# ZOO'S PRINT

Communicating science for conservation

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## Contents



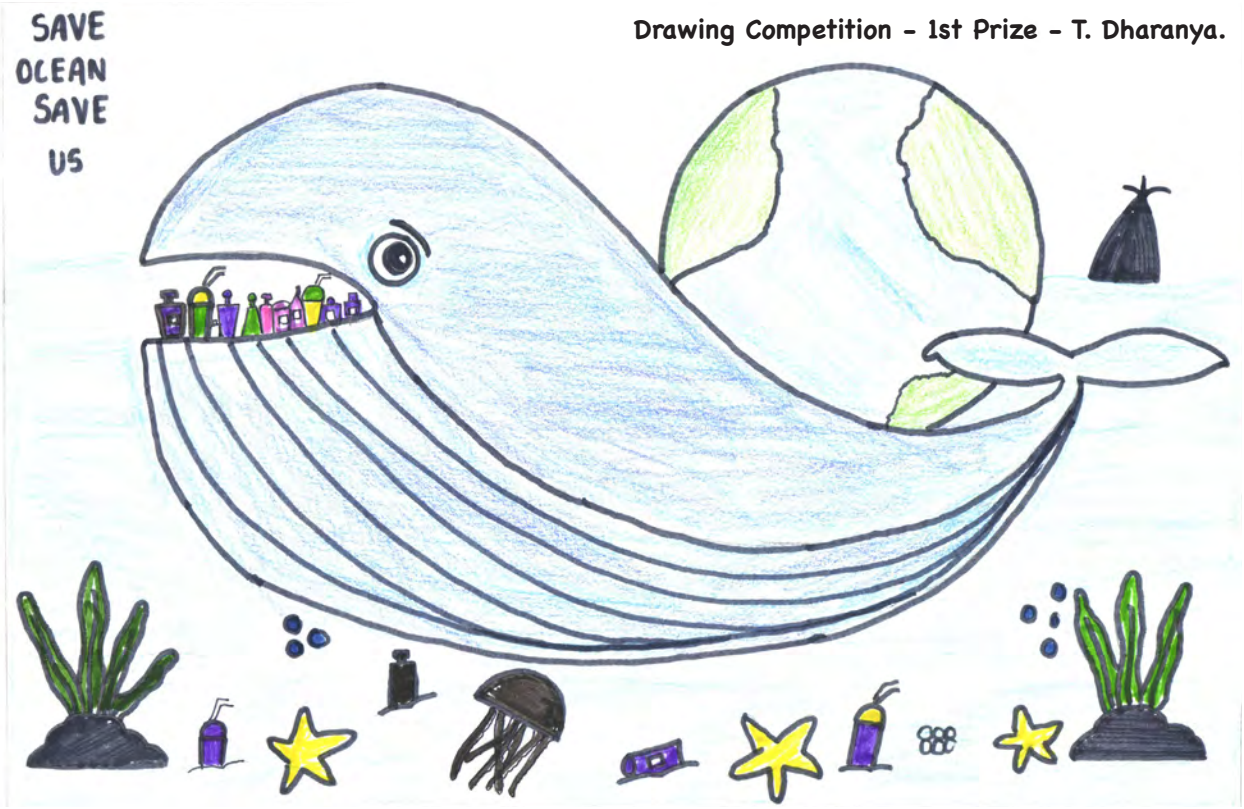
**Cover photo:** ***Poecilotheria hanumavilasumica*****. © B. Ravichandran.**

# Art takes nature as its model

To expound on the immortal words of Aristotle, a philosopher and with works across many subjects, art has truly been inspired by nature from the very beginning; be it the very first cave paintings from many thousands of years ago or the current works on impending world issues like the climate crisis! And in these years we have learnt that art in all its myriad forms, is an extremely powerful medium that has been used very effectively in the past to communicate social and environmental issues. Understanding this, Zooreach launched the **Art for Conservation** (A4C) project on 1 September 2023 with support from the U.S. Consulate General, Chennai to communicate the interconnected global problems of climate crisis and species loss that is destabilising human lives everywhere!

To achieve the vision we collaborated with expert/experienced artists (Stephen Nash and Luci Betti-Nash for Illustrative art; Sunita and Chetan Shetty for Storytelling; Dharanidharan for Performing art (theatre)) to build and train over 30 budding artists through workshops to create effective artworks based on sound science that will create awareness and encourage wildlife conservation and climate action to bring people from various streams and demographics into the fold to amplify impact. The final culmination was an exhibition of all these artworks and bringing together other wildlife artists held on 21 & 22 September 2024!

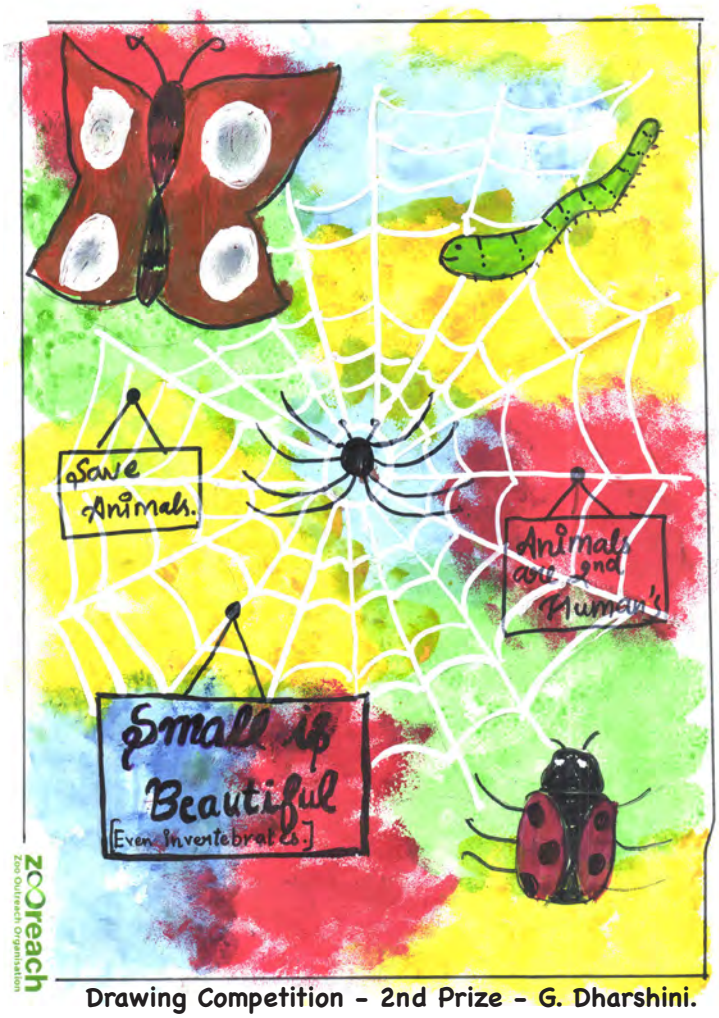
The first day of the exhibition started with a Sketch Showdown! – drawing competition. Over 200 students belonging to private schools, tribal schools,




Drawing Competition - 1st Prize - T. Dharanya.

government schools, and individual participants participated in the drawing competition. The competition winners were - 1st Prize - T. Dharanya, National Model School; 2nd Prize - G. Dharshini, National Model School; 3rd Prize - Elakshi Mahika, CS Academy School; and Special Prizes by V.L. Sri Shakthi, National Model School; G. Sridevi, National Model School; A. Ananya, National Model School; N. Adesh Pravin, National Model School; T. Sanjith, National Model School; B.P. Harshini, National Model School.

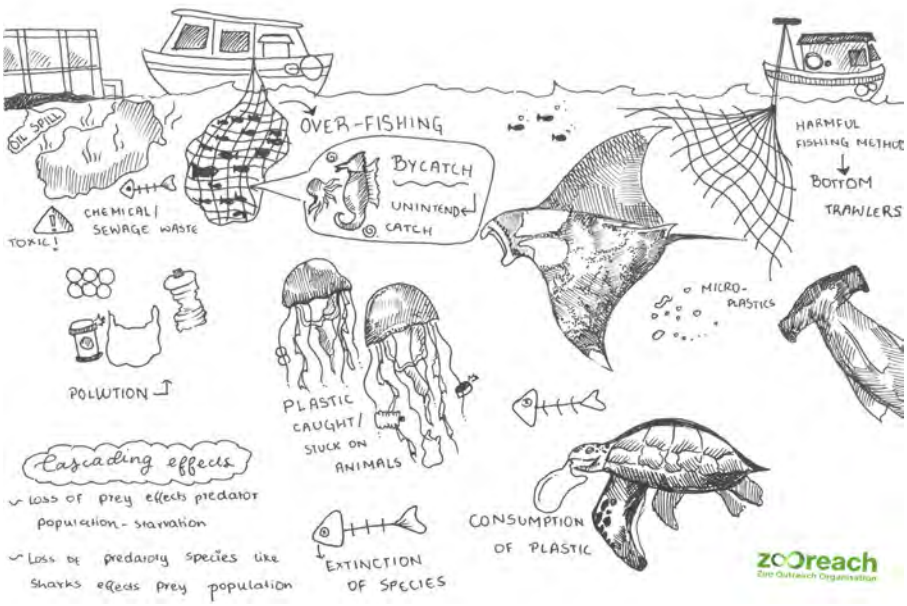
All the students also went through the art exhibition where there were about 25 art pieces exhibited on many topics involving human wildlife interactions, human perceptions of




Drawing Competition - 2nd Prize - G. Dharshini.

# Zooreach activities

**Drawing Competition - 3rd Prize - Elakshi Mahika.**




wildlife, threats to wildlife, ecosystems, caused by humans, and - '**Animism and the lives of little Tigers of nature: a unique perspective**', and Chalk sculptures of tiny creatures by Anjali Pujari; '**Foxes and Jallikattu?**', by Alaguraj Mathaiyan; '**Fashion and Wildlife**', by Indira Naidu; '**Bycatch: Boon or Burden**', by Elakshi Mahika Molur; '**Roads that Kill**', by Janani Karthik; '**Percieve**', '**Protection**', and '**Slipp her Home**' (animated film), by Maya Santhanakrishnan; '**Gibbon moves**', '**Sharing**', by Sambita Modak (artist) & Ishika Ramakrishna (Researcher), and '**Divartify**' by Sambita Modak (artist) & nature art enthusiasts of Indian Institute of Science; '**Grass is Always Green on the Other Side**', by Megha Kashyap; '**Sightseeing or Strangling Biodiversity**', by Athulya N.K. (Artist) & Nithin Divakar (Researcher, KFRI). These art pieces (some were series) were of different styles including cartoons, acrylic on canvas, fabric colours on cloth, acrylic on wood, ink on cloth, ink on canvas, digital prints, animation film, chalk sculptures, and water colour on paper. The art works were on display for both days from morning until late evening on both days of the exhibition.

The drawing competition was followed by the official inauguration with Eric Atkins, Cultural Affairs Officer, and Gokula Krishnan, Project Co-ordinator, US Consulate General, Chennai Office; Aravindan S., Founder, Clusters Media College; and Sanjay Molur, Executive Director, Zoo Outreach Organisation. During the inauguration each of the guests spoke a few words to mark the occasion and shared their experiences with all the students, artists and general public.

This was followed by a fantastic theatre performance by the students of a primary government school trained by one of the theatre participants titled, 'Wildlife: The Beauty or the Beast'. This performance focused on the importance of co-existence with biodiversity (mainly elephants and snakes) around human habitations specifically focused on Coimbatore. The children did a fantastic

job of understanding animals to build co-existence between humans and wildlife through the medium of theatre.

The next performance was an animated children's story by Chaithra Shree J. titled, 'Atthi Are you lazy?' on a conversation between the mighty fig tree and the little ants. From the little ants, storyteller Senbaga Poonguzhali took us into a story of Rudyard Kipling titled, 'Toomai of the Elephants' where Toomai is a young elephant Mahout/trainer who has a rare opportunity to observe elephants in the wild and realises how much elephants suffer in captivity and lose their essence as wild animal.

The afternoons on both days were dedicated to the screening of the animated film 'Slipp her Home' which tackled human perceptions towards cockroaches through a thought experiment of role reversal with a cockroach and see life through its eyes; and other documentaries on projects run by Zoo Outreach Organisation to create awareness about conservation work happening spanning the length and breadth of the country.

This was followed by a Gen 'Z'-centric play by Padma and Santhosh that showcased a fantasy conversation between a young social media influencer and a snake that speaks and expresses facts that bust myths and superstitions commonly believed regarding snakes by many people. From snakes we moved to majestic Himalayas heard the wonderful story by Lalitha Shankar of the Ghost of the mountains – the snow leopard and importance of tolerance and co-existence with wildlife in shrinking landscapes and habitats.

The next theatre performance titled, 'A Black and Golden Rosette' was by Ashritha and Abhishek of Holematthi Nature Foundation and students of Government Higher Primary School, Kannuru, Karnataka was focussed on the real life challenges of some of these children and their families in relation to human leopard coexistence, causes for increased interaction and its inherent challenges and possible solutions.

From the fiery forests we dove deep into the oceans with Lovekam: A wasted world – a theatre performance by Meenakshi on the importance of responsible disposal and segregation of waste and more importantly the ability to refuse items that we do not truly need to reduce waste generation in the first place. And the final performance for the first day was 'Groove Theatre: The Sea Turtle's Last Journey!" by Arjun Samudra Manthana and team was a lovely combination of dance movement combined with theatrical narrative poetry describing the journey of sea turtle back to the beach where she was born and finding it polluted with plastic and why this needs to change.

All performances and stories were followed up with conversations and

discussions with the audience on the specific subject to flush out the topic further. And address any doubts or refer to local context of the regions that the audience and artists had come from, making the whole day an extremely fertile space for conversations and inspire actions around wildlife conservation.

The second day started with a repeat performance of well-enjoyed 'Black and Golden Rosette', 'Lovekam', and 'Toomai of the Elephants'. A fresh story narrated on Day 2 was 'Palming off the Rainforest' by Vardhini Suresh shed light on the growing issue of palm oil plantations replacing original forests and loss of biodiversity.

This was followed by meaningful conversations with some representatives of the original inhabitants of the Nilgiris – few members from the Irula and Kurumba communities on their disappearing nature-connected life practices and eroding memory of age-old traditions. But one clear understanding that remains is that, wildlife and ecosystems will not harm humans if left to go about their own daily schedules.

After hearing from the original inhabitants it was organic to follow it up with conversation and coffee with scientists and researchers – H. Byju, Achuthan Shrikanthan, Boominathan, and Sanjay Molur on growing human wildlife co-existence in India and specifically southern India focussed on various taxonomic groups such as elephants and snakes, threats causing decline of wildlife and growing concerns of climate crisis and how it is a very real and looming danger for humankind.

The event closed with thanks and remarks by Gokula Krishna, Project Coordinator, US Consulate General, Chennai Office; a fantastic performance by SWORD – Adhiyaman Kalaikuzhu on Human Elephant Co-existence through traditional Tamil folk arts and the final message of wildlife conservation sent across by Vijay TV star Shalini to her many fans of all age groups.

Some of the other events by young school kids concerned with this cause were violin performances by Elakshi Mahika Molur on both days at different times and a lovely donation drive by four school girls – Sanjana Sathish and team.

On the whole the event reached out to thousands of people across the two days from all age groups and all strata of society which was the vision and dream, and we hope that this event becomes a regular feature of the Coimbatore calendar every year to keep reminding the community about the need for making sustainable life choices that can make the difference towards a healthy a safe future for humans and wildlife!

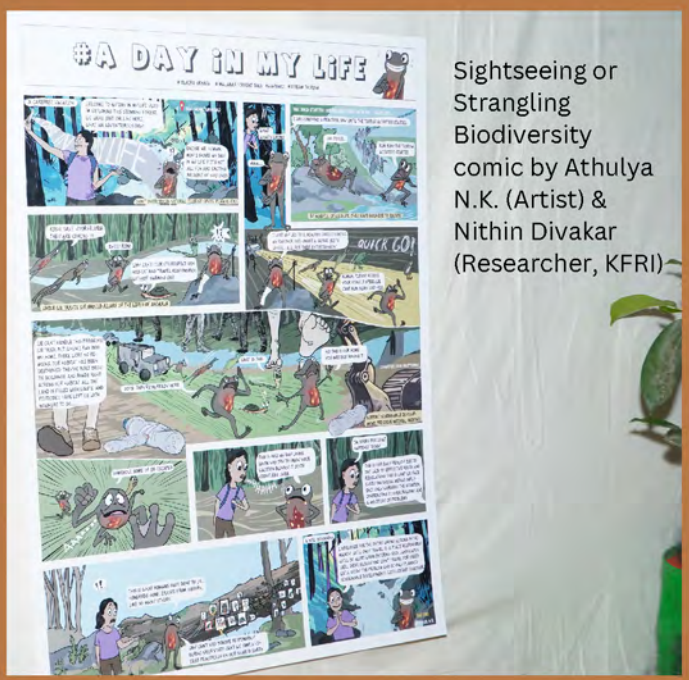
**Priyanka Iyer, Researcher, Zoo Outreach Organisation Trust, Coimbatore 641006, Tamil Nadu, India.**

Gibbon moves by Sambita Modak (Artist) & Ishika Ramakrishna (Researcher)

Sharing by Sambita Modak (artist) & Ishika Ramakrishna (Researcher)

Protection by Maya Santhanakrishnan


Interactive art on Gibbon distribution & threats.

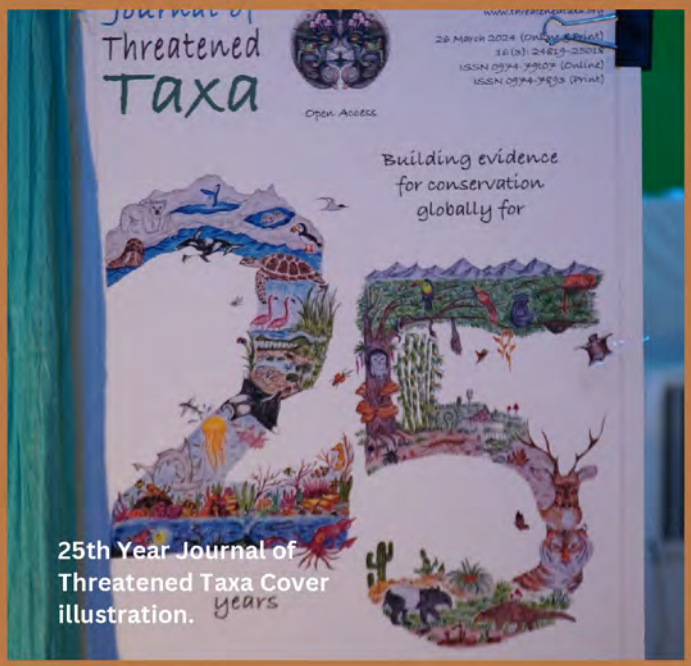



Sightseeing or Strangling Biodiversity comic by Athulya N.K. (Artist) & Nithin Divakar (Researcher, KFRI)


Chalk sculptures of tiny creatures by Anjali Pujari

Perceive by Maya Santhanakrishnan


Roads that Kill by Janani Karthik




25th Year Journal of Threatened Taxa Cover illustration.


Grass is Always Green on the Other Side by Megha Kashyap

Animism and the lives of little tigers of nature: a unique perspective by Anjali Pujari

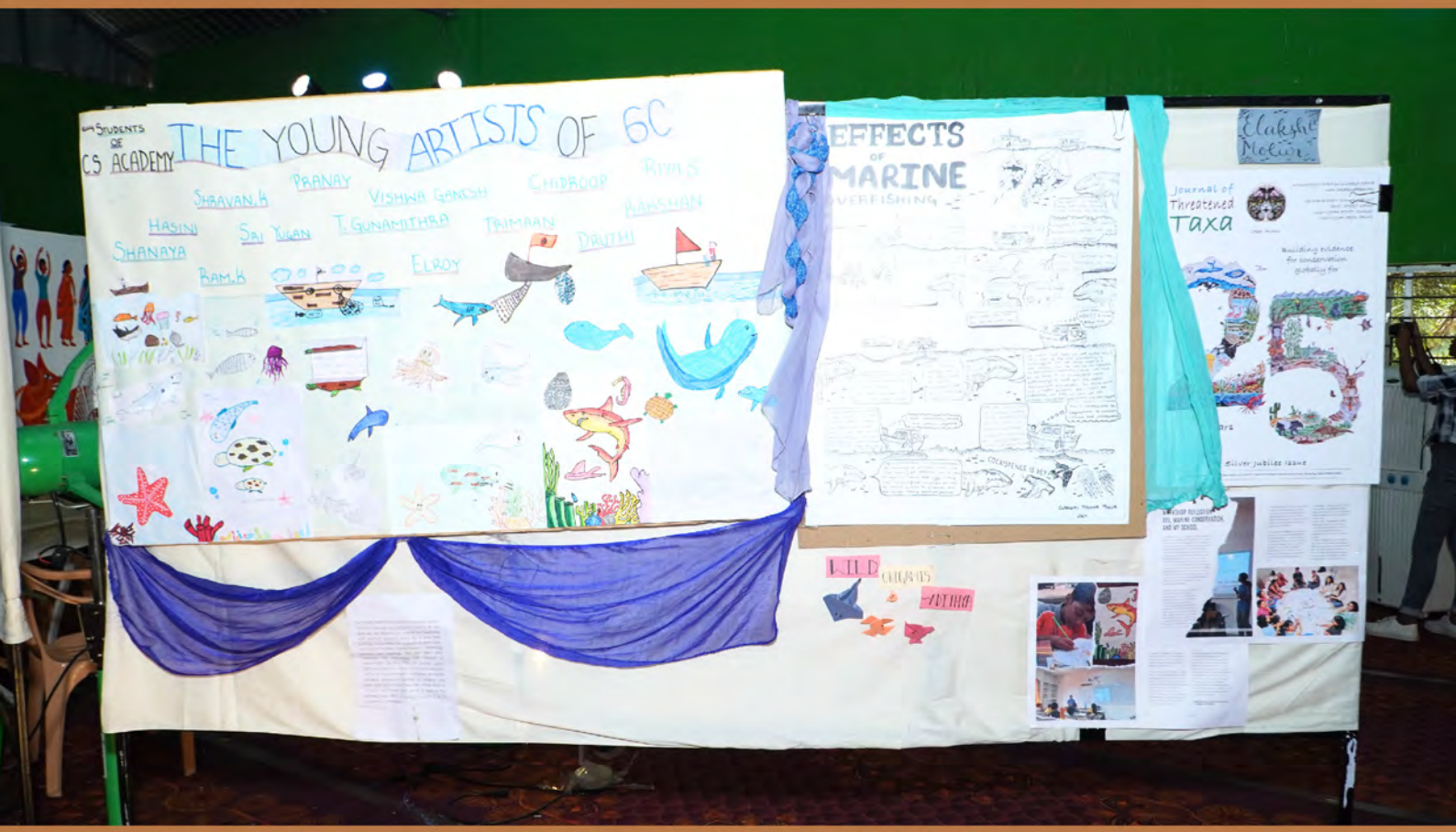

Donation drive art piece



Animated film: Slip her home poster

Foxes and Jallikattu? by Alaguraj Mathaiyan

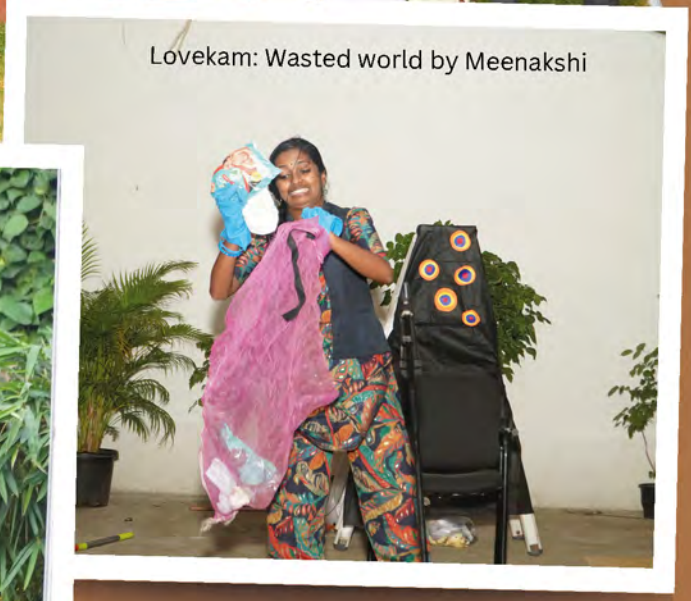

Sightseeing or Strangling Biodiversity by Athulya N.K. (Artist) & Nithin Divakar (Researcher, KFRI)



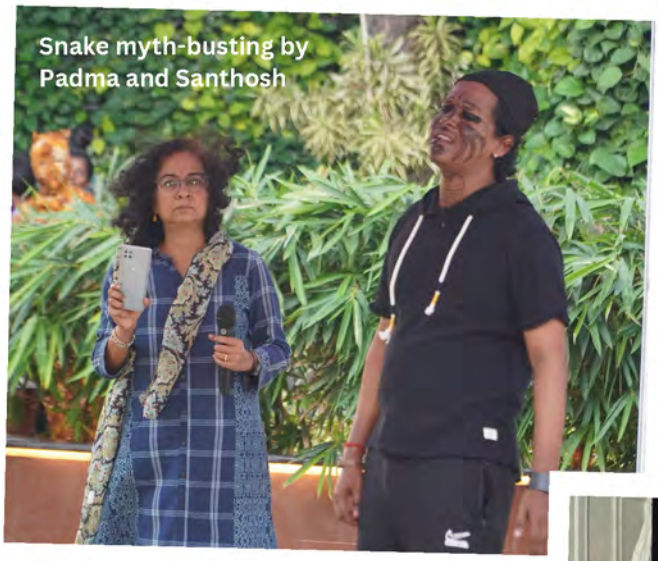

Bycatch: Boon or Burden by Elakshi Mahika Molur

Birds in Nature

Government Higher Primary School, Kannuru, Karnataka's students, artists, Eric Atkins (USCG), Gokula Krishna (USCG) and Sanjay Molur.

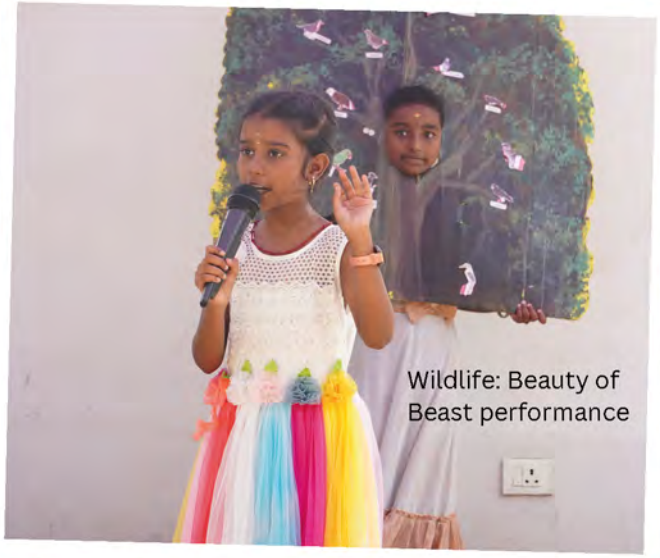


Lovekam: Wasted world by Meenakshi



Snake myth-busting by Padma and Santhosh

Groove Theatre by Arjun and team



Wildlife: Beauty of Beast performance

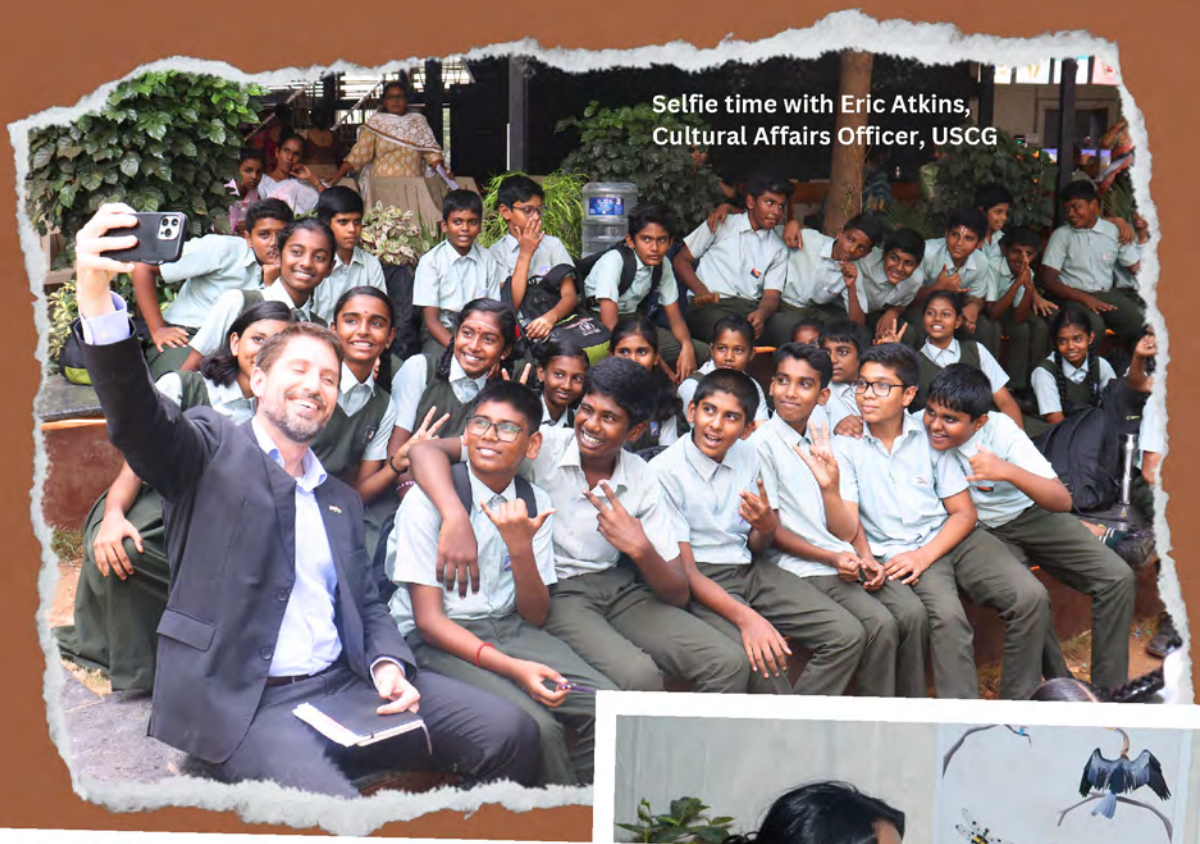
Expert panel coffee with conservationists

A Black and Golden Rosette performance

SWORD Human-Elephant Coexistence performance

Ghost of the mountain
story by Lalitha Shankar

Padma
translating
Kannada play
into Tamil

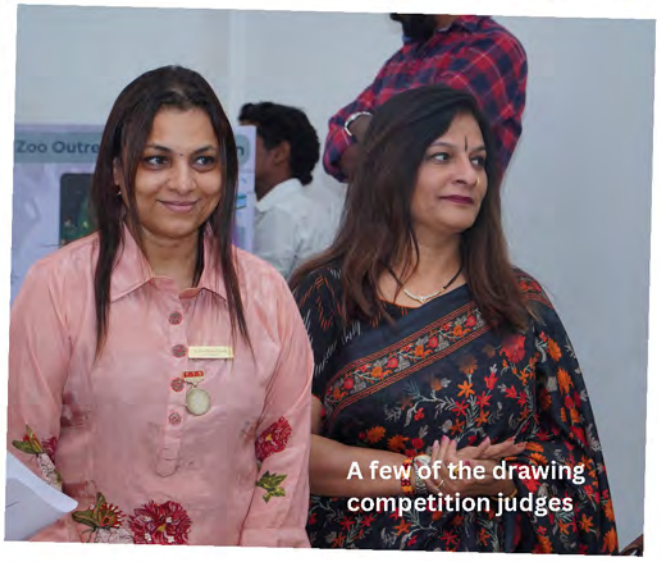


Selfie time with Eric Atkins, Cultural Affairs Officer, USCG

Illustrative artist Megha interacting with kids

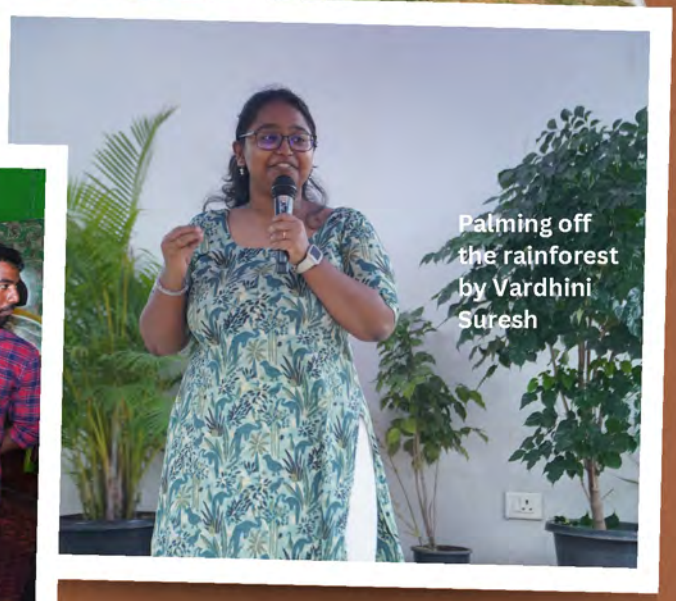
Sketch showdown

Toomai of the Elephants by Senbaga Poonguzhali



A few of the drawing competition judges

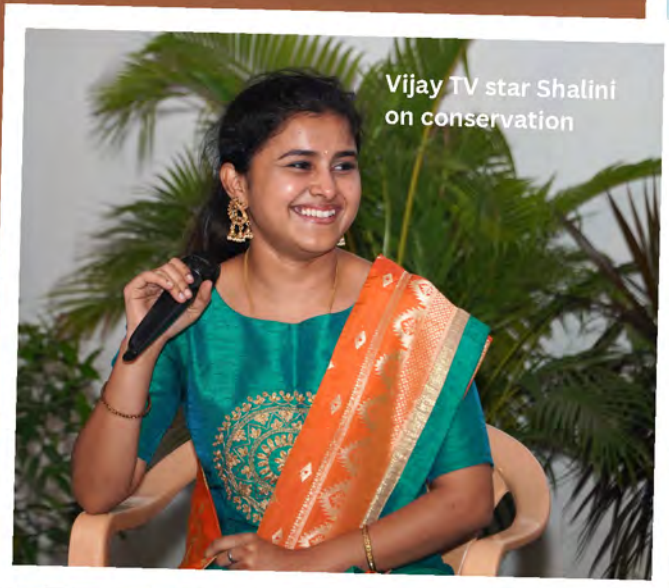
Donation drive artwork with students



Palming off the rainforest by Vardhini Suresh

Fox Jallikattu by Alaguraj

Illustrative artist Maya interacting with audience



Vijay TV star Shalini on conservation

Zooreach team at event closing

Atthi Are you lazy? story by Chaithra Shree J.

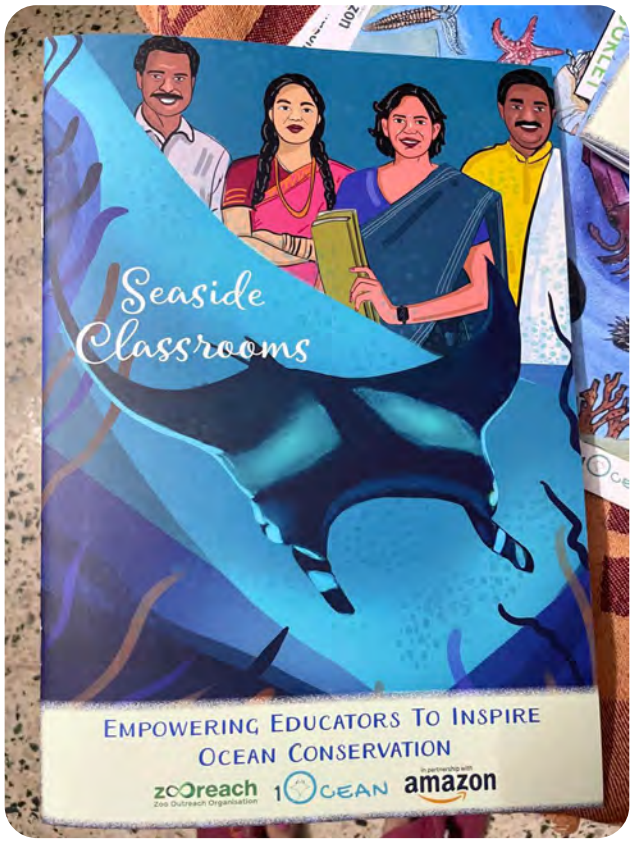
Irula and Kurumba community members.

Elakshi Mahika Molur violin performance

Illustrative artist Janani interacting with Herpetologist Achuthan

# 1OCEAN (Ocean Conservation Education and Action Network) Making Waves in Ramanathapuram, Rameswaram

Hey everyone, it's Dr. Monta Ray here, the official mascot for the 1OCEAN (Ocean Conservation Education and Action Network) initiative by Zooreach! I've been on quite the adventure since 2023, and I have some cool stories to share from my latest trip to Ramanathapuram district, Rameswaram. So, buckle up, and let's dive into the fun stuff!




**The teacher manual photo.**

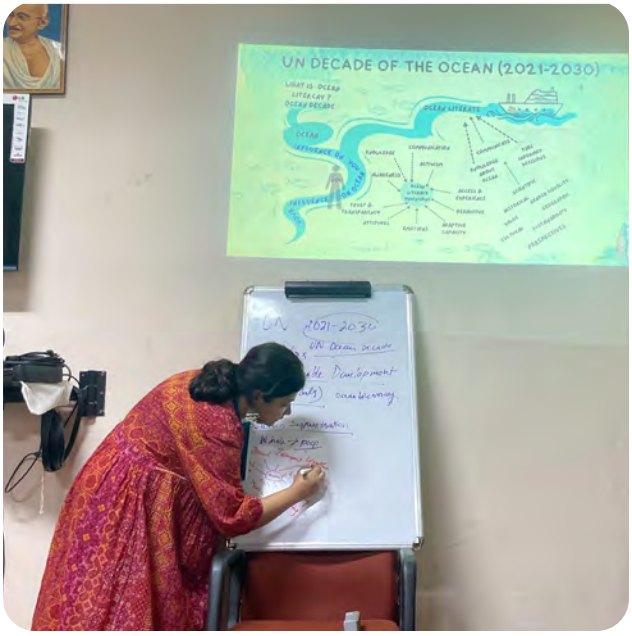
This past July, from the 3rd to the 5th in the CMFRI campus, the Zooreach 1OCEAN team put together an educator's workshop in the heart of Rameswaram. Backed by the UN Ocean Decade program and supported by Amazon, we're on a mission to mix ocean topics into our school lessons, making learning about the ocean as exciting as it sounds. We had 20 teachers from different schools in the district join us for this ride, diving into what it means to be ocean literate with the help of an Educator's manual, "Seaside Classrooms," prepared by the Zooreach team. The manual "Seaside Classrooms" was our way of saying, "Hey, the ocean is awesome. You can learn about it using different subjects and simultaneously be a hero for it."


**Resources for students.**

**A Glimpse into the Educators' Workshop: An Insightful Three-Day Workshop on Ocean Literacy**

The workshop, attended by 20 educators, was held at the CMFRI campus from 3–5 July 2024. Here's a recount of the enriching experience that unfolded.

# Zooreach activities




**Explaining about the UN Ocean Decade.**

**Activity to understand the different zones of the ocean.**

**Know my friends game played by the teachers.**

**Day 1: The beginning**

• The day began with a friendship band tying ceremony, underscoring our collective commitment to protect the ocean. This symbolic act set a tone of unity and dedication among us.

• An engaging icebreaker session soon followed, facilitating a lively interaction among the participants.

• After a refreshing tea break, the workshop continued with an enlightening session on mind maps aimed at developing a comprehensive understanding of the ocean. It was intriguing to observe the diverse perspectives of different educators. On the third day, we revisited the mind maps with a post-workshop exercise, and it was revelatory to witness the evolution in the teachers' understanding post-workshop.

• I, Dr. Monta Ray, was also introduced to the educators. This was followed by discussing innovative ways to engage with marine life. This included a marine species hunt and interactive games highlighting the Indian coastline and the difficulty in measuring it.

Day 1 was a rich mix of learning, active participation, and mutual enthusiasm for exploring ocean literacy further. It left us, the teachers, eagerly anticipating the upcoming sessions.

**Day 2: Dive into Information about marine biodiversity present in Rameswaram**

• On the second day, our journey into marine education continued with a visit to the Central Marine Fisheries Research Marine Museum in the morning. This excursion was designed as an immersive learning experience, allowing them to observe and document the diverse

marine species on display, thereby fostering a practice of mindful observation that could be encouraged among their students, along with the importance of nature journaling.

• Following this visit, we engaged in a Dichotomous Key game, an activity aimed at simplifying the complexities of taxonomy and classification in a fun and interactive manner. This was educational and equipped them with a tool to spark curiosity among our students about the scientific aspects of marine life.

• The afternoon session introduced them to the Species Card game, a competitive yet informative game that challenging them to recognize various marine species through facts and data on the cards, emphasizing the importance of marine conservation.

• After a well-deserved lunch break, the day ended with a compelling talk by a guest speaker, H. Byju, a researcher focusing on the shorebirds of the Rameswaram coastline. The educators were pleasantly surprised by the diversity of shorebirds they encountered in Rameswaram. Many had not realized the region hosted such a wide variety of species, showcasing the richness of the local marine ecosystem, instilling a sense of pride among the teachers.

The second day was a testament to the importance of observation, the importance of nature journaling, and the exposure to the diverse biodiversity on the coastline.

**Day 3 - The Conclusion**

• Day 3 started with “Stripes Tell Stories,” which depicted the alarming trend of rising temperatures in India through a visually striking and interactive method. Teachers represented the surface temperature of different years, with

**The educators getting to know each other by introducing each other.**

**Activity to map and understand the length of India’s coastline.**

**Visit to the Marine museum.**

**Pledge taking ceremony with the educators.**

the intensity of the color indicating the increase in temperature. This innovative approach conveyed the critical message of climate change while demonstrating how complex data can be simplified and made accessible for students.

• This was followed by a Jenga game designed to symbolize the importance of collective efforts in environmental conservation.

• N. Raveendran from Iragukal Amritha Nature Trust spoke about his journey working in Rameswaram's landscape.

• The afternoon session was dedicated to "What the teachers could do with their students" for an exhibition that will be done post-workshop with the students. A discussion on setting realistic expectations followed the importance of maintaining communication and strategies for effective follow-up post-workshop.

The 3-day workshop concluded with feedback and mind mapping sessions, similar to Day 1. These sessions allowed participants to reflect on their learning experiences, share feedback, and brainstorm ideas for implementing their new knowledge in their teaching practices.

After the workshop, each teacher was given a seaside classroom manual and education packets to teach their students.

The journey we started with these 20 teachers is just the beginning. "Seaside Classrooms" is set to make waves across schools, promising a future where every kid gets how majestic and crucial the ocean is to our planet. In times like these, when our oceans face so many threats, stepping up our game in education is not just cool; it's essential. We're all about building a smarter, more caring, ocean-loving world. So, here's to making a splash and keeping the ocean awesome for generations!

Following this experience, the teachers implemented their new knowledge in their teaching practices using the educator's manual and to create more awareness and to drive action amongst the rest of the community prepared exhibits to showcase in the exhibition. The following article highlights the exhibits, representing their efforts and the impact of the "Reverse the Red" Exhibition.


**Group Photo.**

The 20 educators who participated in the workshop were K. Sivakumar, M. Syed Sharifa from Panchayat Union Primary School (PUPS), Mandapam, Nesamalar Sumathi from Panchayat Union Primary School (PUPS), C. Koraiyur, S. Ilamaran from St. Josephs HSS Verkottu, D. Meena from Vallal Pari

# Workshop held for teachers on ocean literacy

**Ramanathapuram:** The Central Marine Fisheries Research Institute (CMFRI), in collaboration with the Zoo Outreach Organisation, conducted a three-day educators' workshop on ocean literacy for govt schoolteachers across the Ramanathapuram district from Wednesday.

According to a release, the workshop aimed to equip teachers with the knowledge and tools needed to integrate marine biodiversity and ocean conservation into their curriculum and to use activities and experiential learning from a manual produced and published by the Zoo Outreach Organisation. The manual encourages educators to use Rameswaram's diverse ecosystems as a living classroom for their students. The workshop participants, along with their students, will organize an exhibition in the last week of August. TNN

அரசு பள்ளி ஆசிரியர்களுக்கு
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Middle School, J.D. Christopher from Government Higher Secondary School (GHSS) Pamban, R. Navaneethapriya from Panchayat Union primary school Gendhamathanaparvatham, S Selvaswamy from Government Higher Secondary School (GHSS), Vedhalai, P. Inbaraj from PUPS Thalaithoppu, J.S.R. Arockiam from PUPS Padaivettivalai, N. Raja from PUPS, Panaikulam, K. Ravi from GHSS Alangakulam, S. Nagarethinam from GHSS Kamankottai, R. Manimozhi from GHSS Thinaikulam, M. Balamurugan from GHS Vaniyankulam, R. Dharmaraj from GHS Thiruthrakosamangai, B. Muruganantham from GHSS Uppoor, M. Arulselvan from GHSS Sikkal, A. Ramar from GHSS Athiyoothu, and G. Kumar.

**Acknowledgements**

The success of the Seaside Classrooms workshop is due to the contributions of many people. Special appreciation goes to Sanjay Molur for fostering a space for critical thinking, growth, and sometimes even room to fail and learn. Thanks to Payal Molur for her valuable feedback and corrections to the manual, and to Latha Ravikumar, Rajesh Kanna and Marimuthu for helping with the translations. I am especially grateful to Latha Ravikumar and Radhika Suresh for helping design the book and ensuring its timely completion. A special thanks goes to Priyanka for her scientific insights, and to Paridhi Modi and Ragunath for their translation and coordination support at the workshop. I would also like to acknowledge Prabash Rath, without whose help we would not have secured this grant. My gratitude extends to the NSNOP (Namma School Namma Ooru Palli) team, G. Kumar, H. Byju, N. Raveendran, and CMFRI for their crucial roles in making this workshop a success.

Last but not least, I would like to express my heartfelt thanks to the 20 teachers whose participation and enthusiasm were essential to the success of this project. Without their commitment, the workshop would not have achieved its goals.

**Tandrali Baruah, Educator, Zoo Outreach Organisation Trust, Coimbatore, Tamil Nadu 641006, India.**

# 1OCEAN "Reverse the Red" Exhibition in Ramanathapuram, Rameswaram

Hi, I am Dr. Monta Ray, the official mascot of the 1OCEAN (Ocean Conservation Education and Action Network) and I am back again. I'm thrilled to share the incredible journey our teachers embarked on following our workshop in early July, mentioned in the Zoo's Print article **"1OCEAN Making Waves in Ramanathapuram, Rameswaram"**. Armed with the insights and strategies from "Seaside Classrooms," they've woven the beauty and critical importance of ocean conservation into their lessons across various subjects.

However, their dedication didn't stop at the classroom doors; they went further, creating engaging exhibits for a school-wide exhibition. The "Reverse the Red" Exhibition in Rameswaram was a testament to their hard work and our collective mission at 1OCEAN. The Zooreach team's visit in late August to conduct outreach programs added another layer of engagement in addition to the school-wide exhibition. It helped to deepen the impact of our efforts. Witnessing our educators' and students' creativity and passion in bringing ocean literacy to life has been profoundly inspiring. This article highlights a few exhibits representing the efforts and the impacts of the "Reverse the Red" Exhibition.

**Panchayat Union Primary School (PUPS) Mandapam**

I am delighted to share the remarkable outcomes of the engagement between PUPS Mandapam students and their dedicated teachers, K. Sivakumar and M. Syed Sharifa, in our broader efforts towards ocean literacy. These educators and students have indeed embodied the spirit of innovation and creativity in their contributions to the "Reverse the Red" Exhibition held in Rameswaram.

The students put together captivating exhibits, including a puppet show with a song that beautifully narrated the different layers of the ocean, bringing to light the rich biodiversity beneath the surface. Their ability to weave educational content with entertainment was truly commendable. To innovate and educate simultaneously, they designed a new game involving magnets to simulate fishing scenarios along the coastline. This interactive game effectively communicated the importance of

**PUPS Mandapam different habitats exhibit.**

sustainable fishing practices and the necessity of returning unintended catches to their natural habitats, thus fostering a sense of responsibility and awareness among participants. Furthermore, the students utilized lights to illustrate the various habitats within the ocean, creating a visually stunning exhibit that underscored the diversity and complexity of marine ecosystems. The creativity, passion, and dedication demonstrated by the PUPS Mandapam students and teachers have been profoundly inspiring. It was heartening to witness such enthusiasm and commitment.


**PUPS Mandapam puppet show to showcase the different layers of the ocean.**

**GHSS Vaniyankulam Exhibition.**

**Government Higher Secondary School (GHSS), Vaniyankulam**

I am thrilled to recount the engaging session held at GHS Vaniyankulam, where, under the guidance of M. Balamurugan, students enthusiastically participated in the "Know My Species" card game. The game's structure, alternating between a "guesser" and a "describer," challenged the students to rely on their listening skills and knowledge of species. The excitement was palpable as each correct guess allowed the guesser to keep the card, and the ultimate goal of accumulating the most cards added a competitive edge.

**Panchayat Union Primary School (PUPS), Panaikulam**

Out of the many exhibits that the school did under the guidance of their teacher, N. Raja, one that stood out was the visualization of the stripes, which tell stories using ice cream sticks. This project created a compelling visual representation of India's surface temperatures over 61 years, from 1961 to 2022. Each stripe colorfully marked a year, with blue indicating cooler temperatures and red representing warmer years, against a baseline from the 1960s to the 1980s. The intensity of each stripe's color

**PUPS Panaikulam stripes tell stories too exhibit.**

vividly captured the temperature fluctuations, offering a captivating 'rainbow' that chronicles the evolution of our planet's climate. This exhibit served as a powerful visual narrative on the urgent issue of climate change.

**Vallal Pari Middle School**

I was honestly overjoyed to see the dedication and creativity of the students as they crafted models of sea turtles and orcas using biodegradable materials. It took them many weeks, but the results were heartwarming. Imagine my delight when I discovered they had even created a model of me, a manta ray! In addition to these models, the students showcased their extensive work with the education packets they were given. They meticulously recorded marine species found in their local area, complete with photographic evidence. Their presentations also included the different life histories of various animals, creatively displayed as if taking a ride on a Ferris wheel. The guidance of their teacher, D. Meena, was instrumental in bringing these projects to life.

**Vallalpari exhibits done by students.**

**Government High Secondary School (GHSS), Thinaikulam**

Students in this school, under the guidance of R. Manimozhi, showcased a deep understanding of the different layers of the ocean in the exhibition. They showcased a dynamic model of the ocean's layers by combining water, dish soap, and ink in a clear tray placed over an ocean zone chart. Using a clear cup as a magnifying glass, they explored the positioning of various marine animals and plants, comparing their observations to their prior knowledge.

**GHSS Tinaikulam students displaying explore the ocean game.**

**Panchayat Union Primary School (PUPS), Koraiyur**

The primary students, under the inspiring guidance of teacher Nesamalar Sumathi, presented a play on plastic pollution. It was truly heartwarming to see these young students dressed as fishermen and marine life, bringing to life the severe issue of ocean pollution through their performance. The involvement of their parents, who attended the play and later interacted with our experts, added a wonderful

**PUPS Koraiyur play to showcase ocean pollution.**

sense of community and shared purpose. The teachers of this school's dedication to engage and educate through music and play the next generation creatively is commendable.

**Panchayat Union Primary School (PUPS), Gendhamathanaparvatham**

The primary school students of R. Navaneethapriya from Panchayat Union Primary School, Gendhamathanaparvatham, prepared the "We Are All in the Same Boat" activity for the exhibition. This engaging and educational game not only illustrated the myriad threats faced by our ocean. The creativity and enthusiasm displayed by the teacher by bringing real fishing nets to capture the animals made this game enjoyable.


**Student from PUPS Gendamanparvatham explaining the details filled by her in the education booklet given to them.**

To conclude, through the dedicated efforts of students and teachers in Rameswaram, the "Reverse the Red" Exhibition has illuminated the path for ocean conservation education. Recognizing the intricate value of each species within an ecosystem is paramount to its conservation. Without a deep appreciation for the roles and relationships within ecosystems, efforts to conserve would be directionless. The work done by the students and teachers serves as a beacon of hope. As we move forward, let's commit to deepening our knowledge, for only through understanding can we truly protect and preserve the natural world. We hope to cover more programs like this soon.

**Acknowledgments**

A special thanks to the entire 1OCEAN team, including the education team (Sanjay Molur, Payal Molur, Priyanka Iyer, R. Marimuthu and Ragunath) and the administrative team (Latha Ravikumar, K. Geetha, S. Radhika), for their outstanding efforts in making this program a success. A special mention to Paridhi Modi, who ensured smoother coordination. Our driver, Mukesh, also deserves recognition for ensuring we reached the schools on time. Their dedication and hard work have been instrumental in the success of our event. Additionally, we would like to extend our heartfelt appreciation to all the teachers and students who dedicated weeks of hard work to make the exhibition a resounding success. We are also grateful to CMFRI for providing us with accommodation and further supporting the success of our program.

Furthermore, we would like to express our profound gratitude to Amazon for supporting our project. Their backing has significantly contributed to our efforts and success. Thank you for believing in our mission and helping us make a meaningful impact.

**Tandrali Baruah, Educator, Zoo Outreach Organisation Trust, Coimbatore, Tamil Nadu 641006, India.**

# The Indian theraphosid status puzzle

The South Asian Invertebrate Specialist Group (SAsISG), as part of its 2021–2025 quadrennium, Target 010, 'Complete global Red List assessments of 60 Tarantula species of India by 2025' assessed 60 species of Theraphosidae spiders (AKA tarantulas) endemic to India as per the 'IUCN Red List of Threatened Species' guidelines in a three-day workshop at Coimbatore, India on 19–21 July 2024.


The workshop had 12 subject experts, Abinesh A., Arjun Viswa, Aswathy S., Bhargavi Srinivasulu, Chelmala Srinivasulu, Gautam Kadam, Harshil Patel, Moinudheen, Rakesh Kumar Mohalik, Sanjay Molur, Shouvik Mali, and Souvik Sen; a GIS specialist, Nishanth Srinivas; and 10 fellows from the Ram Hattikudur Advanced Training in Conservation – Maitreyi Hegde, Nilesh Murmu, Paridhi Modi, Pooja Patil, Shivaani A. Swaathi NA, Tandrali Baruah, Trisa Bhattacharjee, Vardhini S., and Usha Ravindra. Sanjay Molur facilitated the 3-day workshop and along with Chelmala Srinivasulu facilitated the working groups while the rest of the workshop team participated as contributors and/or as assessors.

The 60 species were assessed tentatively as follows: 4 Critically Endangered, 11 Endangered, 5 Vulnerable, 19 Data Deficient, 4 Near Threatened, and 14 Least Concern. Three were Not Evaluated. One-third of the tarantula species in India are threatened with extinction. Most common threats for the species were road expansion, soil extraction, persecution, pet trade, habitat degradation, landslides, and flooding. Tentatively, the Western Ghats & Sri Lanka, Himalaya, Indo-Burma, and Sundaland hotspots hosted 17, 7, 4, and 1 species, respectively. This is the first time that 46 species were assessed and 14 species were reassessed after 16 years. Of the 14 species reassessed, the status of seven species remains unchanged. Of the remaining

*Poecilotheria hanumavilasumica.* © B. Ravichandran.

seven, three were downlisted (*Poecilotheria metallica*, *P. miranda*, & *Thrigmopoeus truculentus*), three were uplisted (*Poecilotheria regalis*, *P. tigrinawesseli*, & *Thrigmopoeus insignis*), and one species is synonymised (*Poecilotheria nallamallaensis* with *P. formosa*).

Of the 60 species, at least three species were taxonomically uncertain hence were recommended for further research. Research on population size, distribution, trends, life history, and ecology were recommended to all species due to non-availability of information on these factors. Most of the papers on checklists were not considered for the assessment due to no clarity on the taxonomy and specimen identity. The distribution records from predatory papers were not considered. The information considered for Red list assessment were solely based on the data collated from all published papers and from the experts' personal communications on their unpublished distributional records and observations from their surveys, after considerable debate on the validity of the species and its occurrence. A more detailed and definite report will be published in the coming issue.

This assessment is crucial to understand the risk of extinction in these lesser known and most ignored invertebrate groups, and to mobilize conservation focused research work for the threatened and 'Data Deficient' species.

*Poecilotheria metallica*. © Sanjay Molur.

**Acknowledgements:** This workshop was possible thanks to the funding from Mohammed bin Zayed Species Conservation Fund (MbZSCF) and International Union of Commission for Nature (IUCN) Species Survival Commission (SSC) - Internal grant 2023 via RE-WILD and the support from Zoo Outreach Organisation (Zooreach) team in organising it.

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# Terra mater's silent struggle: the urgent need to save our soil

Soil, a foundational component of the Earth's ecosystem, is critical for food production, water filtration, and providing habitat for countless organisms (Sekercioglu 2010; Sahu et al. 2024). Despite its importance, soil faces a severe and escalating threat from pollution, driven primarily by human activities. "Terra mater", Latin for "Mother Earth," epitomizes our planet's nurturing and life-sustaining essence. Earth sustains its myriad inhabitants as a mother provides for her offspring (Johnson 1993). However, this nurturing relationship is under threat as the insidious war on soil pollution intensifies (Staros 2021). Far from being mere dirt, soil is essential for terrestrial life, yet it is compromised by industrial processes, modern agriculture, urban development, and improper waste disposal (Bardgett 2016). The pollution not only undermines the soil's ability to support life but also disrupts ecosystems and poses significant risks to biodiversity and human health (Kolawole & Iyiola 2023).

Addressing this hidden crisis

**It is more valuable than oil. It is our Soil!! © Pooja Purohit.**

**Discarded cigarette filter: a hidden threat to soil health and ecosystems. © Akash Rana.**


**Effective waste management practices at Shikhar Fall, Dehradun: preserving natural beauty and soil health. © Himanshu Sahu.**

**Domestic animals consuming waste and plastic, with improper waste management leading to road contamination: Morena, M.P. © Himanshu Sahu.**

is imperative for maintaining the health and balance of our planet's ecosystems. This article explores the causes, consequences, and potential solutions to soil pollution, highlighting the urgent necessity for soil conservation.

**The hidden crisis of soil pollution**

Soil pollution refers to the presence of toxic chemicals, contaminants, and pollutants in the soil that can harm plant, animal, and human health (Osman 2014). Unlike more visible forms of environmental degradation, such as deforestation or air pollution, soil pollution often goes unnoticed until its effects are severe (Al-Taai 2021). Given the foundational role soil plays in the health of our ecosystems, addressing its pollution is paramount for the conservation of our planet.

**Causes of soil pollution**

Soil pollution driven by various human activities, significantly impacts environmental and public health. Industrial activities contribute heavily, as factories release heavy metals, chemicals, and waste into the environment, rendering soil toxic and unsuitable for agriculture (Mishra et al. 2019). Agricultural practices further exacerbate soil pollution; the extensive use of pesticides, herbicides, and

fertilizers introduces harmful substances, disrupting soil biota and contaminating water supplies. Urbanization and construction lead to soil erosion and contamination, with improper waste disposal degrading the soil further (Al-Taai 2021). Waste disposal practices, including landfills and illegal dumping, introduce pollutants into the soil, with leachate contaminating soil and groundwater.

**Plastic waste on topsoil: threatening plant growth and ecosystem health. © Pooja Purohit.**

**Land conservation through clean-up and plantation efforts by Bhomya Foundation: restoring ecosystem health and promoting biodiversity. © Himanshu Sahu.**

The consequences of soil pollution are severe and multifaceted. Contaminated soil not only diminishes crop yield and quality but also leads to the bioaccumulation of toxic substances in the food chain, jeopardizing both food security and consumer health (Ali & Khan 2018). The health impacts are profound, including an increased risk of cancers, neurological disorders, and reproductive issues (Mishra et al. 2019). Additionally, ecosystem balance is disrupted, as pollutants kill beneficial microorganisms and insects, reducing soil fertility and biodiversity (Sahu et al. 2024). This also adversely affects wildlife, with contaminants moving up the food chain, leading to health problems and decreased survival rates (Ali & Khan 2018). Economically, the degradation of soil necessitates expensive remediation efforts and reduces agricultural productivity, which negatively impacts farmers' livelihoods and the broader economy.

**Conservation: the foremost priority**

Conserving soil is crucial for the survival and well-being of all life forms (Pimentel et al. 2013). Soil forms the foundation of terrestrial ecosystems, supporting plant growth, herbivores, and their predators, ensuring robust ecosystems. It acts as a natural filter for water, trapping pollutants and maintaining the purity of water sources by recharging aquifers and rivers. As a significant carbon sink, soil captures carbon dioxide from

the atmosphere, mitigating climate change and controlling global carbon levels. Additionally, soil plays a vital role in nutrient cycling, breaking down organic matter and replenishing nutrients essential for plant growth. Many animals, from insects to larger mammals, depend directly on soil for habitat and as a food source (Coleman et al. 2024). Before addressing other conservation issues like water, plants, or animals, prioritizing soil protection and restoration is essential due to its foundational role in sustaining life and ecosystems.

**Mitigation and remediation**

Effective mitigation and remediation of soil pollution requires strict regulations on industrial emissions, waste disposal, and agricultural chemicals. International agreements are crucial for addressing transboundary pollution. Sustainable agricultural practices, like organic farming, integrated pest management, and crop rotation, reduce reliance on harmful chemicals, while conservation tillage and covering cropping maintain soil health. Pollution cleanup methods such as bioremediation, phytoremediation, and soil washing detoxify polluted soils using natural processes. Raising public awareness and education on soil health's importance and pollution's impacts can drive community action and policy change, ensuring sustainable soil conservation and ecosystem health.

**Conclusion**

The health of our soil is intrinsically linked to the health of our planet and ourselves. As the foundation of life, soil requires our immediate attention and care. Addressing soil pollution necessitates a concerted effort from governments, industries, and individuals worldwide. Governments must enforce stricter regulations on industrial waste and agricultural practices, while industries should adopt sustainable methods to minimize contamination. Individuals can contribute by reducing the use of harmful chemicals in their gardens and supporting sustainable products. By understanding the gravity of the situation and taking these proactive measures, we can protect and restore this vital resource, ensuring a sustainable future for generations to come. Only through prioritizing soil conservation can we safeguard the broader ecosystems that depend on this fundamental element.

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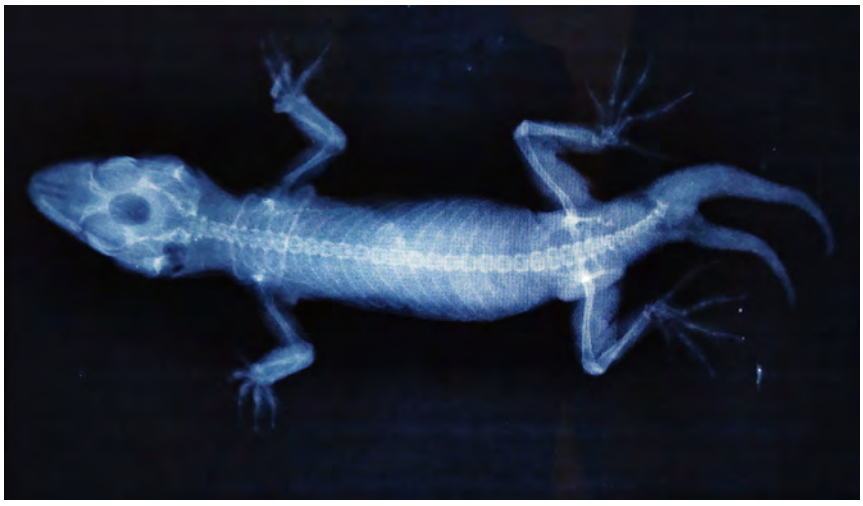
# First record of tail bifurcation in the Indian House Gecko *Hemidactylus flaviviridis* from Odisha

Lizards across several groups utilise caudal autotomy, the ability to deliberately severe off the tail, to escape from predation (Bateman & Fleming 2009). The detached tail often continues to wriggle vigorously, distracting predators and giving the lizard a chance to escape. After successful autotomy, the lizard regenerates its tail within a few weeks (Clause & Capaldi 2006). The regrown tail usually replaces the autotomized tail; however, sometimes there are complications. Indeed, there are frequent sightings of bifurcated tails in lizards (Hayes et al. 2012; Tamar et al. 2013; Walker 2013; Kolenda et al. 2017; Koleska et al. 2017). These abnormalities likely result from incomplete autotomy, where the tail

Tail bifurcation in *Hemidactylus flaviviridis*. © Swarup Fullonton.



X-Ray of *Hemidactylus flaviviridis*. © Swarup Fullonton.

doesn't fully detach but breaks enough to still spur tail regrowth. Even though lizards are arguably the most comprehensively studied reptilian family, and there are several studies on caudal autotomy in this taxon (Kaiser & Mushinsky 1994; Tyler et al. 2016), there is no single published record of tail bifurcation in house geckos *Hemidactylus* spp. from Odisha, India. Therefore, here we report an observation of tail bifurcation in the *Hemidactylus flaviviridis* and the first report from Talcher, Odisha State of India.

On 16 October 2023 at 1230h, one of the authors found a *Hemidactylus flaviviridis* with two tails perched on the upper part of the house in Talcher (21.1419 N & 85.1582 E). Body pale greyish-brown type with length 16 cm, digits with sub digital lamellae, one or two basal lamellae single rest divided, digit 1 of manus is bit more than half the length of digit 2, scales are granular on back, 11–14 lamellae under fourth toe, 5–7 pores on each side (Lajmi & Karanth 2020). It was seen that the bifurcation was from the same base of the original tail, that to the second tail appearing to have grown by the side of the original tail.

The regenerated tail was equal as the length of the original tail, which appeared same as the original, main tail was 4.2 cm and second 3.8 cm with girth 3.2 cm and 2.9 cm. For detail analysis we did an X-ray of the lizard specimen, from that it was quite clear that the internal, regenerated tail appears to be less intricately structured, with vertebrae and highly organised muscles in the original tail replaced by rigid cartilage and loosely connected muscle bundles. Another interesting observation was that this individual was particularly easy to capture and did not attempt to escape. Multiple tails in lizards currently remain unknown, as previous studies have only addressed the costs and fitness impacts associated with caudal autotomy and tail regrowth of single tails (Bateman & Fleming 2009). Further studies are required to understand comprehensive physiological examinations of the breakage planes and signals triggering caudal autotomy.

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# Black Softshell Turtle in Dima Hasao (North Cachar Hills), Assam

The Black Softshell Turtle *Nilssonia nigricans* (Anderson, 1875) is a relatively recent addition to the faunal list of Assam as it was thought to be restricted to the Bostami tank of Bangladesh (hence also called Bostami Turtle) until Praschag & Gemel (2002) reported the wild populations from the state. It is a rather rare turtle (other than temple ponds) in north-eastern India. Globally, its known range is a small one from Assam, Nagaland, and Tripura to Bangladesh. It has been listed as 'Critically Endangered' (Praschag et al. 2021). Ahmed & Das (2010) reported this species from Kaziranga and Manas National Parks, Biswanath Ghat, and temple ponds of Biswanath Ghat & Sarupeta, while Praschag & Gemel (2002) reported it from Nameri NP, Kamakhya temple pond, Nagshankar

Black Softshell Turtle *Nilssonia nigricans*. © Anwaruddin Choudhury.

temple pond, and Nazira. Longchar (2017) reported it from the hilly terrain of Wokha District, Nagaland. This has been reported in a newspaper and so far, not published in peer-reviewed journal.

The present account describes reporting of a live turtle photographed in Langting-Mupa Reserved Forest of Dima Hasao District (North Cachar Hills) in central Assam. On 17 March 2017, a turtle was photographed and observed closely near Hajong Lake (25.362N, 93.232E), a natural waterbody inside dense forest. This lake is also popularly known as 'turtle lake' and is given protection by forest department owing to occurrence and sightings of turtles in the wild. However, this lake was never treated by locals as a 'temple lake' as there are a few across Assam where devotees sometimes release turtles caught elsewhere. This lake is well inside a reserved forest with no temple in the vicinity. The patrolling staff of the department found it near the lake on land and brought it to the camp. Their motto was to release it back to the lake but since it was found on land, they wanted to see whether any injury was there. Its carapace was low and oval, and dark-grey in colouration, large head, plastron whitish and faint grey with four large callosities. The straight carapace length was 30.15 cm and straight carapace width was 17.5 cm. Its identification was further confirmed by expert (Firoz Ahmed pers. comm.).

Hajong Lake and its surrounding area has been notified as a Biodiversity Heritage Site in 2022 and in the list of fauna, *Nilssonia nigricans* has been mentioned and Fishing Cat *Prionailurus viverrinus* of which there is no record (ASBB 2024). Listing the turtle with species without any record indicates that the veracity of the list may need a recheck. The source of information or any publication reference has also not been mentioned. No methodology has been mentioned as to how the data was obtained.

In India, *Nilssonia nigricans* species is known from Brahmaputra floodplains except the record from Wokha and Hajong Lake (this report) which are from hilly terrain.

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# Electrocution, a threat to the Indian Flying Fox in Thoothukudi District, Tamil Nadu

The status of the Indian Flying Fox *Pteropus medius* as listed under the IUCN's Red List is 'Least Concern' and the population trend is indicated as "Decreasing" (Tsang 2020). It is declining worldwide, due to anthropogenic disturbance. It includes roost loss (cutting of roost trees) for road expansion, building construction and deforestation, hunting for food and medicine, crackers, fire/ smoke to disturb the bat colony, etc. (Mickleburgh et al. 2002; Srinivasulu & Srinivasulu 2004; Senthilkumar 2014).

In addition to the listed threats, electrocution (from power line accidents) is a growing threat to *Pteropus medius*. Similar threats were already reported in Karnataka (Molur et al. 2007), Assam (Ali 2010), and Andaman Islands (Rajeshkumar et al. 2013). All the previous studies were based on a few observations and incidences. However, I systematically observed *P. medius* individual power accidents in various places of Tiruchendur town and nearby villages

Electrocuted Indian Flying Fox Pteropus medius at foraging sites. © K. Senthilkumar.

**Electrocuted Indian Flying Fox *Pteropus medius* at Tiruchendur roost site. © K. Senthilkumar.**

(Thoothukudi District, Tamil Nadu, India) between August 2015 and November 2017. I recorded this electrocution of *P. medius* individuals within the day roost site and foraging sites up to 7 km distance from their roost trees. A total of 18 electrocuted *P. medius* individuals were observed, among these 16 individuals were observed in foraging sites, i.e., closer to fruit trees and the remaining two individuals were observed below the roost tree, where the power line passes. Mostly, young ones were made accidents on power lines during flight trials in their foraging area. Among these female bats (n = 11) were affected more compared to male (n = 7) individuals. Based on my observation, in two years *P. medius* electrocution occurred maximum during the rainy season (September–November).

Most of the electrocuted bats were dark black and few of them remained their original colour and became rigid, due to partial burn. The electrocution accident depends on an individual's body size, wingspan length, maturity, roosting, flight and foraging behaviours. When the wings touch two phases of the line, the bat was burned. The Indian Flying Foxes have large wingspan (about 1–1.5 m in length) compared to other bat genus (Bates & Harrison 1997). Mostly, the human settlement and agricultural areas power lines in-between gap is 0.5–1 m. So, easily the bat individuals were affected by power lines. In the case of microbats can easily fly between the power lines and their wingspan length is about less than 0.5 m (Bates & Harrison 1997).

One electrocuted male *P. medius* individual was collected from our college campus on 23 August 2016. During dark hours hundreds of *P. medius* individuals foraged in *Ficus religiosa*, *Syzygium cumini*, *Azadirachta indica*, *Terminalia* sp. trees of our college campus. It is the main foraging site of fruit bats in Tiruchendur town. Three electrocuted individuals were observed at very close to our college campus. One pup was noted in below the roost tree (*Terminalia arjuna*), which is located in Avuyadayar Pond, Tiruchendur.

Totally, five day roost sites were recorded in this area, related to this electrocution observation. Among these two of them (Paramankurichi & Udankudi) were already reported (Senthilkumar 2014) and details of the remaining

**Table 1. The Indian Flying Fox *Pteropus medius* electrocution details in Tiruchendur area, Thoothukudi District.**

| | Place/ location | Observed date | Latitude & Longitude | Sex | Distance from roost tree (~) |
|---|---|---|---|---|---|
| 1 | Paramankurichi 1 | 04.viii.2015 | 8.4862 N & 29.1759 E | Male | 400 m |
| 2* | Tiruchendur 1 | 02.x.2015 | 8.4943 N & 29.6620 E | Female | < 1 m |
| 3* | Meignanapuram 1 | 18.iii.2016 | 8.4730 ”N & 28.3829 E | Female | <1 m |
| 4 | Tiruchendur 2 | 23.viii.2016 | 8.5088 N & 30.5307 E | Male | 650 m |
| 5 | Tiruchendur 3 | 06.ix.2016 | 8.4970 N & 29.8219 E | Female | 300 m |
| 6 | Meignanapuram 2 | 05.x.2016 | 8.4759 N & 28.5572 E | Male | 200 m |
| 7 | Nadunalumoolaikinaru | 08.x.2016 | 8.4892 N & 29.3549 E | Female | 1 km |
| 8 | MelaTiruchendur | 21.xi.2016 | 8.4928 N & 29.5715 E | Female | 600 m |
| 9 | Paramankurichi 2 | 11.xii.2016 | 8.4843 N & 29.0630 E | Female | 800 m |
| 10 | KeelaNadunalumoolaikinaru | 24.xii.2016 | 8.4866 N & 29.1990 E | Female | 600 m |
| 11 | Tiruchendur 4 | 30.vi.2017 | 8.5019 N & 30.1160 E | Male | 400 m |
| 12 | Sathankulam 1 | 18.vii.2017 | 8.4493 N & 26.9582 E | Male | 5 km |
| 13 | Kulasekaranpattinam | 12.ix.2017 | 8.4105 N & 24.6337 E | Male | 5km |
| 14 | Tiruchendur 5 | 09.x.2017 | 8.5062 N & 30.3734 E | Female | 500 m |
| 15 | Tiruchendur 6 | 16.x.2017 | 8.5108 N & 30.6485 E | Male | 750 m |
| 16 | Chettikulam | 26.x.2017 | 8.4711 N & 28.2660 E | Female | 7 km |
| 17 | Nangaimozhi | 15.xi.2017 | 8.4693 N & 28.1604 E | Female | 800 m |
| 18 | Sathankulam 2 | 15.xi.2017 | 8.4485 N & 26.9127 E | Female | 5 km |

*Roosting site observation and all other observations were made in foraging sites.

sites (Tiruchendur, Meignanapuram and Thanjainagaram) are reported for the first time.

To conserve the Indian Flying Foxes, I recommend the Tamil Nadu Electric Board to avoid power lines near to large trees where bats are roosting and also to set up power lines with adequate gaps of more than 1.5 m. The use of insulated power cables may be another solution to avoid electrocution. Without taking any action, this species population will drastically decrease and threaten their survival.

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# Report of Great Blue Mime from Kakoi Reserve Forest, Assam

India is one of the 17 mega biodiverse countries in the world and home to almost 1,501 species of butterflies (Kunte 1997). Assam being a unit of two zoogeographic sub-regions, the Indian and the Indo-Chinese, and part of the eastern Himalayan region, one of the four biodiversity hotspots in the country with diverse climatic conditions, topological variations, and ecological habitats such as forests, grasslands, floodplains, hilly regions etc. (Gogoi et al. 2022) is immensely rich in butterfly diversity with around 962 species representing six families: Papilionidae, Lycaenidae, Riodinidae, Nymphalidae, Pieridae, and Hesperiidae. (Kehimkar 2016).

Kakoi Reserve Forest (27.3694 N, 94.0834 E) is an evergreen forest in the foothills of Arunachal Pradesh and occupying an area of 4,415.03 ha. It is located in the Lakhimpur District, Assam. The RF hosts a rich biodiversity, but no effective study has been conducted to assess the biodiversity (Saikia & Saikia 2020; Boruah & Saikia 2023).

***Papilio paradoxa* Zincken, 1831. © Gayatri Dutta.**

During a butterfly survey at Kakoi RF in September 2020, we came across an individual looking like a *Euploea* sp. Two individuals of the species were sighted in the riparian fringing habitat of the RF, where the species was mud-puddling. We photographed the individuals for further confirmation at around 1315 h. After comparing the photograph with the same-looking butterfly species and by using identification keys (Kehimkar 2016) we confirmed the species as *Papilio paradoxa*. Great Blue Mime *Papilio paradoxa* (Zincken, 1831) is a rare Schedule II butterfly species found in low-elevation forests of northeastern India, Bhutan, and Bangladesh (Gasse 2021). Upper forewing (UPF)

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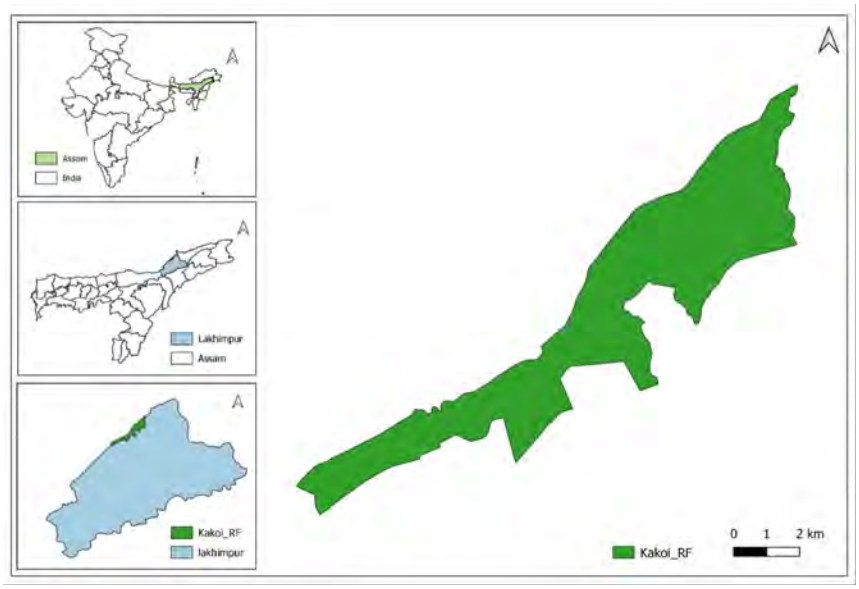


**The study area – Kakoi Reserve Forest, Lakhimpur, Assam.**

with blue gloss, a marginal row of bluish-white spots, a row of elongated blue spots, and a blue spot at the end-cell. Upper hindwing (UPH) dark brown, marginal row of white spots. While stripes between veins and in cells on female UPH. UN rich chocolate-brown. The Under forewing (UNF) cell has an indistinct short white streak. A series of white spots along the outer margin. The UPF of females is basal half dull brown and apical half brown shot with brilliant blue and has white stripes between veins and in cells on UNH (Khemikar 2016).

As per Gasse (2021), India hosts merely five Mime species, namely the Tawny Mime *Papilio agestor*, Gray 1831, Lesser Mime *Papilio epycides* Hewitson 1862, Blue-striped Mime *Papilio slateri*, Hewitson 1859, Great Blue Mime *Papilio paradoxa*, and Common Mime *Papilio clytia*, Linnaeus 1758. While all five are distributed across the northeastern region, their presence in Assam is notably rare. Singh (2017) documented the Great Blue Mime- *Papilio paradoxa* in the Jaipur Reserve Forest and Dehing Patkai National Park of Assam.

The larval food plant of Great Blue Mime is laurels (Lauraceae) (Gupta & Majumdar 2012). The larva displays a velvety hue of either black or green, adorned with fleshy spines and circular red spots along its sides. As for the pupa, it bears a striking resemblance to a fragmented twig, adopting a hue of green or brown mirroring that of the twig to which it securely attaches (Gupta & Majumdar 2012).

## Discussion

The Great Blue Mime exhibits Batesian mimicry as the male mimics blue crows and the female mimics *Euploea radamanthus*. Butterflies serve as an important pollinator and their diversity acts as an indicator of the ecological fitness of terrestrial biotypes and they are sensitive to the slightest alteration in environmental factors (Dutta et al. 2020). Occurrence of the Great Blue Mime *Papilio paradoxa* indicates Kakoi Reserve Forest as a healthy habitat for butterflies. Therefore, it is crucial to

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conserve and better manage the reserve forest to conserve the biodiversity of the area. However, more information about this species is needed to understand its distributional pattern and the ecological impact it might have.

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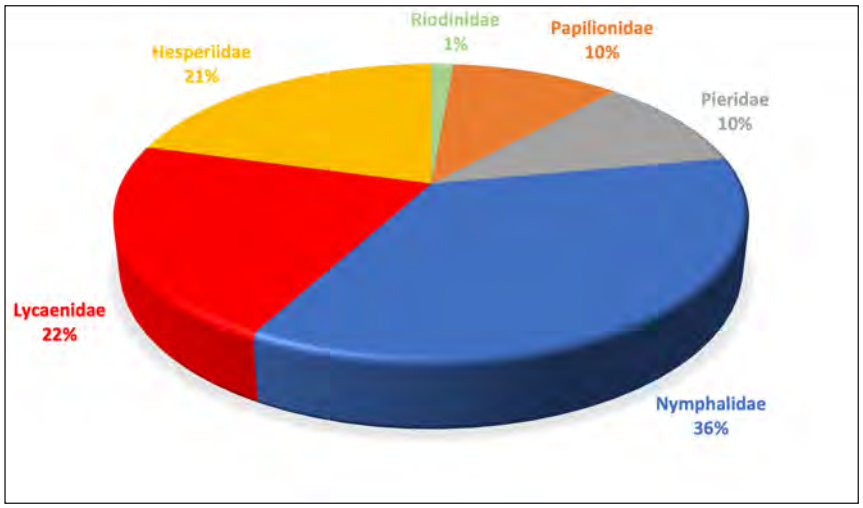
# An insight into the butterfly diversity of Nilachal Hill, Assam

Butterflies are brilliantly coloured and one of the most diverse groups of insects (Basfore & Buragohain 2024) belonging to the order Lepidoptera. In addition to their visual appeal, butterflies serve as reliable indicators of habitat health and demonstrate sensitivity to shifts in climate conditions (Ramana 2010).

The global butterfly population boasts an impressive diversity, encompassing an extensive array of about 20,000–25,000 distinct species (Wynter-Blyth 1957), out of which 1500 species are found in India (Venkataramani 1986). Furthermore, about 962 species and sub-species belonging to five different families have been reported from Assam (Evans 1957).

The current study reports an assessment of the butterfly diversity in the Nilachal Hill, located in the Kamrup metropolitan district of Assam, India. The globally renowned Kamakhya Temple situated on the hill holds significant historical, archaeological, and spiritual value. The hill spans an area of 2.6 km$^2$ (Bohra et al. 2024) and is situated geographically at 26.1677 N, 91.7110 E. The Nilachal Hill encompasses diverse habitats and is mostly dominated by human settlements, with a few thickly forested places interspersed.

A total of 47 field surveys were conducted between August 2022 and February 2024, each involving an investment of atleast four man-hours. The sampling strategy adopted the Pollard Walk methodology (Pollard 1982), entailing traversing approximately 500 m on designated trails across various habitats, including residential areas, forests, religious sites, and streams. Opportunistic surveys were also carried out, focusing on trails rich in flowering and fruiting plants, as well as areas with trees, bushes, rocks, and damp soil, known to attract butterflies for feeding, basking, and mud-puddling activities. Species identification was




**Family-wise abundance of butterflies in Nilachal Hill.**

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**Checklist of butterflies recorded from Nilachal Hill, Assam, India.**

| | Family | Scientific name | Common name | IUCN Red List |
|---|---|---|---|---|
| 1. | Papilionidae | *Atrophaneura varuna* (White 1842) | Common Batwing | LC |
| 2. | | *Graphium agamemnon* (Linnaeus 1758) | Tailed Jay | NA |
| 3. | | *Graphium doson* (C. & R. Felder 1864) | Common Jay | LC |
| 4. | | *Graphium megarus* (Westwood 1844) | Assam Spotted Zebra | NA |
| 5. | | *Graphium sarpedon* (Linnaeus 1758) | Common Bluebottle | LC |
| 6. | | *Pachliopta aristolochiae* (Fabricius 1775) | Common Rose | LC |
| 7. | | *Papilio agenor* Linnaeus 1758 | Great Mormon | LC |
| 8. | | *Papilio chaon* Westwood 1845 | Yellow Helen | NA |
| 9. | | *Papilio clytia* Linnaeus 1758 | Common Mime | NA |
| 10. | | *Papilio demoleus* Linnaeus 1758 | Lime Butterfly | NA |
| 11. | | *Papilio helenus* Linnaeus 1758 | Red Helen | NA |
| 12. | | *Papilio paris* Linnaeus 1758 | Paris Peacock | NA |
| 13. | | *Papilio polytes* Linnaeus 1758 | Common Mormon | NA |
| 14. | | *Troides aeacus* (C.& R. Felder 1860) | Golden Birdwing | LC |
| 15. | | *Troides helena* (Linnaeus 1758) | Common Birdwing | LC |
| 16. | Pieridae | *Appias albina* (Boisduval 1836) | Common Albatross | NA |
| 17. | | *Appias lyncida* (Cramer [1777]) | Chocolate Albatross | NA |
| 18. | | *Appias olferna* Swinhoe 1890 | Eastern Striped Albatross | NA |
| 19. | | *Catopsilia pomona* (Fabricius 1775) | Lemon Emigrant | NA |
| 20. | | *Delias descombesi* (Boisduval 1836) | Red spot Jezebel | NA |
| 21. | | *Delias hyparete* (Linnaeus 1758) | Painted Jezebel | NA |
| 22. | | *Delias pasithoe* (Linnaeus 1767) | Red-base Jezebel | NA |
| 23. | | *Eurema andersonii* (Moore 1886) | One-spot Grass Yellow | LC |
| 24. | | *Eurema blanda* (Boisduval 1836) | Three-spot Grass Yellow | NA |
| 25. | | *Eurema hecabe* (Linnaeus 1758) | Common Grass Yellow | NA |
| 26. | | *Gandaca harina* (Horsfield [1829]) | Tree Yellow | NA |
| 27. | | *Ixias pyrene* (Linnaeus 1758) | Yellow Orange Tip | NA |
| 28. | | *Leptosia nina* (Fabricius 1793) | Psyche | NA |
| 29. | | *Pieris brassicae* (Linnaeus 1758) | Large Cabbage White | NA |
| 30. | | *Pieris canidia* (Linnaeus 1768) | Indian Cabbage White | NA |
| 31. | Lycaenidae | *Anthene emolus* (Godart [1824]) | Common Ciliate Blue | NA |
| 32. | | *Anthene lycaenina* (Felder 1868) | Pointed Ciliate Blue | NA |
| 33. | | *Arhopala centaurus* (Fabricius 1775) | Centaur Oakblue | NA |
| 34. | | *Caleta decidia* (Hewitson 1876) | Angled Pierrot | LC |
| 35. | | *Caleta elna* (Hewitson 1876) | Elbowed Pierrot | LC |
| 36. | | *Castalius rosimon* (Fabricius 1775) | Common Pierrot | NA |
| 37. | | *Catochrysops strabo* (Fabricius 1793) | Forget-me-not | NA |

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| | Family | Scientific name | Common name | IUCN Red List |
|---|---|---|---|---|
| 38. | Lycaenidae | *Cheritra freja* (Fabricius 1793) | Common Imperial | LC |
| 39. | | *Chilades lajus* (Stoll [1780]) | Lime Blue | NA |
| 40. | | *Chilades pandava* (Horsfield [1829]) | Plains Cupid | LC |
| 41. | | *Curetis acuta* Moore 1877 | Acute Sunbeam | NA |
| 42. | | *Heliophorus epicles* (Godart [1824]) | Purple Sapphire | NA |
| 43. | | *Hypolycaena erylus* (Godart [1824]) | Common Tit | NA |
| 44. | | *Jamides alecto* (C. Felder 1860) | Metallic Cerulean | LC |
| 45. | | *Jamides bochus* (Stoll [1782]) | Dark Cerulean | NA |
| 46. | | *Jamides celeno* (Cramer [1775]) | Common Cerulean | NA |
| 47. | | *Lampides boeticus* (Linnaeus 1767) | Peablue | NA |
| 48. | | *Loxura atymnus* (Stoll 1780) | Yamfly | NA |
| 49. | | *Megisba malaya* (Horsfield [1828]) | Malayan | NA |
| 50. | | *Neopithecops zalmora* (Butler [1870]) | Common Quaker | NA |
| 51. | | *Prosotas dubiosa* (Semper [1879]) | Tailless Lineblue | NA |
| 52. | | *Prosotas nora* (C. Felder 1860) | Common Lineblue | NA |
| 53. | | *Pseudozizeeria maha* (Kollar [1844]) | Pale Grass Blue | NA |
| 54. | | *Rapala iarbas* (Fabricius 1787) | Common Red Flash | NA |
| 55. | | *Rapala manea* (Hewitson 1863) | Slate Flash | NA |
| 56. | | *Spalgis epius* (Westwood [1851]) | Apefly | NA |
| 57. | | *Surendra quercetorum* (Moore [1858]) | Common Acacia Blue | NA |
| 58. | | *Leptotes plinius* (Fabricius 1793) | Zebra Blue | NA |
| 59. | | *Taraka hamada* (Druce 1875) | Forest Pierrot | NA |
| 60. | | *Zeltus amasa* (Hewitson [1865]) | Fluffy Tit | NA |
| 61. | | *Zizeeria karsandra* (Moore 1865) | Dark Grass Blue | NA |
| 62. | Riodinidae | *Abisara echerius* (Stoll [1790]) | Plum Judy | NA |
| 63. | | *Zemeros flegyas* (Cramer [1780]) | Punchinello | NA |
| 64. | Nymphalidae | *Acraea terpiscore* (Linnaeus 1758) | Tawny Coster | NA |
| 65. | | *Ariadne merione* (Cramer [1777]) | Common Castor | NA |
| 66. | | *Athyma inara* Westwood 1850 | Colour Sergeant | NA |
| 67. | | *Athyma perius* (Linnaeus 1758) | Common Sergeant | NA |
| 68. | | *Cethosia biblis* (Drury [1773]) | Red Lacewing | NA |
| 69. | | *Cethosia cyane* (Drury [1773]) | Leopard Lacewing | NA |
| 70. | | *Charaxes bernardus* (Fabricius 1793) | Tawny Rajah | NA |
| 71. | | *Charaxes bharata* C. & R. Felder [1867] | Common Nawab | NA |
| 72. | | *Charaxes marmax* Westwood 1847 | Yellow Rajah | NA |
| 73. | | *Chersonesia intermedia* Martin 1895 | Wavy Maplet | LC |
| 74. | | *Chersonesia risa* (Doubleday [1848]) | Common Maplet | NA |
| 75. | | *Cirrochroa aoris* Doubleday [1847] | Large Yeoman | NA |
| 76. | | *Cirrochroa tyche* C. & R. Felder 1861 | Common Yeoman | NA |

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| | Family | Scientific name | Common name | IUCN Red List |
|---|---|---|---|---|
| 77. | | *Cyrestis thyodamas* Doyère [1840] | Oriental Map Butterfly | NA |
| 78. | | *Danaus chrysippus* (Linnaeus 1758) | Plain Tiger | LC |
| 79. | | *Danaus genutia* (Cramer [1779]) | Striped Tiger | NA |
| 80. | | *Discophora sondaica* Boisduval 1836 | Common Duffer | NA |
| 81. | | *Elymnias hypermnestra* (Linnaeus 1763) | Common Palmfly | NA |
| 82. | | *Elymnias malelas* (Hewitson 1863) | Spotted Palmfly | NA |
| 83. | | *Euploea core* (Cramer [1780]) | Common Crow | LC |
| 84. | | *Euploea midamus* (Linnaeus 1758) | Blue-spotted Crow | NA |
| 85. | | *Euploea mulciber* (Cramer [1777]) | Striped Blue Crow | NA |
| 86. | | *Euthalia aconthea* (Cramer [1777]) | Common Baron | NA |
| 87. | | *Euthalia lubentina* (Cramer [1777]) | Gaudy Baron | NA |
| 88. | | *Hypolimnas bolina* (Linnaeus 1758) | Great Eggfly | NA |
| 89. | | *Junonia almana* (Linnaeus 1758) | Peacock Pansy | LC |
| 90. | | *Junonia atlites* (Linnaeus 1763) | Grey Pansy | NA |
| 91. | | *Junonia hierta* (Fabricius 1798) | Yellow Pansy | LC |
| 92. | | *Junonia iphita* (Cramer [1779]) | Chocolate Pansy | NA |
| 93. | | *Junonia lemonias* (Linnaeus 1758) | Lemon Pansy | NA |
| 94. | | *Lebadea martha* (Fabricius 1787) | Knight | NA |
| 95. | | *Lethe chandica* (Moore [1858]) | Angled Red Forester | NA |
| 96. | Nymphalidae | *Lethe europa* (Fabricius 1775) | Bamboo Treebrown | DD |
| 97. | | *Lethe rhoria* (Fabricius 1787) | Common Treebrown | NA |
| 98. | | *Melanitis leda* (Linnaeus 1758) | Common Evening Brown | LC |
| 99. | | *Melanitis phedima* (Cramer [1780]) | Dark Evening Brown | NA |
| 100. | | *Moduza procris* (Cramer [1777]) | Commander | NA |
| 101. | | *Mycalesis mineus* (Linnaeus 1758) | Dark-branded Bushbrown | NA |
| 102. | | *Mycalesis perseus* (Fabricius 1775) | Common Bushbrown | NA |
| 103. | | *Mycalesis visala* Moore [1858] | Long-branded Bushbrown | NA |
| 104. | | *Neptis hylas* (Linnaeus 1758) | Common Sailer | NA |
| 105. | | *Orsotriaena medus* (Fabricius 1775) | Medus Brown | NA |
| 106. | | *Pantoporia hordonia* (Stoll [1790]) | Common Lascar | NA |
| 107. | | *Parantica aglea* (Stoll [1782]) | Glassy Tiger | NA |
| 108. | | *Parthenos sylvia* (Cramer [1775]) | Clipper | NA |
| 109. | | *Symbrenthia lilaea* (Hewitson 1864) | Common Jester | DD |
| 110. | | *Tanaecia lepidea* (Butler 1868) | Grey Count | NA |
| 111. | | *Vagrans egista* (Cramer [1780]) | Vagrant | NA |
| 112. | | *Ypthima baldus* (Fabricius 1775) | Common Five-ring | NA |
| 113. | | *Ypthima huebneri* Kirby 1871 | Common Four-ring | NA |
| 114. | | *Vindula erota* (Fabricius 1793) | Cruiser | NA |
| 115. | | *Tirumala limniace* (Cramer [1775]) | Blue Tiger | NA |

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| | Family | Scientific name | Common name | IUCN Red List |
|---|---|---|---|---|
| 116. | Hesperiidae | *Ampittia subvittatus* (Moore 1878) | Tiger Hopper | NA |
| 117. | | *Ancistroides nigrita* (Latreille [1824]) | Chocolate Demon | NA |
| 118. | | *Baoris unicolor* Moore [1884] | Black Paint-Brush Swift | NA |
| 119. | | *Borbo cinnara* (Wallace 1866) | Rice Swift | NA |
| 120. | | *Burara harisa* (Moore [1866]) | Harisa Orange Awlet | NA |
| 121. | | *Cephrenes acalle* (Höpffer 1874) | Plain Palm Dart | NA |
| 122. | | *Erionota acroleuca* (Wood-Mason & de Nicéville 1881) | Small Palm-redeye | NA |
| 123. | | *Gerosis bhagava* (Moore [1866]) | Common Yellow-breasted flat | NA |
| 124. | | *Gerosis phisara* (Moore 1884) | Dusky Yellow-breast flat | NA |
| 125. | | *Gerosis sinica* (C. & R. Felder 1862) | White Yellow-breasted flat | NA |
| 126. | | *Halpe zema* (Hewitson 1877) | Banded Ace | NA |
| 127. | | *Hasora chromus* (Cramer [1780]) | Common Banded Awl | NA |
| 128. | | *Lambrix salsala* (Moore [1866]) | Chestnut Bob | NA |
| 129. | | *Matapa sasivarna* (Moore [1866]) | Black-veined Branded Redeye | NA |
| 130. | | *Notocrypta curvifascia* (C. & R. Felder 1862) | Restricted Demon | NA |
| 131. | | *Notocrypta paralysos* (Wood-Mason & de Nicéville 1881) | Common Banded Demon | NA |
| 132. | | *Odontoptilum angulata* (C. Felder 1862) | Chestnut Angle | NA |
| 133. | | *Oriens gola* (Moore 1877) | Common Dartlet | NA |
| 134. | | *Parnara* sp. | | NA |
| 135. | | *Pelopidas assamensis* (de Nicéville 1882) | Great Swift | NA |
| 136. | | *Polytremis lubricans* (Herrich-Schäffer 1869) | Contiguous Swift | NA |
| 137. | | *Pseudocoladenia dan* (Fabricius 1787) | Fulvous Pied Flat | NA |
| 138. | | *Sarangesa dasahara* (Moore [1866]) | Common Small Flat | NA |
| 139. | | *Scobura isota* (Swinhoe 1893) | Khasi Hills Bob | NA |
| 140. | | *Suastus gremius* (Fabricius 1798) | Oriental Palm Bob | NA |
| 141. | | *Tagiades gana* (Moore [1866]) | Suffused Snow Flat | NA |
| 142. | | *Tagiades japetus* (Stoll [1781]) | Common Snow Flat | NA |
| 143. | | *Telicota colon* (Fabricius 1775) | Pale Palm-Dart | NA |
| 144. | | *Udaspes folus* (Cramer [1775]) | Grass Demon | NA |
| 145. | | *Unkana ambasa* (Moore [1858]) | Hoary Palmer | NA |

performed in the field or from photos using literature (Evans 1932; Kehimkar 2016) and web sources like ifoundbutterflies (https://www.ifoundbutterflies.org/).

A total of 145 species of butterflies belonging to 95 genera and six families were recorded during the study. Among the recorded species, 19 species are listed as 'Least Concern' (LC), two as 'Data Deficient' (DD), and 124 species remain non-assessed under the IUCN Red

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**1. *Atrophaneura varuna*, 2. *Graphium agamemnon*, 3. *Graphium doson*, 4. *Pachliopta aristolochiae*, 5. *Papilio agenor*, 6. *Appias olferna*, 7. *Catopsilia pomona*, 8. *Delias descombesi*, 9. *Delias hyparete*, 10. *Leptosia nina*, 11. *Caleta decidia*, 12. *Chilades lajus*, 13. *Curetis acuta*, 14. *Hypolycaena erylus*, 15. *Prosotas dubiosa*, 16. *Abisara echerius*, 17. *Zemeros flegyas*, 18. *Cethosia cyane*, 19. *Charaxes bharata*, 20. *Moduza procris*, 21. *Ypthima baldus*, 22. *Vindula erota*, 23. *Erionota acroleuca*, 24. *Scobura isota*, 25. *Udaspes folus.***

List. Additionally, Nymphalidae was found to be the most dominant family with 52 (36%) species, followed by Lycaenidae with 31 (22%), Hesperiidae with 30 (21%), Pieridae with 15 (10%), Papilionidae with 15 (10%), and the least was Riodinidae with only 2 (1%) species. This study established that a wide range of species may coexist in urban surroundings. Recently, the butterfly species *Unkana ambasa* was also reported from Nilachal Hill, which

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is the first visual proof of the adult species' existence in Assam (Bohra et al. 2024). Hence, Nilachal Hill which has been largely overlooked for biological richness, turned out to be a hub of butterflies. With the exception of the undisturbed forest patches, a large portion of the region is inhabited by people, which will inevitably reduce biodiversity. Inventorying the biodiversity of this particular forest patch is thus crucial because it is in jeopardy due to pollution and habitat loss brought on by numerous anthropogenic activities.

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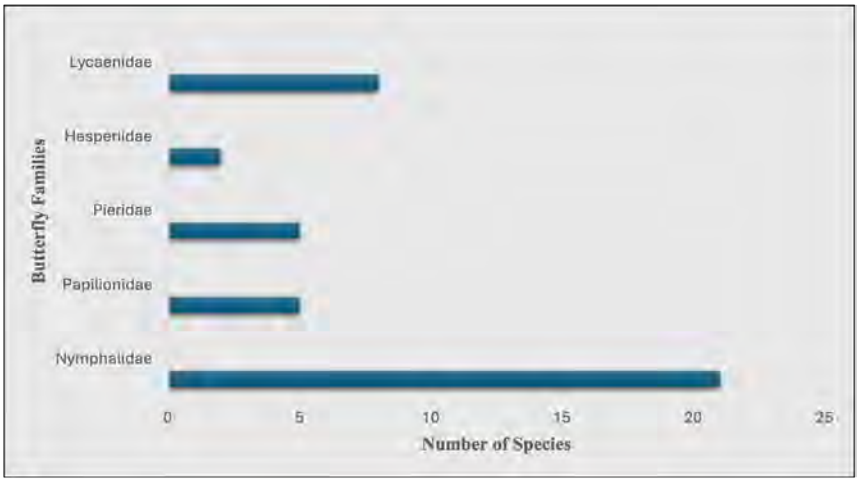
# Diversity of butterflies in Horticulture Research Station of Assam Agriculture University, Guwahati, India

The northeastern region of India, south of the Brahmaputra River hosts remarkable biodiversity that includes a high proportion of endemic, rare, and endangered species (Modak et al. 2018). A total of 962 species and subspecies of butterflies have been reported from Assam, of which five are endemic (Bishaya et al. 2021). The main reason for this phenomenal diversity is the region's unique bio-geographic location at the junction of Indian and Indo-Chinese sub-regions (Saikia 2014).

Assam in northeastern India is ecologically very important as it is a part of the Indo-Burma global biodiversity hotspot and over the years, numerous workers have studied the butterfly fauna in different parts of the state. However, very little data is available on the diversity of butterflies inhabiting human-managed farms and gardens. Therefore, the present study attempts to fill in this research gap by documenting the diversity of butterflies in the Horticulture Research Station of Assam Agriculture University, Guwahati, Assam, from March 2022 to August 2023. The research station is situated in the Kamrup Metropolitan district of Assam, at the western end of Guwahati City by the side of the National Highway 37. It lies at 26.1058 N, 91.6099 E and is spread over an area of 32 ha. Different varieties of fruits, vegetables, flowers, spices, and medicinal and aromatic plants are cultivated in the horticulture research station. This plantation provides a better opportunity for butterflies in terms of nectarine and host plants.

During the study, butterflies were documented using the Pollard Walk survey method (Pollard 1982), which involved walking on trails at a speed of approximately 100 m per 20 minutes. The common




**Distribution of species across the butterfly families observed.**

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**Table 1. List of butterfly species recorded in Horticulture Research Station, Guwahati, Assam.**

| | Family | Common Name | Scientific Name |
|---|---|---|---|
| 1. | Nymphalidae | Clear Sailer | *Neptis nata* Moore [1858] |
| 2. | | Knight | *Lebadea martha* (Fabricius 1787) |
| 3. | | White-line Bush Brown | *Telinga malsaraperseus* (Moore [1858]) |
| 4. | | Northern Common Jester | *Symbrenthia lilaea* (Hewitson 1864) |
| 5. | | Common Baron | *Euthalia aconthea* (Cramer [1777]) |
| 6. | | Common Five-ring | *Ypthima baldus* (Fabricius 1775) |
| 7. | | Common Four-ring | *Ypthima huebneri* Kirby 1871 |
| 8. | | Plain Tiger | *Danaus chrysippus* (Linnaeus 1758) |
| 9. | | Tawny Coster | *Acraea terpsicore* (Linnaeus 1758) |
| 10. | | Grey Pansy | *Junonia atlites* (Linnaeus 1763) |
| 11. | | Yellow Pansy | *Junonia hierta* (Fabricius 1798) |
| 12. | | Lemon Pansy | *Junonia lemonias* (Linnaeus 1758) |
| 13. | | Peacock Pansy | *Junonia almana* (Linnaeus 1758) |
| 14. | | Common Palmfly | *Elymnias hypermnestra* (Linnaeus 1762) |
| 15. | | Spotted Palmfly | *Elymnias malelas* (Hewitson 1863) |
| 16. | | Long-branded Bush Brown | *Mycalesis visala* Moore [1858] |
| 17. | | Common Evening Brown | *Melanitis leda* (Linnaeus 1758) |
| 18. | | Great Eggfly | *Hypolimnas bolina* (Linnaeus 1758) |
| 19. | | Common Castor | *Ariadne merione* (Cramer [1777]) |
| 20. | | Common Sailer | *Neptis hylas* (Linnaeus 1758) |
| 21. | | Medus Brown | *Orsotriaena medus* (Fabricius 1775) |
| 22. | Papilionidae | Common Jay | *Graphium doson* (C. & R. Felder 1864) |
| 23. | | Common Bluebottle | *Graphium sarpedon* (Linnaeus 1758) |
| 24. | | Lime Butterfly | *Papilio demoleus* Linnaeus 1758 |
| 25. | | Red Helen | *Papilio helenus* Linnaeus 1758 |
| 26. | | Common Mormon | *Papilio polytes* Linnaeus 1758 |
| 27. | Lycaenidae | Common Ciliate Blue | *Anthene emolus* (Godart [1824]) |
| 28. | | Centaur Oakblue | *Arhopala centaurus* (Fabricius 1775) |
| 29. | | Common Pierrot | *Castalius rosimon* (Fabricius 1775) |
| 30. | | Lime Blue | *Chilades lajus* (Stoll [1780]) |
| 31. | | Pale Grass Blue | *Pseudozizeeria maha* (Kollar [1844]) |
| 32. | | Purple Sapphire | *Heliophorus epicles* (Godart [1824]) |
| 33. | | Yamfly | *Loxura atymnnus* (Stoll 1780) |
| 34. | | Dark Grass Blue | *Zizeeria karsandra* (Moore 1865) |
| 35. | Hesperiidae | Small Branded Swift | *Pelopidas mathias* (Fabricius 1798) |
| 36. | | Chocolate Demon | *Ancistroides nigrita* (Latreille [1824]) |

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| | Family | Common Name | Scientific Name |
|---|---|---|---|
| 37. | Pieridae | Common Grass Yellow | *Eurema hecabe* (Linnaeus 1758) |
| 38. | | Psyche | *Leptosia nina* (Fabricius 1793) |
| 39. | | Asian Cabbage White | *Pieris canidia* (Linnaeus 1768) |
| 40. | | Lemon Emigrant | *Catopsilia pomona* (Fabricius 1775) |
| 41. | | Red-base Jezebel | *Delias pasithoe* (Linnaeus 1767) |

butterflies observed during the study were identified on the spot during sampling while others were identified from photographs using existing literature (Evans 1932; Kehimkar 2008).

A total of 41 species of butterflies belonging to five families and 32 genera were recorded during the present study (Table 1). Out of the recorded families, Nymphalidae was found to be dominant with 21 species followed by Lycaenidae (8), Papilionidae (5), Pieridae (5), and Hesperiidae (2).

The geographical location of any area, its climatic conditions, and vegetative composition are essential requisites for supporting a rich diversity of butterflies. Among the five families observed the family Nymphalidae was found to be the most dominant. Twenty-one out of 41 species were from Nymphalidae, which accounts for approximately 43% of the total finding. Similar records of the dominance of the Nymphalidae family were found in studies conducted on the Dibrugarh University campus, Assam University campus, RRL campus, and Maliata Reserved Forest of Assam (Bhuyan et al. 2005; Bora & Meiti 2014; Dutta et al. 2020; Basfore & Buragohain 2024).
The comprehensive documentation and analysis of butterfly diversity in an area helps in understanding the potential roles played by the species (Gogoi et al. 2023) and provides valuable insights into species composition and distribution, emphasizing the necessity for targeted conservation strategies. Understanding these patterns is crucial for preserving butterfly populations, which serve as important biological indicators of environmental health and biodiversity. Thus, continued monitoring and conservation efforts are essential to protect these vital components of our ecosystem.

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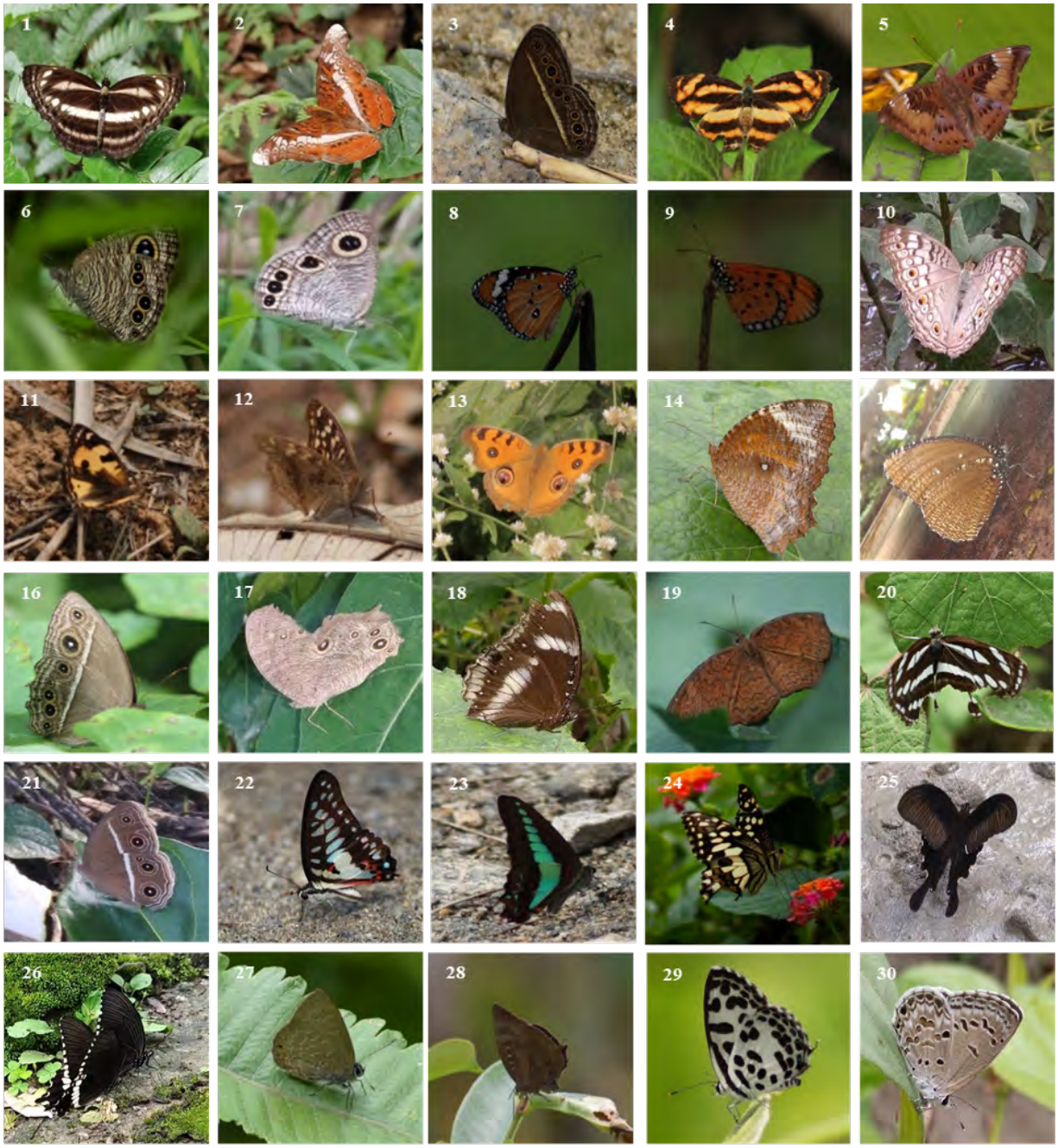


1. *Neptis nata* Moore [1858], 2. *Lebadea martha* (Fabricius 1787), 3. *Telinga malsaraperseus* (Moore [1858], 4. *Symbrenthia lilaea* (Hewitson 1864), 5. *Euthalia aconthea* (Cramer [1777]), 6. *Ypthima baldus* (Fabricius 1775), 7. *Ypthima huebneri* Kirby 1871, 8. *Danaus chrysippus* (Linnaeus 1758), 9. *Acraea terpsicore* (Linnaeus 1758), 10. *Junonia atlites* (Linnaeus 1763), 11. *Junonia hierta* (Fabricius 1798), 12. *Junonia lemonias* (Linnaeus 1758), 13. *Junonia almana* (Linnaeus 1758), 14. *Elymnias hypermnestra* (Linnaeus 1762), 15. *Elymnias malelas* (Hewitson 1863), 16. *Mycalesis visala* Moore [1858], 17. *Melanitis leda* (Linnaeus 1758), 18. *Hypolimnas bolina* (Linnaeus 1758), 19. *Ariadne merione* (Cramer [1777]), 20. *Neptis hylas* (Linnaeus 1758), 21. *Orsotriaena medus* (Fabricius 1775), 22. *Graphium doson* (C. & R. Felder 1864), 23. *Graphium sarpedon* (Linnaeus 1758), 24. *Papilio demoleus* Linnaeus 1758, 25. *Papilio helenus* Linnaeus 1758, 26. *Papilio polytes* Linnaeus 1758, 27. *Anthene emolus* (Godart [1824]), 28. *Arhopala centaurus* (Fabricius 1775), 29. *Castalius rosimon* (Fabricius 1775), 30. *Chilades lajus* (Stoll [1780]).

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**31. *Pseudozizeeria maha* (Kollar [1844]), 32. *Heliophorus epicles* (Godart [1824]), 33. *Loxura atymnnus* (Stoll 1780), 34. *Zizeeria karsandra* (Moore 1865), Family: Hesperiidae 35. *Pelopidas mathias* (Fabricius 1798), 36. *Ancistroides nigrita* (Latreille [1824]), Family: Pieridae 37. *Eurema hecabe* (Linnaeus 1758), 38. *Leptosia nina* (Fabricius 1793), 39. *Pieris canidia* (Linnaeus 1768), 40. *Catopsilia pomona* (Fabricius 1775), 41. *Delias pasithoe* (Linnaeus 1767).**

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# Rare sighting and conservation threats to Black Francolin in West Midnapore, West Bengal

*Francolinus francolinus* (Linnaeus, 1766). © Suman Pratihar.

The Grey Francolin and the Black Francolin belong to the "Francolin" group, which comprises 21 species and which has a worldwide distribution (Mahmood et al. 2010). The Black Francolin species is found in the various ecological zones of India starting from Kashmir to West Bengal and also in Nepal (Heidari et al. 2009). Black Francolin or 'Kala Teeter' in Hindi is also a state bird of Haryana. The Black Francolin is jet black in colour with streaks of gold and white cheek patches and a touch of copper near the collar. It is found in arid grasslands, forests, and agricultural tracts. It breeds from April to July; the breeding season varies in different ranges (Sharif 2014). The nests are constructed on the ground. The female makes a shallow scrape, concealed with vegetation, very difficult to be detected by predators (Khan 2010). It is frequently spotted in places that have thick vegetation as cover. It plays an important roles in the ecosystem by spreading seeds of plants and pollination. Nests were situated in agriculture field's border areas where there was thick grass cover and these grass and crop fields were surrounded with Shal *Shorea robusta* forest on one side and bamboo on the other.

Midnapore is located at 22.250 N & 87.650 E at 23m. West Bengal is a state in eastern India. It was early in the morning when we started our survey in Bhadulota jungle area in May 2020. We walked more than 2 km from the main road deep into the forest. During our continuous bird monitoring, we spotted two black birds with cheek patches just beside a paddy field. One of them quickly disappeared, but we were able to photograph the other. Then we started visiting that place frequently.

We identified the bird as Black Francolin *Francolinus francolinus* though we were unable to identify the bird at the subspecies level. We identified the species with

the following morphological characters. Jet black bird with short tail; upper part and flanks spotted white and fulvous; white patch on cheeks, chestnut collar; brownish red leg, black tail had white narrow bars and male similar to female but paler. We also have spotted the nest in grass line depression in bare ground. We also found rice, dried peas, and grass seeds that are the main dietary items for black francolin. When we spoke to the farmers in that area we understood that they used to kill the birds for meat. They prepared a loop of rope near their nest to trap the first bird. Then by using the captured bird they trapped others. We convinced them not to kill the shy and rare bird.

The Black Francolin is one of the most valued game birds of Pakistan (Riaz et al. 2011) due its delicate flavour and important source of bush meat for poor people of Asia (Forcina et al. 2015). In many countries of Asia, Black Francolin is reared for meat, eggs and cock fighting among birders. According to media reports, despite the ban on hunting of francolins, illegal poaching continues. Illegal sale of bird meat happens clandestinely in many parts of the country. In Pakistan, hunting of francolins is extensive and their meat is available in hotels at a premium price. Despite its camouflage and swiftness, in India, people manage to capture this bird for sport, meat, and hunting. In West Bengal, village people illegally keep a pair of birds in cage as pets. A Calcutta High Court order in 2019 put a complete ban on ritual hunting in various districts of southwestern Bengal. The court also directed the civil administration as well as the police authorities to provide all possible cooperation to the chief wildlife warden to stop the hunt. Illegal hunting, habitat destruction and their fragmentation were observed as the main reasons of its population decline in some areas of the Himalayan region. Black Francolins aren't uncommon, in fact they are classified as 'Least Concern' under the IUCN Red List. They were abundant earlier till they got hunted exceptionally.

It was in 2018, when the media flashed the report that a renowned cricketer-turned-politician got into trouble because of the gift he received from Pakistan, a Masala-stuffed Black Francolin. Keeping the stuffed bird is illegal under the Indian Wildlife Protection Act as it invites a jail term up to three years or Rs 25,000 fine or both.

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# Himalayan Buzzard spotted in Chhattisgarh: a new addition to the region's avifauna

The Himalayan Buzzard *Buteo refectus* is a medium-sized, polymorphic raptor found in the Himalaya, from Jammu & Kashmir to possibly Bhutan. It is a resident bird of the Himalaya and a winter visitor to the Himalaya, northeastern India and Bangladesh (Rasmussen & Anderton 2012). Due to its complex taxonomic history, there has been significant confusion regarding its status and distribution in India. Identifying the Himalayan Buzzard in the field is challenging because it resembles the Common Buzzard *Buteo buteo vulpinus* and the Long-legged Buzzard *Buteo rufinus*. Notably, the Long-legged Buzzard is a common winter migrant in Gujarat, while the Common Buzzard is less frequently observed in Gujarat (Ganpule et al. 2022). Grimmett et al. (2011) did not recognize the Himalayan Buzzard as a distinct species in their research.

Himalayan Buzzard. © Pratik Thakur.

On 22 October 2023, I visited Ramgarh Hills in Surguja. While trekking up Pugdandee Mountain to Maa Kali Mandir (22.895N, 82.908E), I observed a Shaheen Falcon gliding circularly over the cliff. Positioned below the cliffs, our view was limited. When the bird flew closer, I managed to capture some photographs. Subsequently, another raptor, resembling the Shaheen Falcon appeared, and I managed to take a single photograph. Despite waiting until sunset, the buzzard did not return. The bird was not sighted in subsequent visits on 29 October and 12 November at the same location.

The raptor observed had a dark brown belly contrasting with a pale brown breast, a dark moustachial stripe, dark carpals, barring on the lower belly, a dark tail band, and a dark trailing edge to the wings, with barring extending onto the outer primaries. The pectoral band was obscured with barring, and the dark tail band, barred belly, and dark trailing edge indicated it was an adult. The solid, even-width belly band was conspicuous. After thorough comparison with standard literature (Grimmett et al.

2011; Rasmussen & Anderton 2012; Ganpule & Bhatt 2014; Ganpule et al. 2022), and in consultation with ornithologists Ravi Naidu and Nirav Bhatt, also confirmed by Envis-BNHS, I concluded that the bird was a juvenile Himalayan Buzzard. Unlike the Common Buzzard, which has more uniform coloration below and lacks dark carpals and a distinct dark belly band, the Himalayan Buzzard features a dark belly band extending further than the upper breast markings, dark carpals, and a prominent moustachial stripe. Additionally, the Himalayan Buzzard has a broader tail band and barring on the outer primaries. Although similar to the Long-legged Buzzard, juvenile Long-legged Buzzards can be distinguished by their sparsely barred secondaries, longer wings, streaked lesser coverts, and longer tarsi. They also have a powerful beak, stronger tarsi, and a smaller head compared to juveniles, while the Himalayan Buzzard appears more compact (Ganpule et al. 2022).

Ganpule (2023) provides compelling evidence of the Himalayan Buzzard's presence in peninsular India beyond the Himalayan Arc, with records from Odisha, Tamil Nadu, and Gujarat. This species was reported from Valmiki Tiger Reserve in Bihar (Choudhury 2016). Previous bird studies did not mention about the occurrence of this species in Chhattisgarh (Chandra & Boaz 2018 a,b,c; Naidu et al. 2021; Bharos et al. 2023). Bharos et al. (2023) reported nine Himalayan and sub-Himalayan species from the Surguja region. This study, along with findings by Thakur (2023) on the Grey Bushchat and Gupta & Bharos (2023) on the White-capped Redstart, as well as observations of the Himalayan Buzzard, indicate the distribution pattern of Himalayan species in the northern hills of Chhattisgarh. Tyabji (1994) suggested that conducting a comprehensive survey of the entire northeastern part of Madhya Pradesh (now part of Chhattisgarh), which lies within the Vindhyachal biogeographic region, could reveal significant insights into the distribution of Himalayan or sub-Himalayan species that were previously thought to exist in central India. The sighting of the Himalayan Buzzard marks the first recorded instance of this species in Chhattisgarh and adds a new entry to the list of Himalayan species observed in Peninsular India.

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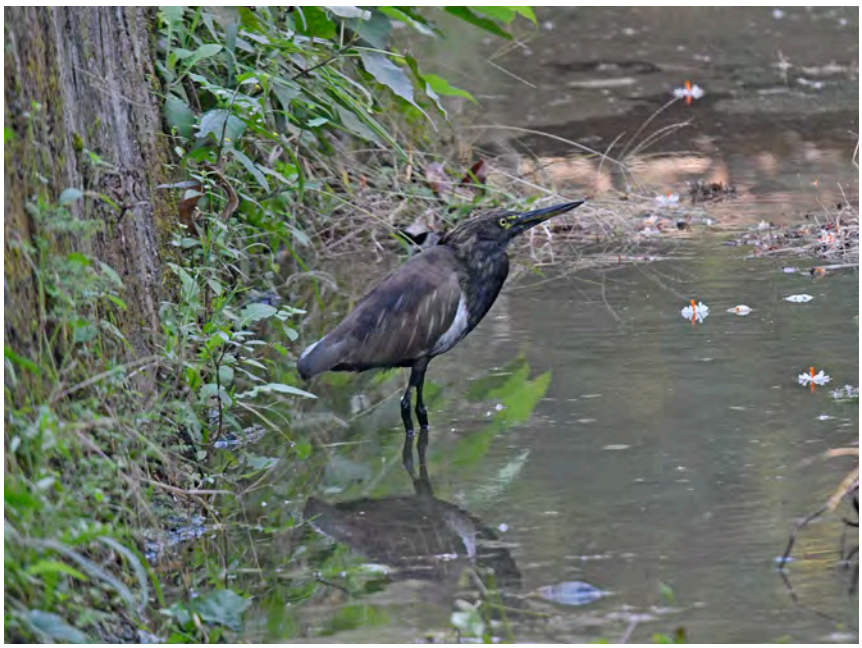
# A melanistic Pond Heron *Ardeola grayii* in Assam

Melanism is the increased development of the dark-coloured pigment melanin in the skin and feather of a bird (also other animals, especially mammals). In such cases the animals look much darker than the normal colour phases. I here report a melanistic Pond Heron *Ardeola grayii*.



**A dark-phased (possible partially-melanistic) Pond Heron *Ardeola grayii* in Islampur kabristan, Guwahati. ©Anwaruddin Choudhury.**

In the month of November 2023, in 'kabristan' (graveyard) located in Islampur locality (26.179 N, 91.760 E, 47 m) of Guwahati city in Assam, on at least three days I observed a Pond Heron that surprised me. Its size, shape and activities were like that of a Pond Heron but it looked different. It had whitish wings but its saddle was dark blackish-brown which in a normal bird is brown (non-breeding) and maroon-brown (breeding). Head and neck striped like normal Pond Heron but with deeper and lighter blackish-brown or deep grey. There were also light-coloured streaks on scapulars. Bill was also dark with some yellow streaks on lower mandible. Wings were whitish like in normal Pond Heron. I first noticed it on 10 November 2023, then on 11 November, I photographed it with mobile. On 15 November, I took some good photographs with a DSLR. It was standing on the banks of a 'nullah' flowing down from a small hillock. It was also often seen wading along the nullah itself. My next visit was on 30 November when I did not see it. In case of Indian Pond Heron there are no reports of any

melanism so far (Mahabal et al. 2016). There are reports of melanistic Green Heron *Butorides virescens* from Cuba (McLachlan 2011). Albinism and melanism are generally rare but occurs in many species. Such aberrations have been reviewed recently (Mahabal et al. 2016), who summarised by stating that the review showed that brown and progressive greying are the most common colour aberrations in Indian birds, while albinos were seldom encountered in the wild. They also mentioned that melanism is easier to identify than albinism.

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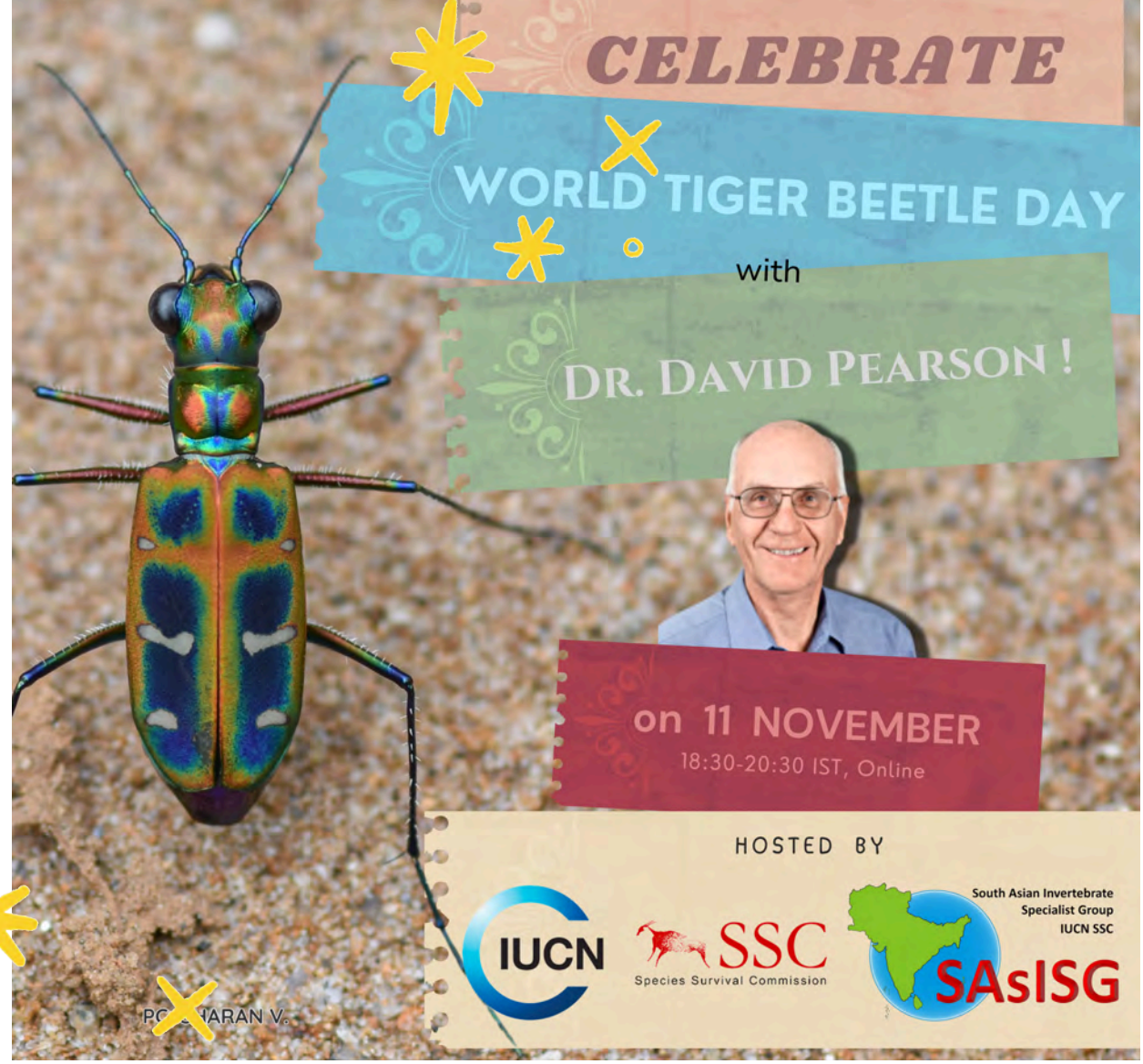


# TIGER BEETLE DAY CELEBRATION

Dr. David Pearson, a Research Professor at Arizona State University, USA, has conducted extensive research on Tiger Beetle ecology, natural history, and biogeography using mathematical modelling, across the world. He has been actively conserving Tiger Beetles via education, citizen science, and popular writings. To honour his contributions and dedication to the species, experts at the **Red List Assessment Workshop of Tiger Beetles of India**, in May 2024, decided to celebrate his birthday on 11 November as the World Tiger Beetle Day.

To celebrate the day, David will be giving a talk on 'Story of my field encounters with Tiger Beetles & how one can conserve them' at 18:30 IST for two hours on 11 November 2024.

To register for the talk, **click here**

If you haven't already, check out his amazing book on 'A Field Guide to the Tiger Beetles of India: Identification and Biology of the Cicindelidae'!

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