Bengal, mainly covering the northern and northeastern parts of India (Dorji et al. 2023; Shah et al. 2014). *Eupeodes corollae* is known to predate on different aphid species including *Aphis craccivora*, *Brevicoryne brassicae*, *Myzus persicae*, *Rhopalosiphum padi* and *Schizaphis graminum*, which holds great ecological importance in terms of modulating the dynamics of

Field image of *Eupeodes* (*Metasyrphus*) *corollae* (Fabricius, 1794) (♀), 02 March 2023. © Arnob Chakrovorty.

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Table 1. Sampling sites along with their GPS location, elevation and vegetation patterns.

	Sampling Site	Latitude / Longitude	Altitude	Vegetation pattern
Assam				
1	Guwahati Railway station	26.1828 N, 91.7498 E	77 m	Highly metropolitan area with high anthropogenic disturbances. Very scanty vegetation.
Meghalaya				
2	North Eastern Hill University campus	25.6110 N, 91.8976 E	1,445 m	High altitude area with conifer type vegetation. Mainly dominated by pine trees.
3	Nohkalikai Waterfall, Cherrapunji	25.2723 N, 91.6905 E	1,456 m	High altitude grassland vegetation, along with bread patches of small shrubs of moderate height.
4	Seven Sisters Waterfall, Nohsngithiang	25.2452 N, 91.7376 E	1,201 m	High anthropogenic disturbance. Tropical montane grassland and shrubland.
Odisha				
5	Midubanda Waterfall, Daringbadi	19.8041 N, 84.0709 E	855 m	Tropical forest adjacent to a waterfall.

Map showing the sampling sites for the study on *Eupeodes* (*Metasyrphus*) *corollae*.

the entomofaunal community (Jiang et al. 2023; Mushtaq et al. 2023).

During two successive field surveys one from Assam to Meghalaya (March 2023) and another in Odisha (July 2023), this species was recorded, which accounts to be the first record of this species from the state of Assam and Odisha (Table 1). Two voucher specimens were collected and deposited to the entomological collection of the Department of Zoology, University of Kalyani (SYPEco2023/27ii/73) and iForNature – Nature Club educational collection (S2548). Rest of the specimens were briefly captured to observe and note the necessary taxonomic characters using a high-power field microscope (Weswox Stereoscopic Binocular Microscope STM-64) and was released thereafter. A total of 13 specimens were observed. Field images were captured by SONY alpha-58 (SLT-A58) camera with Sony 55–200mm f/4-5.6 SAM DT

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Lens. Images were further processed using the Hayear IC Measure Software. Measurements were calibrated using Erma Stage Micrometer (1mm–100 divisions) Model- Galaxy SMM101 (Erma Inc., Yushima, Bunkyo-ku, Tokyo, Japan) (Limsopatham et al. 2021; Chakrovorty et al. 2023). N = 13; ♀ = 8, ♂ = 5; Total Body Length = 8 ± 0.37mm; Wing Length = 6.5 ± 0.15mm.

Material Examined: 1♀, Guwahati Railway Station, Paltan Bazaar, Guwahati, Assam 781001, India, (26.1828 N, 91.7498 E), 27.ii.2023, A. Chakrovorty; 1♂, Midubanda Waterfall, Daringbadi, Odisha 762104, INDIA (19.8041 N, 84.0709 E), 09.vii.2023, A. Chakrovorty.

The taxonomic identification of the species was done based on the following characters: anterior crossvein before midportion of discal cell and downward loop on 3rd longitudinal vein missing (Syrphinae); Posterior margin of scutellum smooth, denticulation absent, scutellum covers tergite 1, antenna porrect and not drooping, abdomen slender (Syrphini); Abdomen longer than thorax, 3rd vein almost straight, abdomen with three pairs of well separated elongated nearly ovoid yellow spots reaching side margins, scutellum with pale hairs (*Eupeodes*); black area on frons reaching 1/3 to 1/4 of the distance between the base of antennae and the ocellus, missing the Y-shaped marking *E. corollae*.

This study documents the distribution of *Eupeodes* (*Metasyrphus*) *corollae* (Fabricius, 1794) from the state of Assam and Odisha for the first time. Assam falls under the general distributional range of the species in India but more importantly, the presence of the species in Odisha highlights a significant range extension of the species. This study critically highlights the importance of opportunistic entomofaunal sampling that can provide us with valuable data of great scientific relevance (Chakrovorty et al. 2020, 2023).

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The Brown-breasted Flycatcher in Assam, with a recent record from Lakhimpur District

The Brown-breasted Flycatcher *Muscicapa muttui* is distributed in northeastern India, central & southern China, northwestern Thailand, northern Vietnam, and probably also in northern & eastern Myanmar; non-breeding in southwestern India (south from Goa), and Sri Lanka (Clement 2020). In the Indian subcontinent, it breeds in northeastern India, winters in southwestern India and Sri Lanka (Grimmett et al. 2016).

Brown-breasted Flycatcher *Muscicapa muttui* at Kakoi Reserve Forest. © Jigyas Boruah.

The habitat of the Brown-breasted Flycatcher is dense thickets in broadleaf evergreen forest and also along the forest river banks in Sri Lanka. It is found between 1,200 m and 1,645 m, usually below 1,400 m in northwestern Thailand and non-breeding quarters at 150–500 m (Grimmett et al. 2011; Clement 2020).

Kakoi Reserve Forest (27.314–93.985 N & 93.985–94.158 E) is an evergreen forest in the foothills of Arunachal Pradesh occupying an area of 4,415.03 ha (Saikia & Saikia 2020). It is located in Lakhimpur District, Assam, and is around 22 km from North Lakhimpur town. The reserve forest hosts a rich biodiversity, but till now no effective study to assess the biodiversity has been done.

On 25 June 2020 at around 0800 h, the authors observed a small flycatcher-like bird perching on a branch of a tree at the height of around 2.5 m near a stream. Though it was a rainy day and the lighting conditions were not suitable for photography, somehow we managed to get some clicks for further identification.

The bird was about 13–14 cm olive brown with a large head, large eye, and broad eye ring. The colour of the crown and forehead was slightly darker. Broad buffish to whitish eye rings with greyish cheek and distinct whitish sub-moustachial stripe. The chin and throat of the bird were whitish, more pronounced brown or grey-

brown breast band and warmer brownish-buff flanks. The bill was larger than the Asian Brown Flycatcher *Musicapa dauurica* with an entirely pale lower mandible (Grimmett et al. 2011; Clement 2020). Therefore, we confirmed that the small flycatcher-like bird was a Brown-breasted Flycatcher *Musicapa muttui*.

Since this species is a passage migrant to the north-east in summer, the occurrence of the species in the Kakoi Reserved Forest is a sign of healthy habitat. According to the eBird range map, the Brown-breasted Flycatcher has been reported in different parts of India as well as from Assam but there is not any previously published report of the species from the Kakoi Reserve Forest making this the first report for the district.

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First record of brown colour aberration in Red-Vented Bulbul from Assam

Numerous animal species are widely recognized to exhibit hereditary colour anomalies, including albinism and leucism (Dutta et al. 2021), especially in birds. Plumage colouration generally arises from a combination of biological pigments (biochromes), structural colour, or sometimes a blend of both factors. Melanins and carotenoids, being the two primary pigments, play a decisive role in determining the plumage colour of birds. van Grouw (2013) stated that the prevalent heritable aberrations observed in wild birds encompass a range of characteristics, including albinism, leucism, brown mutations, dilution and melanism. Identifying color mutations in natural settings can pose considerable challenges, often proving to be exceedingly difficult and not always possible (Mahabal et al. 2016).

Red-vented Bulbuls *Pycnonotus cafer* from Kamrup, Assam, India. © Ritu Kalita.

In India, few documented cases of 'brown' colour aberration or their genetics has been reported. Those records are Soni (1992), Joshua (1996), Pande et al. (2003), Ghose & Khan (2005), and Mestri et al. (2011), but not in Red-vented Bulbul *Pycnonotus cafer* from Assam, India.

During a bird survey conducted on 27 April 2023, at Saru Tezpur Village (26.0786 N, 91.4654 E) of Kamrup District, Assam, a remarkable sighting took place. At approximately 1540 h, a pair of Red-vented

Bulbuls *Pycnonotus cafer* was observed resting near a paddy field. Upon capturing photographs of the pair, it became evident that one of the individuals exhibited extraordinary body colouration. The typically brown colouration on the black parts and the white colouration on the brown parts, together with the normally colored eyes and beak, indicate that this is a 'brown' type of colour aberration.

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Exploring the Biodiversity of Nilgiri Biosphere Nature Park: A Day of Discovery and Awareness

It definitely was going to be one adventurous weekend for me. I woke up with a lot of excitement, dreaming about exploring the wonders of nature. I went along with the Zoo Outreach team to the Nilgiri Biosphere Nature Park along with the Bosch team.

The team.

We set out at 11:30 am for our nature walk. I had a desire to spot some animals and birds that day. As we walked through the gate, we saw a fern palm- Gymnosperm. It is called the 'Relic of Nature'. As we wandered deeper inside, we sighted a wide variety of trees. Our mentor Sanjay explained us about native trees. Native trees are plants that occur naturally and has not been introduced by man.

Sanjay talking to us about the history of the Nilgiri Biosphere Nature Park before the trail

It was fascinating to know that native plants sequester more carbon than invasive species, plants that have been introduced and are not present naturally. He also brought to our awareness that the food we consume on a regular basis like Indian almond, coconut etc are non-native species. For example, tamarind, the souring agent we use in our daily meals is also an invasive species that replaced our native souring agent Kokum. It took me some time to take up this fact because tamarind has

Sanjay and me discussing about the Nilgiri Biosphere Nature Park.

Treasures collected during my nature trail.

already established its dominance in our kitchen today and I have tasted kokum juice only once in a far remote village.

As we continued walking through the trail, we spotted a Rose wood about 200 years old which could live up to 1500 years. We delved deeper into our nature walk and stumbled upon fascinating facts.

Surprisingly, some cacti, originally native to Mexico, now thrive abundantly across India. Our observations led us to discover stingless bees nestled in the branches of the *Bombax cieba* tree, and we learned that the *Terminalia arjuna* tree always prefers to grow near water bodies. We also got to know that there are a lot of endemic trees (found only in that particular region) to the Nilgiri Biosphere, but sadly a lot of them are already taken over by invasive species thus leading to the threatened status of native species.

To conclude, I collected a lot of treasures like fallen seeds, golden leaves, and feathers. I also gathered a lot of knowledge about native forests and ended my day wondering to create an awareness and impact on all others around me.

Advaith Kaushik, Class 9, Yellow Train School, Coimbatore.

Scales, tails, and everything in between - recounting the Squamate Taxonomy Workshop

With a pleasant atmosphere around, often resonating with the croaks of the Common Indian Toads *Duttaphrynus melanostictus*, a three-day Workshop on the Squamata Taxonomy was held from 05–07 September 2023. The workshop was organized in the research collections Museum of NCBS (National Centre for Biological Sciences).

Dr. Tarun Karmakar showing the participants different collections in the NCBS Museum. © Harshil Patel.

Day 1 of the workshop began with a quick introduction session with the participants, the resource persons including Dr. Ishan Agarwal and Dr. Harshil Patel, and the organizers including Dr. H.M. Yeshwanth and Dr. Tarun Karmakar introducing themselves to everyone. It was really astounding to meet and greet the participants from diverse backgrounds.

Dr. Harshil Patel explaining how to morphologically identify different lizards. © Tarun Karmakar.

Following the introduction session, Ishan Agarwal began with the quick sessions on 'introduction to taxonomy' and 'ICZN' – International Code for Zoological Nomenclature. One of the 'never thought of that!' moments for me was when Ishan mentioned that 'species are hypotheses', which meant a species described today may considered invalid tomorrow if sufficient evidences are provided. This session also gave important insights on the importance of 'collection-based research' and the need of integrative taxonomy which utilizes multiple and independent sources of morphological, genetic, and ecological data to delimit the species.

Harshil Patel explaining the dentition of snakes. © Tarun Karmakar.

Participants identifying different Lizard specimens using dichotomous keys. © Tarun Karmakar.

Following this, we were introduced to the Indian squamate diversity, which consists mainly of lizards and snakes. It was interesting to learn that the number of Indian lizard species described increased during 2010–2020, and more than 75 species have been described since 2020. Following this, we got to know the different lizard families in India.

Some of the genus names such as *Sitana* and *Sarada* sounded really catchy. It was also interesting to know that in the family Chamaeleonidae, a single species—*Chamaeleo zeylanicus*—distributed across arid and semi-arid parts of India, and also in Africa. Following the lizards, we got to know the different families of Indian snakes and their typical characters.

The afternoon session began with Ishan explaining to us on why and how to collect and preserve the specimens, the dos and don'ts, and the ethics to be followed. Following this, we were taken on a tour of the research collections guided by Tarun, who showed us around the dry, wet, and tissue sample storage. We were also told about the voucher number and its importance. An important tip Tarun gave us was to ensure that we distributedly depositing our collections in different museums, so that in case something happens, at least the other specimens in the other museums would be available. It was a treat for the eyes when Tarun showed us the entomological collections. I just can't appreciate enough the amount of care and effort that goes into making such collections.

Day 2 began with Ishan explaining us about the cryptic species, with different case studies of Indian lizards. One major example here was the species complex of The Kollegal Ground Gecko *Cyrtodactylus (Geckoella) collegalensis*, on how previously it was thought as to be a

Participants identifying different snake specimens using dichotomous keys. © Tarun Karmakar.

single species, and the work that Ishan and others have done in delimiting the species. The other two examples were about the species delimitation work carried on *Cnemaspis* in the Shevaroy landscapes of Tamil Nadu and the *Hemphyllodactylus* in the sky islands of peninsular India.

The afternoon session began with Harshil explaining us on how to morphologically identify the lizards by looking at different features such as scales, eyelids, lamellae, and femoral pores. Following this, we given the preserved specimens to handle, observe the characters using the dichotomous keys provided and identify the given lizards. I really enjoyed this moment of looking carefully and in depth into each character of the lizard to identify it. Every time we couldn't figure out something, Harshil would patiently explain us. We also learnt how to take different morphometric measurements. It felt amazing to hold the specimen and look in detail each of its character while trying to identify it.

Day 3 began with Harshil explaining us in detail on how to identify snakes morphologically through scalation, and looking other features such as hemipenis, and dentition when scalation is not enough. Following this, we were given preserved specimens of different snakes and were asked to identify them using the dichotomous keys. Being a person who has hardly touched or handled any snakes, it was an indescribable experience holding a snake in the hand while trying to observe different features.

In the afternoon, we had the final session with Ishan giving us an overview of the biogeography of the Indian herpertofauna. It's incredible how biogeography of groups such as *Cyrtodactylus* tracks mountain uplift, while that of the caecilian *Gegeneophis* reveals so much about the ancient wet zone fragmentation. Similarly, the studies on *Ophisops* from grassy biomes and the *Cnemaspis* from the Mysore Plateau makes anyone wonder on how much there is to uncover when it comes to the herpetofauna of India. After ensuring that everyone had adequately identified the snake specimens, the workshop was wrapped up.

These three days of the workshop were one of the best experiences I've ever had in my life, thanks to different factors such as meeting new people, and hands on experience with the morphological identification of lizards and snakes. Even now I recall how patiently Harshil would explain us things even after being asked a dozen times.

Group photograph.

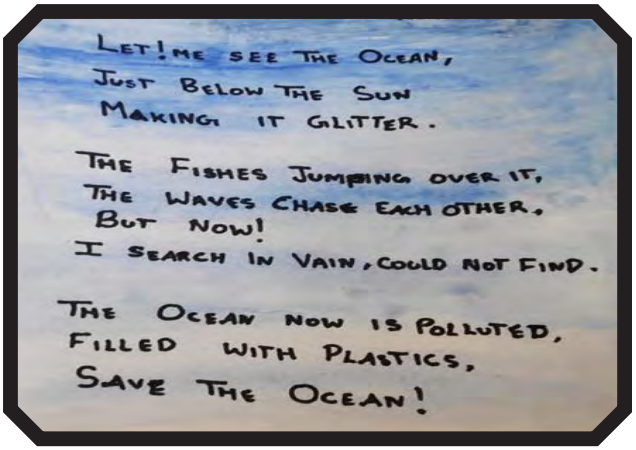
Acknowledgements

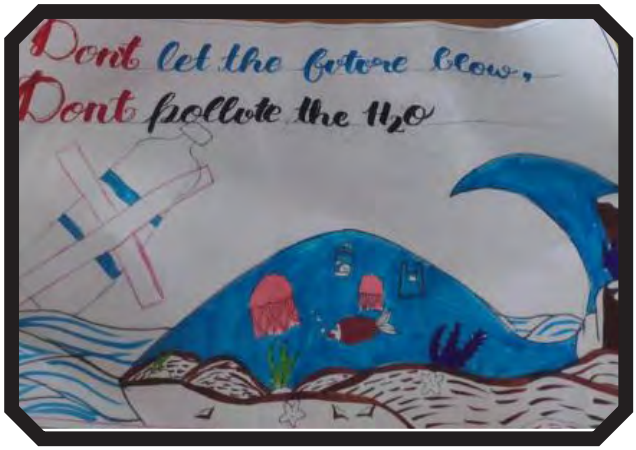
I would like to thank Thackeray Wildlife Foundation for organizing the workshop, Dr. Ishan Agarwal and Dr. Harshil Patel for being amazing resource persons, and Dr. Tarun Karmakar and Dr. Yeshwant H.M for their help at different stages.

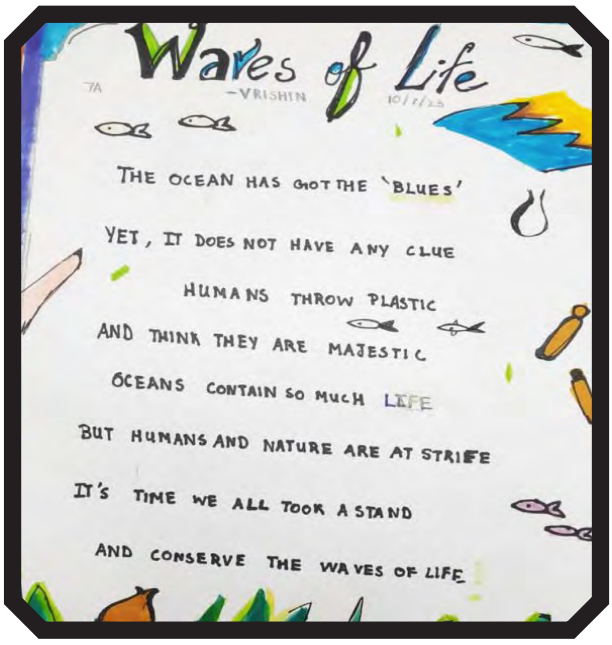
Melito Pinto, Wildlife Information Liaison Development Society, Coimbatore.

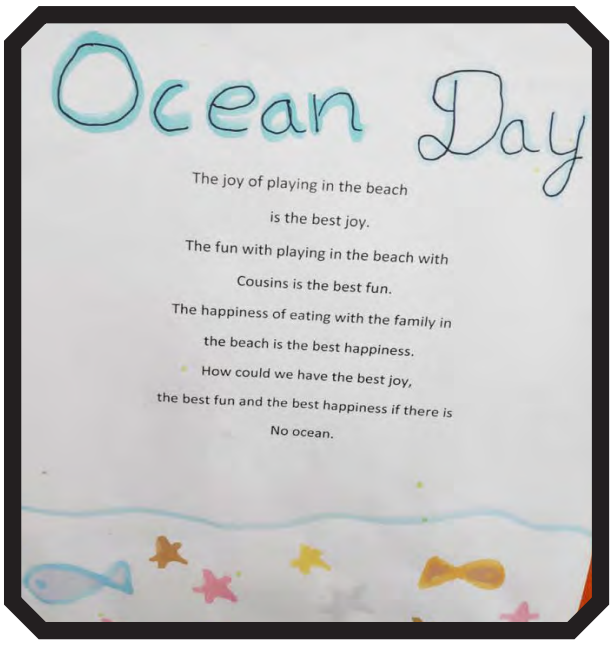
TALES OF OCEAN BY STUDENTS OF CS ACADEMY

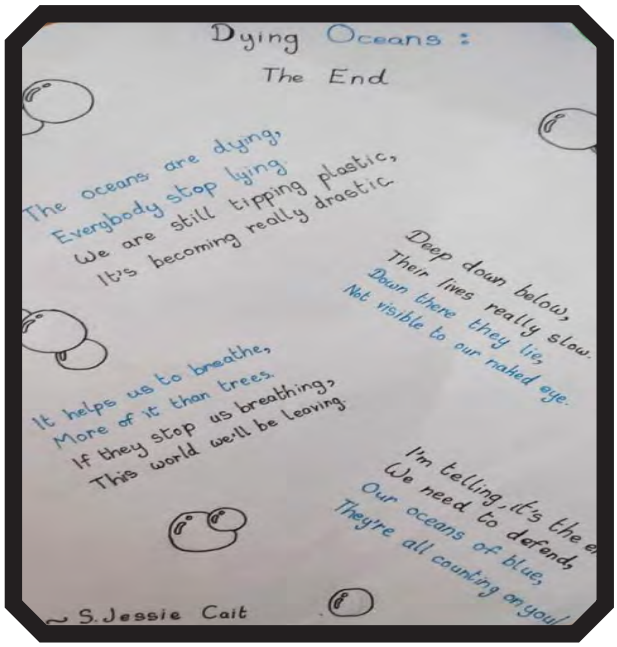
The tales of ocean created by students in grades 7A and 7B of CS Academy as part of the 1OCEAN initiative, a program that covers sustainable fishing, bycatch reduction, the study of shark and ray behaviours, marine preservation, and ocean education, demonstrate their commitment to advocating for ocean conservation. The teacher's objective for this activity was to increase vocabulary, descriptive writing, fact checking in reporting among the students. The lesson objective related to 1OCEAN was for students to craft a story, poem, article, or essay centred around a theme related to the ocean that they were passionate about or wished to raise awareness about. Below, we showcase a selection of these posters.

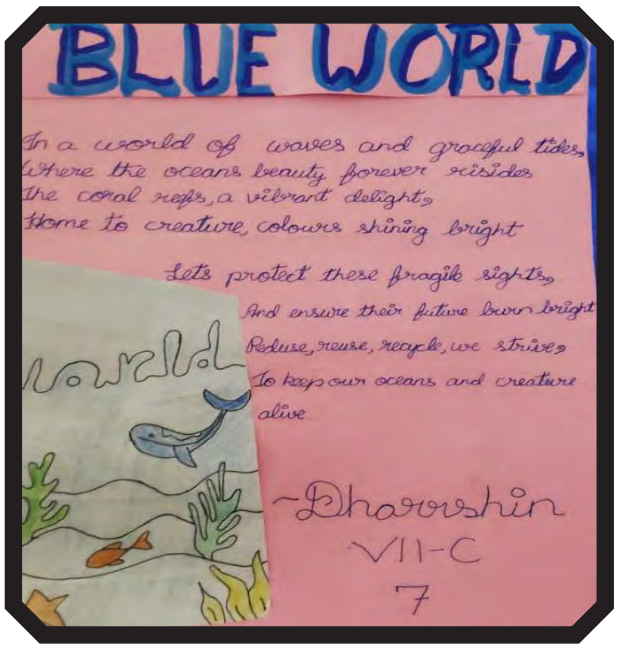








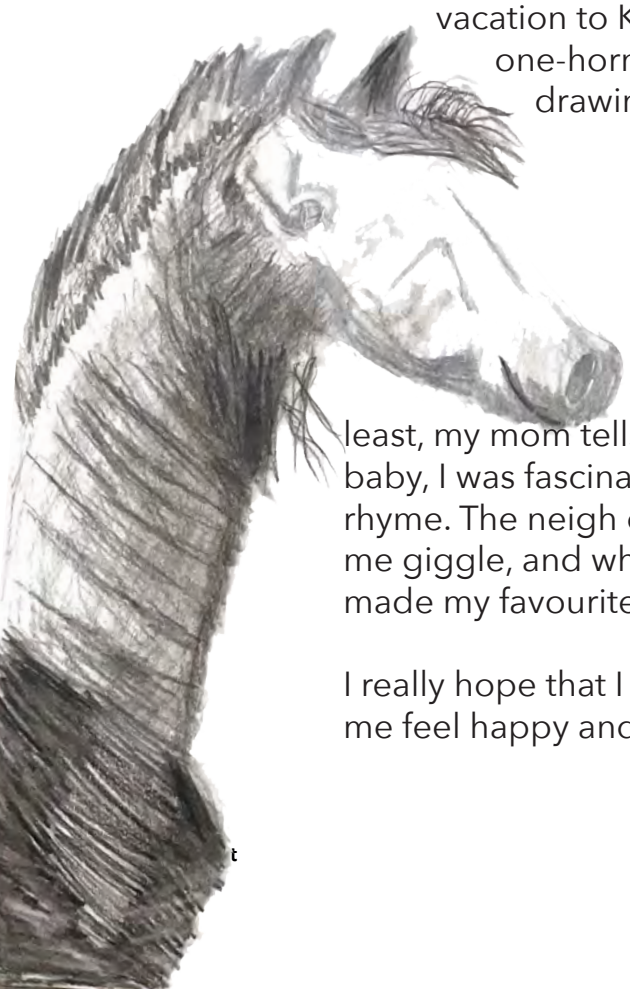




Among the creative work of the students involved in the 1OCEAN initiative, a particularly enchanting aspect was the poetry they composed. These young poets conveyed their sentiments and insights about the ocean. These poems not only showcased their artistic talents but also served as a poignant reminder of the need to protect and preserve our oceans for generations to come. In this fusion of literature and art, the students' poetic voices echoed the urgency of the ocean conservation cause.

Hey there! I am Avyukta Deka, a 3rd grader from Valistus International School, Bengaluru, who absolutely loves drawing and painting. I am always excited to bring amazing wildlife to life through my drawings.

The inspiration behind creating this artwork are as follows. Simba from the movie "The Lion King" inspired me to sketch a kind lion but a powerful leader who has special abilities like a wizard in the Harry Potter universe. My family vacation to Kaziranga National Park amazed me how fast the Great one-horned rhinoceros is and turned my adventure into the drawing.



Ceaser a chimpanzee, from the movie, "The rise of the planet of the apes," gained human like intelligence and made his way through my heart to the paper. Last but not the least, my mom tells me that since I was a baby, I was fascinated by the old Macdonald rhyme. The neigh of the horse always made me giggle, and when I got an opportunity, I made my favourite farm animal

I really hope that I keep drawing as it makes me feel happy and it's super fun.

Avyukta Deka

ZOO'S PRINT

Communicating science for conservation

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We welcome articles from the conservation community of all SAARC countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and other tropical countries if relevant to SAARC countries' problems and potential.

Type — Articles of semi-scientific or technical nature. News, notes, announcements of interest to conservation community and personal opinion pieces.

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Case reports: case studies or notes, short factual reports and descriptions.

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Cartoons, puzzles, crossword and stories

Subject matter: Captive breeding, (wild) animal husbandry and management, wildlife management, field notes, conservation biology, population dynamics, population genetics, conservation education and interpretation, wild animal welfare, conservation of flora, natural history and history of zoos. Articles on rare breeds of domestic animals are also considered.

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