



SCALE, SLITHER, AND HOP

A Brief Introduction to Northeast India's Herpetology

This handbook is a collaborative effort of:



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SCALE, SLITHER, AND HOP: A Brief Introduction to Northeast India's Herpetology

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Cover photo: Pope's Pit Viper by Avrajjal Ghosh

Design and illustrations: Radha Pennathur

Maps: Anuj Shinde

CONTRIBUTORS:

Editor-in-Chief: Jyotsna Nag

Team: Aditi Bidkar, Anuj Shinde, Jithin Vijayan, Jyotsna Nag, Niket Alashi, Prathamesh Amberkar, Radha Pennathur, Rahul Manshani, R. Sankaranarayanan, Shubham Soni, and Vaishnavi Apte

Additional Editorial Inputs: Nandini Velho

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Cold-blooded Wonders:

Amphibians and Reptiles

Amphibians and reptiles are two important groups of cold-blooded vertebrates that play crucial roles in ecosystems worldwide. They have many different adaptations that allow them to thrive in various environments such as rainforests, grasslands, wetlands, deserts, rocky mountains, etc.

Amphibians are small animals that need a moist environment to survive. This group includes frogs, toads, caecilians, salamanders, and newts. All of them can breathe through their thin, permeable skin and their lungs. Most amphibians start as aquatic larvae and then metamorphose into semi-terrestrial, fully terrestrial, or fully aquatic adults. Amphibians are broadly classified into:

ANURA

Frogs and toads are small-bodied, tailless, and are adapted for living in freshwater or on land, underground or in trees. Their skin varies from species to species in having vivid patterns and colours.



URODELA

Salamanders and newts have moist skin and distinctive tails. They also have an amazing ability to regrow their body parts. North-east India has three species of newts!

GYMNOPHIONA

Caecilians are limbless, worm-like, and exhibit adaptations for an underground environment. They have reduced eyesight and a specialised skull for burrowing.

Right: Benji's Caecilian (*Ichthyophis benjii*)



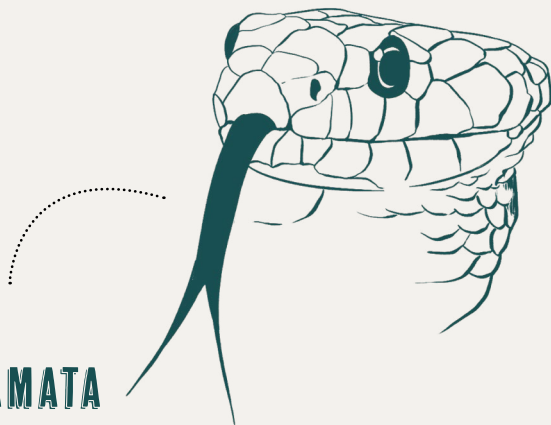
Reptiles are known for their scaly skin and their ability to thermoregulate. Their bodies do not generate heat on their own, so they rely on external heat sources for temperature regulation. This group includes snakes, lizards, crocodiles, gharials, turtles, tortoises, etc.

Reptiles consist of four main groups:



CROCODYLIA

includes the **crocodiles, alligators and gharials**, all large and predatory.



SQUAMATA

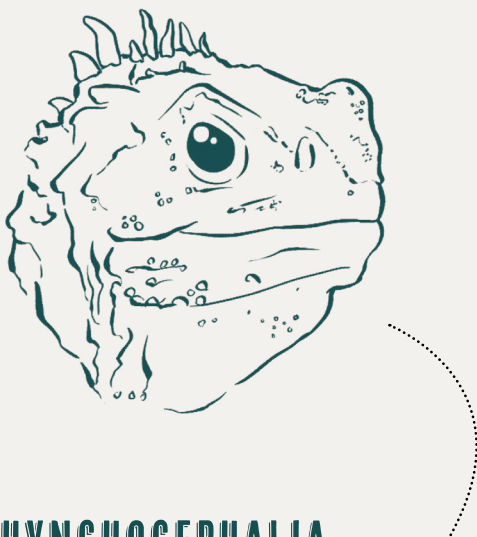
includes **snakes and lizards**, known for their ability to shed their scaly skin periodically.

TESTUDINES



comprises the **turtles, tortoises, and terrapins**. These can easily be identified by their distinct shell.

Top: Assam Roofed Turtle (*Pangshura sylhetensis*)



RHYNCHOCEPHALIA

includes only one living species called the **tuatara**.

Introduction to Herpetology and Herping

WHAT IS HERPETOLOGY?

Herpetology is a branch of biology that deals with the study of reptiles and amphibians. Reptiles and amphibians are also commonly called **herps**. People studying amphibians and reptiles are called herpetologists. They study various aspects of amphibians and reptiles, including their taxonomy, anatomy, ecology, evolution, behaviour, and conservation. They conduct field research, work in laboratories, and contribute to efforts aimed at understanding and preserving these ecologically important groups of animals.



HERPING: LOOKING FOR HERPS IN THEIR NATURAL HABITAT

Herping is the act of searching for, observing, documenting, and studying herps in their natural habitats. People who engage in herping are called **herpers**. When herping, keen observation is an essential skill. Simple observations have made us uncover newer things about herps and broaden our understanding of their complex world.

Amphibians and reptiles exhibit an incredible diversity, with so much yet to be discovered about them. Further studies are essential to enhance our understanding of their biology and ecological roles.



MOUNTAIN PIT VIPER

The Mountain Pit Viper (*Ovophis monticola*) has heat-sensing pits located between its eyes and its nostrils that helps it find its warm-blooded prey.

A Quick Guide To Field Herping

As exciting as this activity sounds, it is also crucial to understand that certain risks are involved. A majority of the herps are active during the night and hence herping is usually carried out at night. Visiting the forest at night can be dangerous since animals other than herps, such as large mammals like elephants, tigers, bears, etc. might also be active then. Keeping a few guidelines in mind will help you mitigate the risks.



Record shot of the head of a Pope's pit-viper (*Trimeresurus popeiorum*) from Arunachal Pradesh.

HOW TO PLAN A HERPING TRIP

Don't visit an unknown patch of wilderness after dusk.

It is advisable to know your field site before you explore it in the dark. The best way to do this is to get acquainted with the landscape during the day or accompany someone who can guide you or is familiar with the landscape.

Additionally, you could use a GPS device (or your phone) to **mark your trail**. You can follow the same path back in case you lose your trail.

Don't go herping alone.

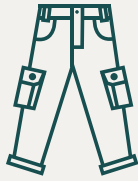
Know your herps.

Knowing about the species diversity in the area beforehand helps you understand what to expect and also gives you a heads-up about potential venomous snakes you might find.

You can refer to a field guide, or explore the locality of interest on iNaturalist.

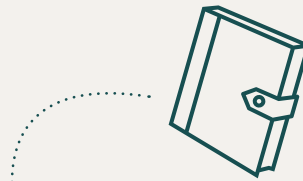


THINGS TO CARRY ON A HERPING TRAIL



Full clothing and footwear

Wear long-sleeved shirts, long pants, and shoes or gum-boots to protect yourself from insect bites and scratches while walking through bushes



A pocket diary and pen

Keep a diary and a pen to record your observations, document species encountered during herping, and jot down important notes



Torches and spare batteries

To ensure visibility in the dark



Leech Socks

If you are herping in monsoons



Snake hook/Rock flipper

They can help you rake leaf litter and flip objects



Camera

And waterproofing gear to protect it



Mosquito/ tick repellents



Quick snacks and water

To keep yourself hydrated and energetic.



Over-the-counter antifungal dusting powders

Herping in tropical climates makes some people susceptible to fungal infections



Rain gear

THINGS TO DO DURING HERPING

Where and how to look for herps?

To start with, you can do the following things to search for herps.



MOIST PLACES

Any moist places like streams, banks, tree buttresses, or logs of wood are some good places to scan.



LISTEN

Try to listen for frog calls, and then look for the frog by trying to locate the origin of the call.



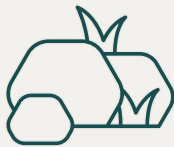
CHECK TREE HOLES, CREVICES

and anything that you think may provide refuge to a herp



LEAF LITTER

You might find skinks and frogs in this small habitat. You can use a snake hook or a stick to explore it carefully.



FLIP ROCKS

to check for anything that might be sitting under. Ask your friend to check for herps under the rock while you flip it. Place the rock in its original place.



BASKING

Scan through rivers or ponds to search for turtles, and also places like logs of wood in water, bare rocks, and sandbanks that may be used for basking by them



EYESHINE TECHNIQUE

Line up the flashlight with your eye to scan for herps - you might see a faint eye shine reflect back. This makes it easier to spot herps like frogs and geckos.

DOCUMENTATION



HERP TRIP #1 Location

- Date and time
- Weather and temperature
- Number of individuals of a particular species spotted during herping
- Where was the individual spotted?
E.g. Under a rock, log or leaf litter, in a stream, or on a tree
- What was the individual doing?
E.g. Foraging, mating, sleeping, or eating

PHOTOGRAPHY

Photographing herps can be a tricky business with them jumping and slithering around. It can really be challenging to capture them on your camera.

Herps are sometimes cryptic in appearance, i.e. different species can look really similar, making it difficult to distinguish between them. You can only tell them apart upon close examination of certain characters. This might include scale counts in reptiles or unique markings in amphibians.

Similar to other animals, reptiles and amphibians are legally protected, and handling them without permission is strictly prohibited. Hence, clicking record shots from a safe distance is always advisable.

Photographing the individual from the correct angle, to look for a particular character is very important.

TIP: Photograph the head (top and side) and midbody for snake; top and side for frogs and lizards.



Left - Right: Record shot of the side aspect and top aspect of a mountain lizard (*Cristidorsa* sp.) from Tokalo Wildlife Sanctuary, Mizoram.



Top - Bottom: Photo shots showing the top and sides of a Giant tree frog (*Zhangixalus smaragdinus*) from Papum Pare district, Arunachal Pradesh.

ETHICAL HERPING

Herping involves going to places that are co-habited by humans and wildlife. It is important to respect their presence and space. Following some ethical guidelines ensures your safety, responsible usage of photos, and respect for the animal's dignity and yours.

- *Refrain from disturbing herps when they feed, mate, or sleep, etc.*
- *Avoid unnecessary handling, as amphibian skins are sensitive.*
- *Replace the log or rock in its original place.*
- *Artificial stimuli are strictly discouraged, e.g. baiting a snake with frogs or other prey for cool photographs*
- *Learn to stop, be mindful and give the organisms their space.*
- *Herpers might look suspicious to others – do not flash torches on people's houses to respect their privacy.*
- *Avoid flashing lights and camera flashes on herps for too long.*
- *Plan your photography beforehand.*
- *Trophy shots and selfies are strictly discouraged*
- *Seek help from experts while photographing venomous snakes*
- *Crouch mindfully in the forest.*
- *Avoid risking your lives.*

WHAT NEXT?

What should you do with your observations? Become a **citizen scientist!**

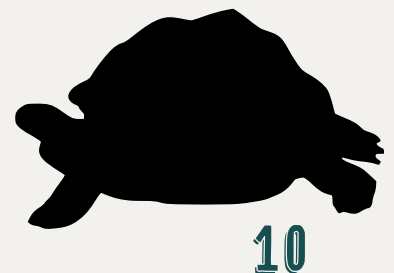
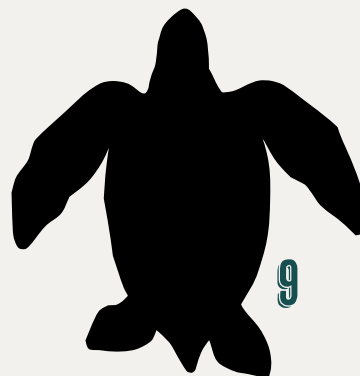
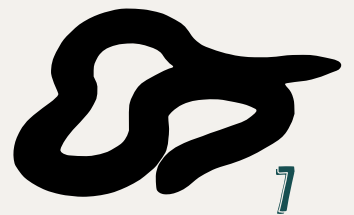
Citizen science involves non-professional individuals participating in scientific research. It enables the general public to contribute valuable observations to scientific studies. In herpetology, citizen scientists can observe, document, and report sightings of reptiles and amphibians in their natural habitat. Their contributions help researchers gather large datasets, monitor species distributions, and understand ecological patterns.

There are a couple of user-friendly online platforms where you can upload your observations on

- iNaturalist (Tutorial - [Click Here](#))
- India Biodiversity Portal (Tutorial - [Click Here](#))

These platforms accept various forms of data, including photographs and audio recordings, making it easier for users to share their findings.

WHO'S THAT HERP?

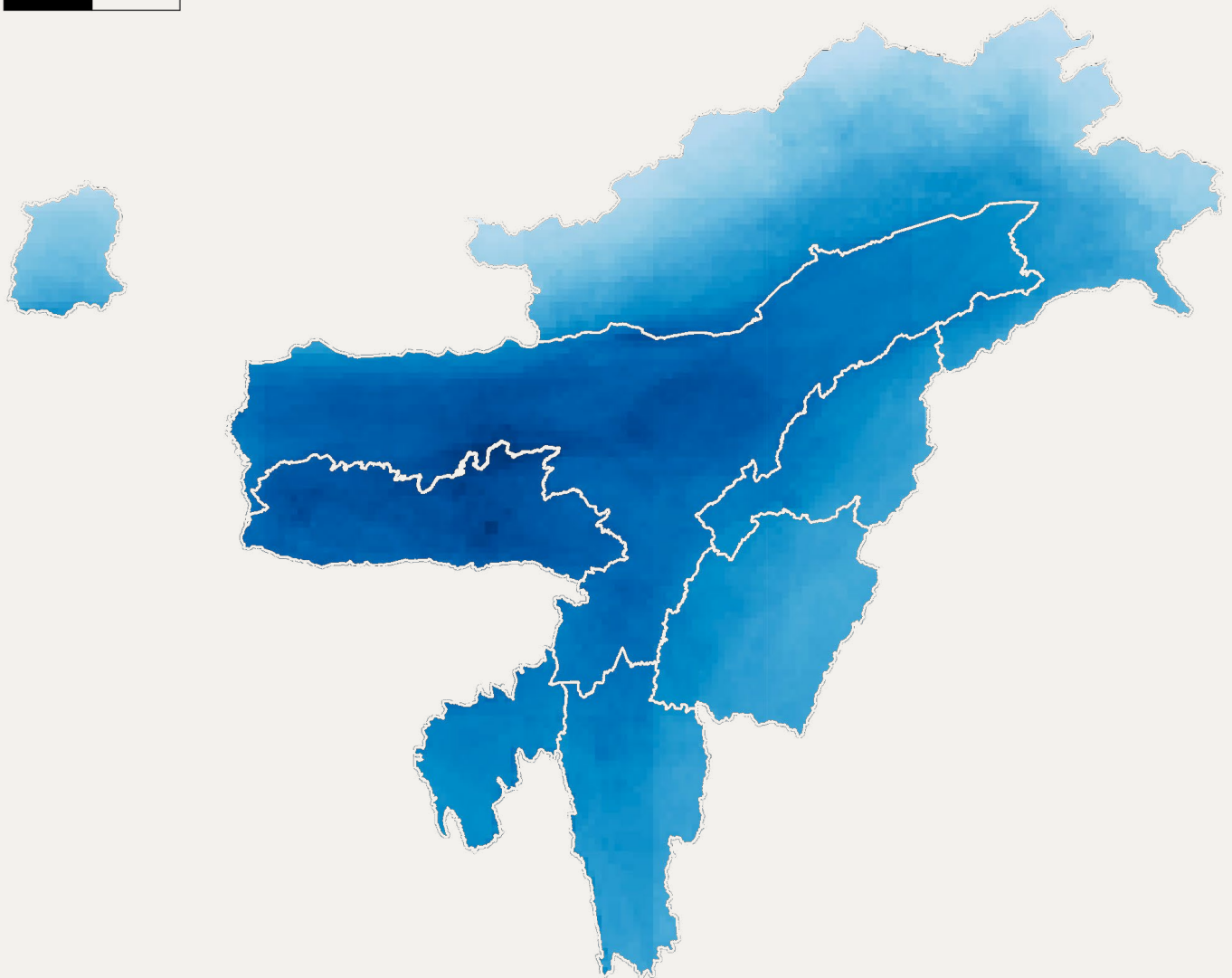


Northeast Indian Herpetofauna

India's Northeastern Region is politically made up of Assam, Tripura, Meghalaya, Mizoram, Manipur, Nagaland, Arunachal Pradesh, and Sikkim. At the confluence of three biogeographical realms, Northeast India has some of the Indian subcontinent's last remaining rainforests and is one the major centres for herpetofaunal diversity.

The region is categorised into the Eastern Himalaya, the Patkai, and the Brahmaputra and Barak valley plains, and shows a remarkable altitudinal gradient ranging from sea level to about 7000 metres above sea level. Its unique biogeographic position, various climatic combinations, and the physical geography nurture a variety of habitats that harbour about 330 species of reptiles and amphibians.

0 100 200 km



This map displays the density of amphibian and reptile species across various northeast Indian states; the darker the shade, the more species are found in that area.

COMMONLY SEEN SPECIES IN THE NORTHEAST

Indian Bullfrog (*Hoplobatrachus tigerinus*)



Cascade Frog (*Amolops* sp.)



Northern Pointed-snout Forest Frog (*Clinotarsus alticola*)



Garden Lizard (*Calotes irawadi*)



South Asian House Gecko (*Hemidactylus frenatus*)



Tokay Gecko (*Gekko gekko*)



Bengal Monitor (*Varanus bengalensis*)



Checkered Keelback (*Fowlea piscator*)



Assam Roofed Turtle (*Pangshura sylhetensis*)



Indian Flapshell Turtle (*Lissemys punctata*)



Asian Common Toad (*Duttaphrynus melanostictus*)



Assam Forest Frog (*Hydrophylax leptoglossa*)



THREATS AND CONSERVATION

Most amphibians and reptiles need specialised habitats and environmental conditions to survive, and are very sensitive to changes in their habitats. Even slightest disturbances in their ecosystem may cause harm to their local populations.

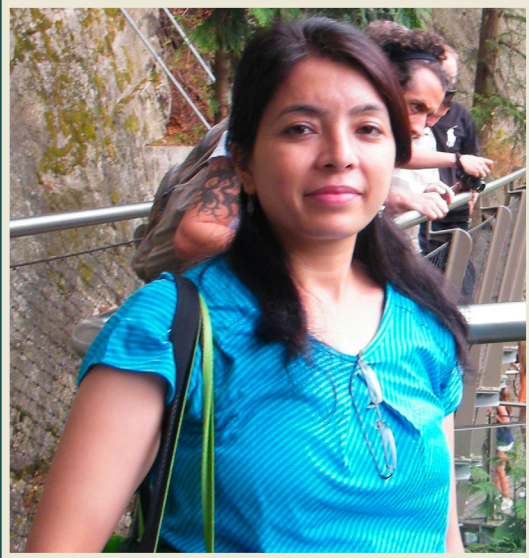
Some prominent threats to the herpetofauna in the Northeast are:

- **Habitat destruction and land use change:** Deforestation, agriculture expansion, and infrastructure development lead to the loss and fragmentation of natural habitats. Use of chemical pesticides and fertilisers in the agricultural fields, rampant logging of trees, ill-planned big development projects like building highways and hydroelectric dams, etc. pose significant threats to reptile and amphibian populations.
- **Consumption of meat:** Reptiles like pythons, rat snakes, turtles, monitor lizards, etc. are extensively hunted for their meat. Large frogs have also been a traditional food source for humans. Export of frog legs from India and Bangladesh was widespread until it was banned in 1985. However, there is still a continued demand for frog meat in certain areas of the region.
- **Overexploitation:** Collection for pet trade, traditional medicine, and the exotic leather industry can lead to population declines and even local extinctions.
- **Lack of awareness and negative perceptions:** All snakes are generally perceived as “**dangerous**”, “**dirty**”, “**venomous**”, and to be associated with bad omens. This leads to snakes being killed on sight. However, it is important to note that only a small number of snake species in the region are highly venomous and encounters with them are rare.

Limited public awareness and insufficient conservation initiatives can hinder efforts to protect and preserve the herpetofauna in Northeast India. Conserving the herpetofauna in Northeast India requires a mixed approach that addresses these threats through adequate research, education, habitat protection, sustainable land-use practices, community involvement, and the enforcement of wildlife protection laws.

Life in Herpetology

Conversations with Northeast Indian herpetologists



DR. BASUNDHARA CHETTRI

Dr. Basundhara Chettri is a professor at Sikkim University's Department of Zoology. A scientist and herpetologist in Northeast India, she has several publications to her credit.

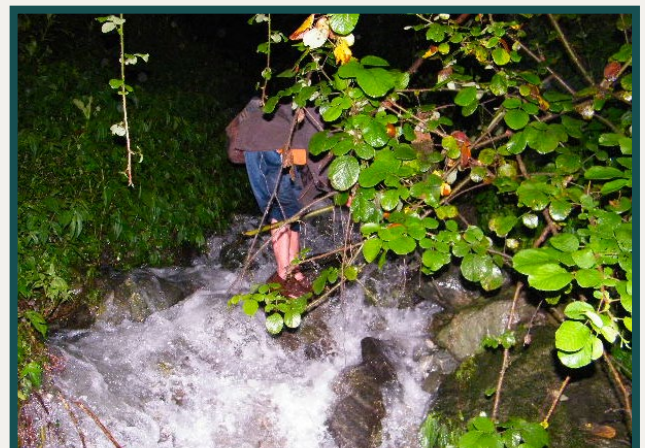
Her extensive work studying the distribution of amphibians along an elevation gradient in the Eastern Himalayas is commendable. Her team is also interested in understanding reptile and amphibian diversity in the socio-ecological landscape of Sikkim-Darjeeling Himalaya.

1. What was your life like growing up? Were you always interested in herpetology?

I grew up in a small village in the Darjeeling district. There were agricultural fields and a lot of forests around. That said, I was not exposed to herpetology during school or college. When I was studying, there was a big, beautifully green Tree Frog (*Zhangixalus smaragdinus*) on my window glass, and it had sky-blue dots on its back. I had no idea what it was back then. I was very interested in forestry, largely because my father was in the West Bengal Forest Corporation. As there were no MSc Forestry courses where I was, I began my higher education in Zoology. I would say my introduction to herpetology was purely a coincidence.

2. Could you tell us about your work on the Sikkim Biodiversity Project with SACON (Salim Ali Centre for Ornithology and Natural History)?

After completing my Master's degree, I started working as a Guest Faculty at the Sikkim Government College. In the meantime, I had the opportunity to join the Sikkim Biodiversity Project with SACON in Tamil Nadu; a multi-institutional project to study the carrying capacity (the maximum population size of a biological species that can be sustained by that specific environment) of the Teesta basin in Sikkim. As the faunal aspect of this project was allotted to SACON, they were looking to interview and hire people from the region itself.



Amphibian survey at night

Even though I did not have any prior experience working with wildlife, I had a brief opportunity to survey salamanders in Darjeeling during my Bachelor's. Since I wanted to study that, I submitted my application to study amphibians with an emphasis on salamanders. This is how my journey with herpetology began. It was tough for me at the beginning as I had no prior experience. But having been allowed to work in the field under the guidance of Dr. S. Bhupathy and Dr. Ajith Kumar along with fellow researchers, I slowly learned and developed an interest in herpetology.

3. You began your PhD investigating the reptile diversity patterns along the Teesta Valley. What did the project aim to do, and how was your PhD experience?

As I mentioned before, the SACON project aimed at studying the carrying capacity of the Teesta River basin because a series of dams were proposed to be constructed on the Teesta River. Keeping Sikkim's varied terrain of elevational gradients in mind, my team and I began our PhD work looking into the pattern of species distribution along the elevational gradient.

We planned to sample across different elevational gradients to understand the species composition and the species turnover. We also wanted to look at the various factors governing the species distribution along the elevational gradient; whether they were spatial, climatic, or other environmental factors playing a role. As this study was a part of a larger project, we covered several taxa. Some people were working on mammals, others on birds, and some others on butterflies. Working together made the arduous work more fun and enriching. My supervisor Dr. S. Bhupathy always encouraged me to publish articles on time. My sincere thanks go to Dr. Ajith Kumar, who was the Principal Investigator of the Sikkim Project. In a true sense, he introduced me to the wilderness.



Basundhara Chettri's PhD team

4. You have extensively worked on amphibians and reptiles since joining the Sikkim University in 2008, and later becoming an assistant professor in 2012. Were there any other groups or NGOs working on amphibians working on amphibians and reptiles in the region? How popular are zoology and ecological sciences in Sikkim amongst students?

After my PhD, I started working at the Sikkim Government College, and then at Sikkim University. During those days, few people like Dr. Sarala Khaling, Dr. Sunita Pradhan, and Dr. Nakul Chettri were working on birds, mammals, and butterflies. However, not many people worked in the herpetology field. What I found strange is that even if the forest officials prevented bird entrapment, frog extraction still continued, as frogs were consumed locally as a delicacy and even used for medicinal purposes. Birds and mammals received much more attention than herpetofauna did, as far as hunting and conservation issues were concerned. But slowly things started changing, and local people and students are taking an interest in herpetology. Even the Forest Department has taken initiatives to ban frog extraction completely now. Hopefully, things will change, and more young people will be interested in this field because although our work is challenging, it is equally rewarding.

5. Apart from frogs, which other species are severely threatened? After being involved in this work for more than a decade, what are the challenges herpetologists face in terms of conservation of herpetofauna in Sikkim?

I feel that almost all the amphibian and reptile species in Sikkim are threatened, I cannot pinpoint a single species. Some of the conservation challenges faced by the researchers include the difficult and inaccessible terrain. Incessant rainfall could also deter them from conducting studies on herpetofauna conveniently. Some areas in Sikkim are restricted, for which you need special permission after a thorough police verification, apart from the required forest permit. Many landslides occur in the monsoon which leads to complete isolation of that area. Monsoon is the peak period for herps and also for tourists. All of this makes our work very difficult.

Another major challenge that we and other aspiring herpetologists face is the taxonomy of amphibians; members of the same species have different colours, for example, the *Amolops* and *Megophrys* group. We neither have experienced taxonomists in the region whom we can consult, nor do we have a museum nearby. The nearest ones are in Kolkata and Guwahati, and we need proper planning and permission to visit either of the places. Thus, we are looking into establishing a small museum in the University. We already have a butterfly repository coming up in Sikkim University's zoology department. It will be a great thing to have our own museum for herps for reference.



Basundhara Chettri with her field assistant

6. Talking about conservation challenges, have you been involved in IUCN assessments in the region? Do we have baseline data on the species?

Most species in the northeast region are listed as Least Concerned or Data Deficient in the IUCN Red List, based on very little data. For example, the Sikkim Grass Lizard (*Takydromus sikkimensis*) was recently classified as Endangered by the IUCN based on our work. I found this species from just one village in south Sikkim during my PhD. Later on, our team could locate this species in different areas of Sikkim, across the plains of West Bengal, and also in Assam.



The Sikkim Grass Lizard (*Takydromus* sp.) - Female

Similarly, the IUCN status of several other species of Northeast India is not known, and IUCN assessment is based on expert opinion which is often not validated on the ground. Therefore, I believe we need to involve more local people from the region and encourage them to become more involved in recording species, and then report to the IUCN for accurate data assessment. Citizen science with digital platforms can become a great tool for accurate assessment of herpetofauna as for other taxa.

7. How would you describe the effects of anthropogenic activities in Sikkim? Is habitat destruction prevalent, and what could be its cause?

We acknowledge that the State Government is coming up with many ambitious projects to conserve biodiversity such as “*Mero Rukh Mero Santati*” which means “*my tree, my generation*”. It asks the citizens to plant 100 trees every time a baby is born. Similarly, there are other projects undertaken by the State Government. But at the same time, Gangtok (the capital of Sikkim) is swiftly moving towards unsustainable tourism. Tourism is the backbone of our state’s economy but due to the high influx of tourists, it has become a threat to the rich biodiversity of the region. The tourism industry needs to be more regulated and an environmentally friendly approach needs to be adopted keeping in mind the fragility of the Himalayan ecosystem.

Another issue is the conversion of agricultural land for other urbanisation purposes. For example, there is a place called 20th Mile near Singtam which was a beautiful paddy field, located at the Teesta River Basin. This area used to harbour considerable herpetofauna and one would surely find rat snakes and water snakes on a sunny day. But recent establishment of pharmaceutical industries in these areas has made it a concrete jungle.

Also, the areas below 1500 m are very important for amphibians and reptiles as above this elevation, their diversity reduces. Unfortunately, we do not have any protected areas below 1500 m except one, hence we might lose many of the species due to anthropogenic involvement in the construction of hydropower systems and pharmaceutical industries among other projects. Being in the field for around two decades, I have seen that herps are mostly found near human habitation, riverine patches or agricultural lands, and not in the interior of the forests. Therefore, the conversion of agricultural land for non-agricultural purposes should be prevented. Numerous streams which housed torrential frogs locally called “*Paa*” should be protected from anthropogenic pressure.

8. Considering elevational gradients, where do you also observe high species diversity? Are the species along the elevational gradients specialised to their climatic requirements? And how does climate change factor in their distribution?

As I said, most of the species are restricted below 1500 m, but there are species inhabiting the middle elevational gradients. But there are some species like the snow toads, *Scutiger* spp., which are found at much higher elevations (3000 m and above). Therefore, it is correct to say that each species has its habitat requirement along the elevational gradients. Distinct vegetation zones are present at different elevations which in turn influence the faunal component resulting in distinct species assemblages. Although the species diversity for herps is more at lower elevations, we cannot ignore the species at higher elevations.



Clumping of fossorial snake species (*Trachischium guentheri*), under boulders in the North Sikkim region

A fossorial snake species, *Trachischium guentheri*, found in mid to high elevations shows unique traits such as communal nesting, and is found mostly in the open grasslands and not in the interior of the forests. We need to find out the driving factors behind this behaviour of laying their eggs together; whether it is lack of microhabitat or temperature because temperature would be more efficiently managed when the eggs are clumped together. It will be interesting to see whether communal nesting is uniform across the elevation gradient. Another interesting study could be seeing range shifts due to climate change as there are sporadic reports of range shifts of many species, such as King Cobra sightings at 1700m in Yuksom, West Sikkim.

9. If any of our readers are interested in studying or working with your research group at Sikkim University, how do you suggest they should apply?

Sikkim University is a central university and students need to apply by taking the Common University Entrance Test (CUET). Notification for this test comes on the university website for both Master's as well as PhD programs between April and May followed by the CUET. For PhD, after clearing the test, the candidates will be called for an in-person interview at the department and selection will be based on their overall understanding of the subject, seriousness, dedication, and interest towards working in difficult terrain and weather conditions.

University does provide a non-NET fellowship but it is not enough for field work. But we encourage them

to start writing their projects for grants and fellowships. Some of the scholars have obtained a Rufford small grant, some of them join ongoing projects with their PIs and some of them also bring their own fellowship as JRF through CSIR NET.

10. Could you also tell us about your current research projects?

My current project continues to focus on reptiles and amphibians and their distribution across the elevational gradients. We are also working on single-species ecology and biology. We are looking into the herpetofaunal diversity in the socio-ecological landscape outside the protected area, and the impact of human settlements on its diversity. We are also comparing different agricultural systems and comparing the species diversity and turnover arising in these conditions. We are also interested in looking into the cryptic diversity of herpetofauna of the region.



Basundhara with her present research team

11. Over the last many years as a woman herpetologist in India, do you recall any challenges you have faced in this largely male-dominated field?

Yes, I think that women in herpetology would always face challenges but if they are really interested, it should not stop them. Night-time surveys in remote and isolated areas are unsafe because sometimes you may encounter intoxicated people who misbehave, and sometimes women are not preferred candidates for herpetological research due to difficult field situations. However, with some precautions, these situations can be managed. Challenges will always be there but if one is determined, it can be overcome. Out of four research scholars working with me, three are girls. I believe that there should be a common platform as every person deserves an equal opportunity.

12. Are you hopeful about the conservation efforts for Sikkim's herpetofauna? What advice will you give to young, aspiring herpetologists in India?

Yes, I think that if people like you at such a young age are so dedicated towards herpetology and are popularising it, then why not others too? I am very hopeful that the younger generations will be interested because the technology has improved for species identification, and you have all the resources at your fingertips. Though herpetofauna research may be challenging due to difficulty in sightings, secretive nature, and unstable taxonomy, it can also be equally rewarding. Who knows? You might end up describing a new species!



ASSAM SNAIL EATER

The Assam Snail Eater (*Pareas cf. monticola*), a semi-arboreal snake, has a very specialised diet — it exclusively eats slugs and snails. The species name “*monticola*” means “inhabitant of the mountains” in Latin.



DR. H. T. LALREMSANGA

Dr. H.T. Lalremsanga is a professor at Mizoram University's Department of Zoology. He is the head of the university's Developmental Biology and Herpetology lab. His current research focuses on biodiversity monitoring, taxonomy, systematics, snake venom, and the ecology of Mizoram's amphibians and reptiles. In partnership with several institutions, he is actively involved in organising conservation awareness programmes among local people.

He is a recipient of The Habitats Trust Action Grant 2022, and is developing methods to assess the population status and conservation needs of Softshell turtles in Mizoram. His research team has published extensively on the herpetofauna of Northeast India in recent years, considerably enhancing our understanding of the many species found there.

1. What was your life like, growing up? Where did you do your education?

I was brought up in Aizawl City, the capital of Mizoram, where I also did my BSc (Zoology), at the Pachhunga University College (PUC). Here in Mizoram, there are many small, fast-flowing hill streams. So, during my childhood, my friends and I used to roam around, swim, observe aquatic animals, and collect pebbles. We would also make artificial pools to swim in. I went to Shillong for higher studies, where I received a CSIR NET-JRF fellowship, after which I started my PhD work with *Madam* (Prof. R. N. K. Hooroo) in the Developmental Biology Lab at North-Eastern Hill University (NEHU). During my PhD, I got an opportunity to join as a guest faculty at PUC in Mizoram. The Department of Zoology was established in Mizoram University in the year 2005, and I got recruited, as I was one of the few eligible candidates. During my vacations, I would still go to Shillong to continue my PhD work, and since my study sites were in Mizoram, fieldwork was not a big problem. I would visit the sites only on holidays, and utilise the university library for literature search. For my PhD, I studied the ecology, breeding behaviour, and development patterns of four frog species in Mizoram. I finally compiled and submitted my PhD during my university vacation in 2011.

2. Were you always interested in herpetology? Was there any particular incident that made you interested in wildlife while growing up?

During my childhood, we would see and catch frogs, lizards, snakes, and caecilians, among many other animals. When I started with college, I was curious about their names. PUC, being one of the most established colleges in Northeast India, had a huge natural history collection. So, I asked them about the names and biology of these species. There were snakes, lizards, frogs, and caecilians, but many of our teachers could not help us identify



Mizoram Parachute Gecko (*Gekko mizoramensi*)

the species that were in the collections, nor could they tell us which snakes were venomous. It built up as a challenge for me to study this kind of thing. To do that, I referred to many books and tried to identify these individuals using the characters mentioned. Doing this required a lot of time and effort as there were very few experts, and I was not aware of them. I used to maintain a mini-museum in my room, and it had many preserved specimens which I later handed over to one of my juniors.

3. What inspired you to pursue a PhD in this field? Can you tell us about your PhD research and fieldwork?

Back then, my ambition was to either be a university professor or a military officer. But I was not eligible for the military, as my left eye was not working. So, I focused on being a professor. During my MSc, I topped my class, and cleared the NET-JRF exam under the CSIR-UGC and with the help of that finance, I could continue my PhD work. I was very glad to have acquired that.

My supervisor was working on the developmental biology of amphibians, and had good connections with other herpetologists like Dr. S. K. Dutta, Dr. Saibal Sengupta, and Dr. Indraneil Das. I contacted them for help with the specimens that I had collected in Mizoram. We deposited most of these specimens at the ZSI, in Shillong, where researchers R. Mathew and Nibedita Sen helped me identify many of them. However, due to a lack of molecular tools, many of those cryptic specimens remained unidentified.



Tamdil Leaf-litter Frog (*Leptobrachella tamdil*)

Towards the end of my PhD work, I realised that one of our specimens was misidentified, and was included in the thesis. I had to then reframe my thesis and explain my work on the developmental stages of two different frog families (*Microhylidae* and *Ranidae*). I am particularly interested in the developmental biology of amphibians because, as you know, life started from water and then transitioned to land. It is interesting to me how metamorphosis takes place, and how it is possible to unravel the many processes that occur using cloning and tissue transplantation. To know this, I think we should also know their ecologies, so my PhD research documenting the ecology, breeding behaviour, and developmental stages of several frog specimens from two frog families involved a lot of sampling, and took a lot of my time and patience.

4. Most of the research you publish reflects rigorous fieldwork in some extremely difficult terrain. Can you tell us about your experiences working in the field?

It is a very difficult task to collect specimens. Luckily, my PhD fieldwork involved visiting certain sites frequently, at least twice or thrice a month, every season. Knowing the emerging period and breeding season of different species helps us get information, find the specimens, and go at the right time during the right season. When surveying, we need to consider their activity times too (diurnal, nocturnal, and crepuscular, etc.) Amphibians are found in different kinds of habitats; some are stream-breeders, some occupy running water, some others, standing water, and some occur in the periphery of lakes, ponds, tree holes, and so on.

I also train my students. I lead them on the first two or three visits, and then after that, they become able to go by themselves. We also have a good division of labour at the lab. Some members are good at finding caecilians, others are good at finding frogs, lizards, or snakes, some others are good at specimen processing, laboratory and paperwork, etc. Luckily, we are locals of Mizoram, and are naturally good in the field; we can swim, we can climb trees, and if necessary, we can climb cliffs also. We eat whatever is available in the local area without any fuss, and that is how we survive long field visits.

During my postgraduate days, I got malaria thrice and was almost going to die, but since my father and sister are from a medical background, I survived. I also got bitten by snakes thrice; first, a viper, then a pit viper, and then, a monocled cobra. After having experienced all this in the field, I realised that it also helps to have good connections with local people in different areas when it comes to finding specimens. Just now, before this call, I got information about a killed Mandarin Trinket snake on the eastern side of Mizoram. We help people identify species, especially snakebites, and add those specimens to our collection.



HT and the team with a King Cobra

Sometimes people try to sell us turtles and tortoises. A few days back, a hunter sent us a photo of a big softshell turtle weighing 54 kilograms, which I suspect was a *Chitra chitra*; it was not a *Chitra indica*, so likely a new species record for India. I have already contacted the forest officer to initiate the legal process. Hunters sell these for ₹400-₹500 per kg, and as most turtles weigh around 4-5 kg so they make more than ₹2000. Later, I found out that the 54kg *Chitra chitra* was already butchered and its uneaten parts were thrown away. The meat was distributed among local people, so I believe the hunter made good money from it. In these cases, I first contact the authorities to start awareness campaigns; first legal awareness, and then conservation awareness.

5. Could you tell us more about your work on the conservation awareness of amphibians and reptiles? What kind of response have you received from the people?

Yes, we do a lot of awareness programmes, whenever and wherever it is required. We distribute pamphlets, t-shirts with our logo and a herp picture, and also refreshments.

Whenever we visit a remote village, we first contact the village council president, NGOs, and other leaders to announce in the villages that we will come and teach them about herps and snakebite management. To those who make it, we give caps, t-shirts, booklets, and so on, otherwise, people do not show up.



Photos from one of their conservation awareness programmes

We have received a positive response, mostly. Due to a lack of awareness, people had been illegally consuming and selling. But once they know that it is a crime to kill, sell, or capture these animals, they do not continue to do that. We have now observed that whenever people capture a turtle or kill a snake, say a king cobra or a python, and we happen to contact them, they get very scared. When surveying for herps using their help, we must be clever to convince them to tell us more, because they tend to hide information. They are unaware of IUCN or other portals, so they assume it is always illegal. Telling them that we have permissions usually helps. Earlier, whenever Mizo people encountered a snake, they would first try to kill it by whatever means. They would feel proud in doing so because in our culture, snakes are seen as harmful and satanic, and the act of killing them was thought of as rewarding. Nowadays, when Mizo people kill a snake, they do not feel good about sharing it, so we see that there is a big change in local attitudes towards the killing of snakes and turtles.

Fortunately, we have received several grants from organisations such as Rufford Foundation, The Habitats Trust, International Herpetological Symposium, Chicago Museum, etc., besides Indian funding from DST, DBT, DRDO, ICMR, and so on, to continue our conservation awareness work in the region. We set up enclosures, the herpetarium, the Developmental Biology and Herpetology Laboratory, the Molecular Laboratory, and the Natural History Museum at Mizoram University from these funds.

6. You have been a prolific publisher in the fields of taxonomy and systematics, I would like to know your views on the status of herp taxonomy in northeast India. How many more species are yet to be described in the region?

It is difficult to say. In 2015, after having surveyed and documented many regions, we presented 52 species in our Mizo book titled, '*Mizoram Rul Chanchin*' (Snakes of Mizoram). We believed that there would be no more new species to describe. However, we got some more species of not just snakes, but also amphibians and other reptiles later. Around 16 additional species were discovered. Now we are describing a new coral snake species, and I hope it will be published by the end of this month (December). It was a long struggle. Because there are many unexplored areas in Manipur, Nagaland, Arunachal Pradesh, and parts of Assam, I believe many undescribed species are still lying there. *Trimeresurus uetzi*, a pit viper species, was described from Myanmar in November. We realised that specimens of this were present in our museum too, and it will be a new species record for India. I am preparing to compile a paper on that.

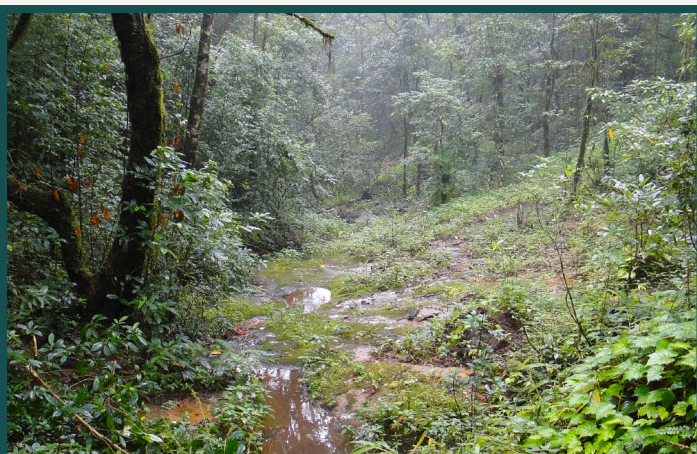
Moreover, there are many cryptic species. We are expecting many new species among the King Cobra group and even among the cobras (*Naja* spp.). We have started exploring Manipur recently, and slowly we will be exploring different parts of Northeast India. The 52 snake species that we documented in 2015 from Mizoram will soon be close to 68. Sequencing the molecular data is important before we can confirm and conclude the results. However, the most essential component to it is always morphology (the external characteristics of a species), and genetics should be used to support morphology.

7. You told us about conservation awareness and the change in people’s attitudes towards herps. Could you tell us about any other factors that threaten amphibians and reptiles in Mizoram?

The main problem is habitat destruction because of human activities. Many kinds of “development” work including the construction of roads create lots of problems in Mizoram. Pollution and lack of waste management is another serious threat. We do not have any good dumping grounds. So, any form of waste, whether it is wet or solid, is just dumped into the canal which flows down into the river, disturbing the habitat downstream.

There is one place in Mizoram, about 50 km south of Aizawl known as Hmuifang Tlang. It is a very nice place with high-altitude forests. During those days in 2010, there were no proper roads to get there, but after the construction of the national highway, it became a tourist spot with big hotels and restaurants. Before this, there were a lot of interesting species, like the Tree Hole Frog (*Nasutixalus jerdonii*) and the one we described, the Mizoram Ground Snake (*Blythia hmuifang*). Many highlander species, especially arboreal snakes and frogs were abundant there. Now this habitat is highly disturbed; forests have been replaced by many buildings and guest houses, which are not even occupied.

To do something about it, in 2017, when I was presenting before the chief minister of Mizoram, I highlighted all of this and told him what had become of this beautiful and precious hill in our state. At first, he was smiling, and then he invited me for tea after the programme. I sensed that he might have felt uncomfortable. When we met, he explained himself and said that he was trying to conserve the environment and nature but because of the pressure from contractors and party workers, he had to give in. He also said that they had told him that they had the knowledge and expertise in this department, so he trusted them and was not able to monitor it thereafter. After that, he apologised. The main challenges are improper waste disposal and road construction, which invariably destroy habitats.



A forest stream in the Hmuifang mountain in Mizoram. This is also the site of discovery for the Mizoram ground snake (*Blythia hmuifang*)



Hmuifang landscape

Another challenge is depleting water resources. The university campus had a lot of streams around, which have now completely dried up. I only realised later that the names of many places around the campus were actually names of streams that used to flow earlier but have completely dried out now. I think we need a lot of awareness among students now, not just older citizens. The elders have their own concepts, and we cannot change their minds easily. But we can motivate the youngsters, show them the data and photos of our streams and waterfalls, and explain how drastically the environment has changed. I feel awareness is necessary not only in cities but in rural areas as well.

8. If any of our readers are interested in studying or working with your research group at Mizoram University, how do you suggest they should apply?

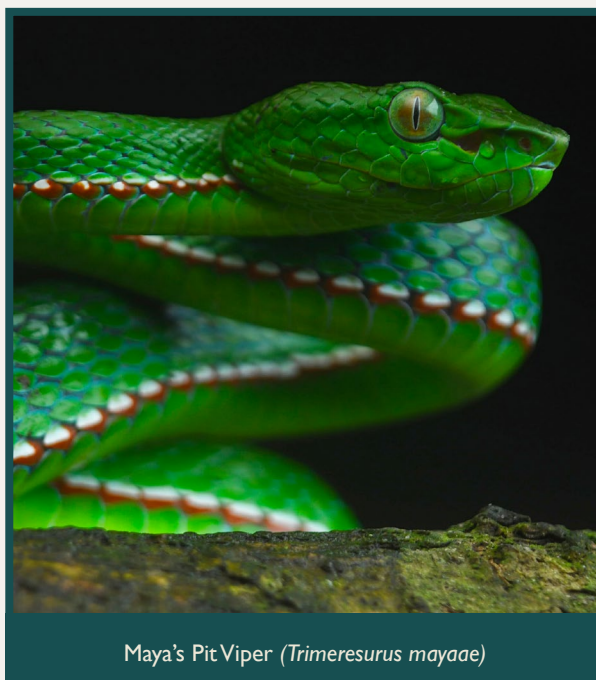
Interested people can apply through the website. They can look up the time for admissions to PhD and MSc courses. It is recommended that students raise their funds. Many fellowships are provided by funding agencies. If they can clear the NET-JRF, it will be easier for them. In case we are hiring people for our new projects, we advertise them on the university website.

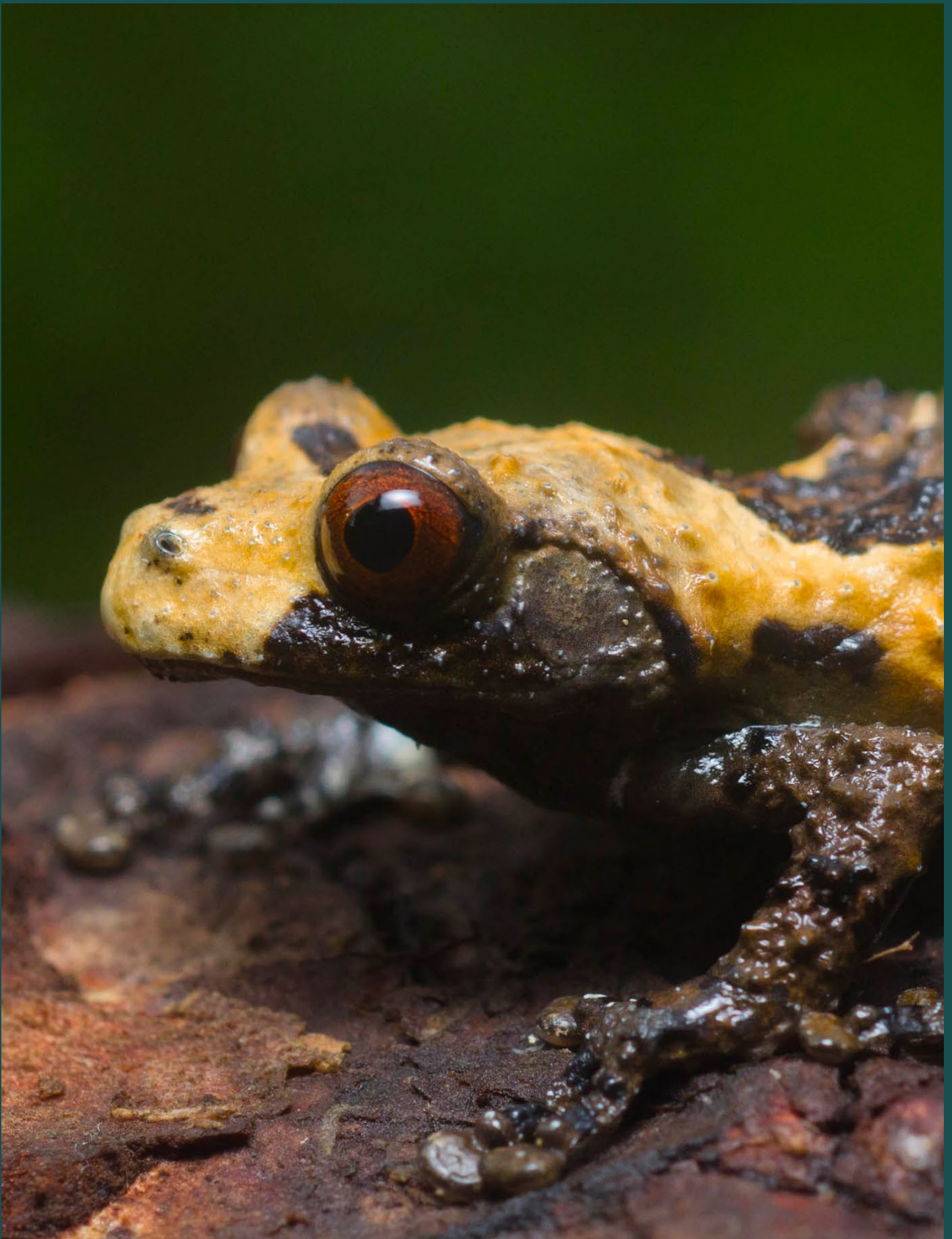
About admission to courses, Mizoram University admits applicants through an entrance test. I, as a faculty member, have no authority over the admission process. If an applicant clears the entrance test, they will automatically get a seat. I believe PhD students should be self-motivated, and should not be entering a PhD course only because their friends did so. If they have specific research interests, they will be fast and good contributors to science.

9. At this moment, which research topics do you feel more interested in?

We are engaged in researching various subjects, including systematics and the evolutionary biology of herps. I find the ecological aspects, such as the natural history and breeding biology of amphibians, particularly fascinating. I am intrigued by factors such as embryonic development, adaptive responses to the environment, and lifestyle adjustments in species like reed frogs, known for their colour-changing abilities.

Snakes also exhibit significant colour variations based on geographical locations, highlighting the fascinating ways they cope with their surroundings and change their lifestyles. Another area of interest and concern is snake venom and the rising cases of snake bites globally, with alarming death and disability rates. Current polyvalent anti-venom, derived from the 'big four' snakes, lacks effectiveness in regions where these snakes are not prevalent. To address this issue, we are proposing a project to ICMR to develop specific anti-venoms for various venomous snakes, drawing from our experiences, particularly in Mizoram. My recent focus includes the characterisation of venoms, not only from snakes but also from scorpions. This will benefit local communities, improve medical treatments, and increase the availability of anti-venoms in rural areas, where snake bites pose a significant threat.





BAIBUNG WARTY TREE FROG

The Baibung Warty Tree Frog (*Theloderma* cf. *baibungense*) is coloured very excitingly — it resembles bird droppings! This might be a special deception strategy to confuse its predators.

Current Herpetological Work in the Northeast

1. AARANYAK

The Herpetological Research and Conservation Division (HRCDD) of Aaranyak is based in Guwahati. The projects focus mainly on diversity, natural history, habitat diversity and conservation of herpetofauna species in the north-east.



Ongoing projects include the survey on Assam Roof Turtle and conservation status in the Kaziranga National Park and Tiger Reserve, Assam, India. Find them [here](#).

Top: Aaranyak team in Dibang Valley

Bottom: Keeled box turtle

Aaranyak

2. WILDLIFE INSTITUTE OF INDIA



The institute is exploring the bewildering herpetofauna diversity of the region under the aegis of SERB, DST, and National Geographic-funded and state Forest Department-supported projects.

So far, a genetic and morphological database of more than 300 species has been generated from the region that includes 12 new species, 10 rediscoveries, and 12 new country records. Currently, the institute is working in the Eastern Himalayas as part of the National Mission For Sustaining The Himalayan Eco-System. Learn more [here](#).

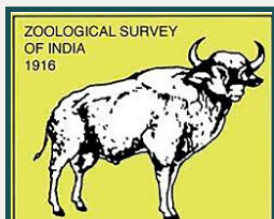
Right: WII Team with Range Officer of Kamlang Tiger Reserve after completing Glaw Lake Track | WII



3. ZOOLOGICAL SURVEY OF INDIA (ZSI)

The North Eastern Regional Centre (NERC) of ZSI in Shillong has completed multiple herpetofaunal studies in Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura. These studies have led to the discovery of about 30 new herpetofauna species.

They have ongoing faunal studies (including herpetofauna) in Manas National Park (Assam), Murlen National Park (Mizoram), and Dibru-Saikhowa Biosphere Reserve, Assam. The Centre holds a depository of over one lakh identified faunal specimens collected throughout the NE region including a sizeable collection of herpetofauna. Another Regional Centre at Itanagar, Arunachal Pradesh (APRC) covers the entire state of Arunachal Pradesh and currently holds a collection of 40,000 faunal specimens.



Learn more here:

[1. Annual Report 2021-2022](#)

[2. Welcome To APRC, Itanagar](#)

[3. About us North Eastern Regional Centre \(NERC\), Shillong, Meghalaya](#)

4. MIZORAM UNIVERSITY, AIZAWL

The Department of Zoology of Mizoram University is working on reptile venomics and diversity assessment through DNA barcoding and community-based approaches. A recent project was on the evaluation of the efficiency of snake repellents against the venomous snakes of Northeast India in laboratory conditions. Ongoing projects include:



- Educating young minds about snakebite management and conservation of snakes in Mizoram
- Mimicking the mesic ecology and conservation of King Cobra through a public academic approach
- Taxonomic assessment of herpetofauna diversity in Dampa Tiger Reserve and Tamdil National Wetland, Mizoram, through DNA barcoding
- Population status and conservation of softshell turtles through a community-based participatory approach in Mizoram
- Karyological analysis and DNA barcoding of Amphibians from Dampa Tiger Reserve, Mizoram

Learn more [here](#).

5. LONG-TERM ECOLOGICAL MONITORING PROGRAMME: EASTERN HIMALAYAS



The LTEO programme, initiated by MOEF&CC in 2015, has set up observatories in the country while working on multiple themes with a common goal of understanding the effects of climate change on ecosystems. Aaranyak leads the herpetofauna component in the northeast with observatories in Arunachal Pradesh. The objectives involve population monitoring along elevation gradients, phenology, and thermal biology of select herpetofauna species.

Learn more [here](#).

6. SIKKIM UNIVERSITY, GANGTOK



The School of Life Sciences at Sikkim University has worked on the altitudinal distribution of amphibians in the Eastern Himalayas until 2015. A PhD scholar from the university is currently trying to understand the distribution patterns and phylogeny of the Sikkim Grass Lizard. Learn more [here](#).

7. FRESHWATER TURTLES AND TORTOISES FOUNDATION (FTTF)

Freshwater Turtles and Tortoises Foundation (FTTF) is an organisation that works towards the conservation of freshwater chelonians and freshwater ecosystems in India through collaborative research, community action and education, and policy advocacy.

Freshwater Turtles and Tortoises of India (FTTI), a citizen science program in collaboration with the India Biodiversity Portal (IBP) is a platform for information and resources on India's freshwater turtles and tortoises. It provides a platform for students, researchers, and community members to document much needed information on turtle ecology. This citizen science project has helped create a comprehensive database on turtles and their distribution in north-east India, a turtle hotspot.



The Black Softshell Turtle Conservation project is an ongoing project that aims at updating the status of this Critically Endangered species in the protected areas and along the Brahmaputra river basin in Assam. Since 2019, several forest staff in protected areas of Assam have been trained in turtle survey techniques and turtle identification through this project. A National Geographic supported film raising awareness on the species and the need for its conservation in Assam is also being developed. Ongoing research also includes studying the movement ecology of large softshell turtles in the Brahmaputra floodplains.

Learn more [here](#).

Top Right: Black Softshell turtle basking in Kaziranga National Park

Top Left: Turtle surveys on the Brahmaputra river in North Bank of Kaziranga National Park with forest staff



8. TEZPUR UNIVERSITY, TEZPUR

The Molecular Toxicology Laboratory at Tezpur University works on snake venom characters and properties. Their ongoing project is about designing aptamers against the venom protein of Red-tailed Bamboo Pit Viper and its validation.

Learn more [here](#).



9. HELP EARTH

Help Earth is a non-profit organisation based in Guwahati, that works in reptile rescue and conflict-related awareness in the state of Assam. They also assist with many research projects in the region along with other institutions.

Learn more [here](#).



A research group wades through the wooded grasslands in the Sailam village, Mizoram, looking for herps

Herping Destinations in the Northeast

Herping in the Northeast can be fun, but also challenging. While Northeast India is home to many protected areas, here is a list of a few of them that you can visit to see snakes, frogs, lizards, turtles, salamanders, and caecilians - many of which are exclusively found there.

Ensure that you don't venture into any of the areas before getting the required permits and move around only when you have a forest guide/naturalist with you. Strictly avoid handling any of the animals, as many of the species are highly venomous.

PAKKE TIGER RESERVE

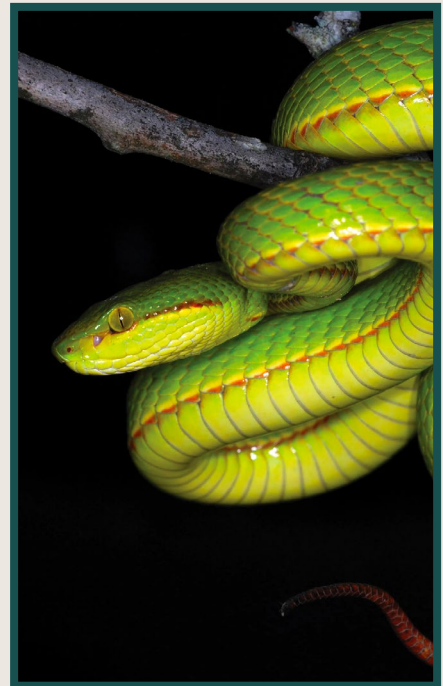
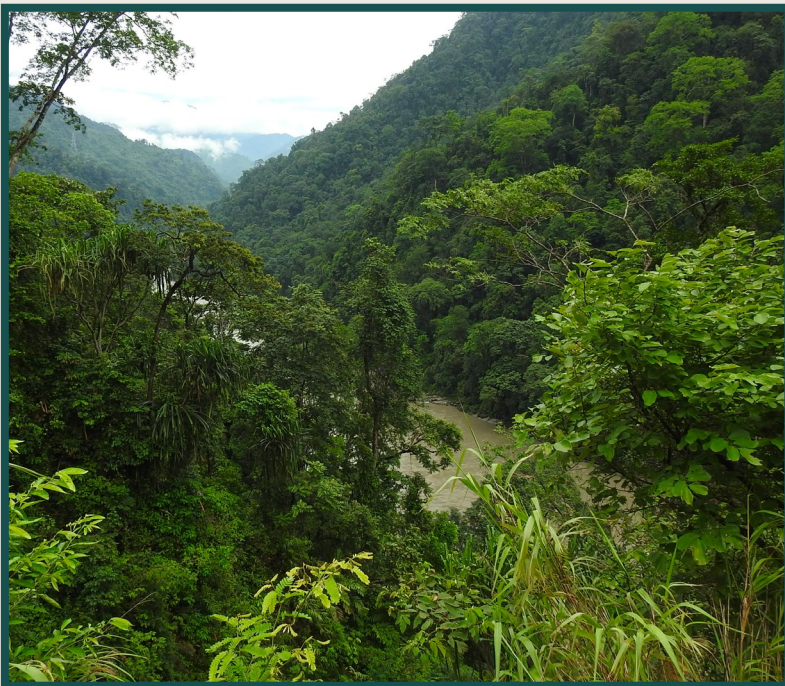
ARUNACHAL PRADESH

CLOSEST AIRPORT: Tezpur

CLOSEST RAILWAY STATION: Biswanath Chariali Railway Station

ELEVATION: 150 to 2,000 m

With a landscape of thick evergreen forests and the Pakke and Kameng rivers flowing through the area, Pakke T.R. is about two and a half hour drive from the Kaziranga National Park in Assam. Herpetofauna like the Salazar pit viper, Green cat snakes, black kraits, tree frogs, and monitor lizards can be found here. Learn more [here](#).



Left: Pakke Tiger Reserve | Right: Salazar Pit Viper

NONGKHYLLEM WILDLIFE SANCTUARY MEGHALAYA, RI-BHOI DISTRICT

CLOSEST AIRPORT: Guwahati/Shillong

CLOSEST RAILWAY STATION: Guwahati Railway Station

ELEVATION: 200 - 950 m

The semi-evergreen forests of Nongkhyllem are composed mainly of Sal and Bamboo. The wildlife sanctuary can be reached through either Khanapara in Guwahati or Shillong, as it rests on the border of Assam and Meghalaya. A 90 minute drive from either of these cities can get you to Quinine village in Meghalaya, from which a road leads to inside the sanctuary. Nature enthusiasts can stay at Umtasor Forest Guest House after receiving permission from the Meghalaya Forest Department. One can look out for herps like the Khasi bent-toed gecko, tree frogs, and Brown-spotted pit vipers.



Top: Nongkhyllem Wildlife Sanctuary | Bottom: *Rhacophorus bipunctatus*



TRISHNA WILDLIFE SANCTUARY

TRIPURA

CLOSEST AIRPORT: Agartala

CLOSEST RAILWAY STATION: Garjee Railway Station

ELEVATION: 15 - 75 m

Situated in the low-lying areas of Tripura, with a large number of seasonal streams flowing through the dense forests and grasslands, Trishna WLS is about 100 km from Agartala by road. Look for snakes like the Bindee keelback, cat snakes, and pit vipers. Spadefoot toads, bent-toed geckos, and tokay geckos are also commonly found here.



Top: Tokay Gecko | Bottom: Bindee Keelback



DAMPA TIGER RESERVE

MIZORAM

CLOSEST AIRPORT: Lengpui Airport, Aizawl

CLOSEST RAILWAY STATION: Bairabi Railway Station

ELEVATION: 49 - 1095 m

Composed of evergreen to semi-evergreen forests dotted with bamboo, Dampa Tiger Reserve is about 127 from the state capital Aizawl via road. One can walk through the forest trails with guides to spot herpetofauna like the Green Fan-throated lizard, Spotted forest skink, Khasi hills Keelback and Mizo Rain snake.

Learn more [here](#), [here](#) and [here](#).



Top and Bottom Left: Green Fan-throated Lizard | Bottom Right: Khasi Hills keelback

KHANGCHENDZONGA NATIONAL PARK

SIKKIM

CLOSEST AIRPORT: Bagdogra International Airport, West Bengal

CLOSEST RAILWAY STATION: New Jalpaiguri Junction Railway Station

ELEVATION: 1,829 to 8,550m

While looking for herpetofauna in the very cold, high elevation mountainous regions can be difficult, one can look out for the East Himalayan Mountain lizards, Flat-tailed house geckos, the Greater black krait, and the Himalayan keelback in the lower elevation temperate broad-leaved forests of this national park. While herping in such high elevation landscapes, ensure that you pick the right season to visit. The park is just a 4 hour drive from Gangtok, the capital of Sikkim.



Top: Kanchendzonga National Park | **Bottom:** Himalayan Keelback

KAZIRANGA NATIONAL PARK

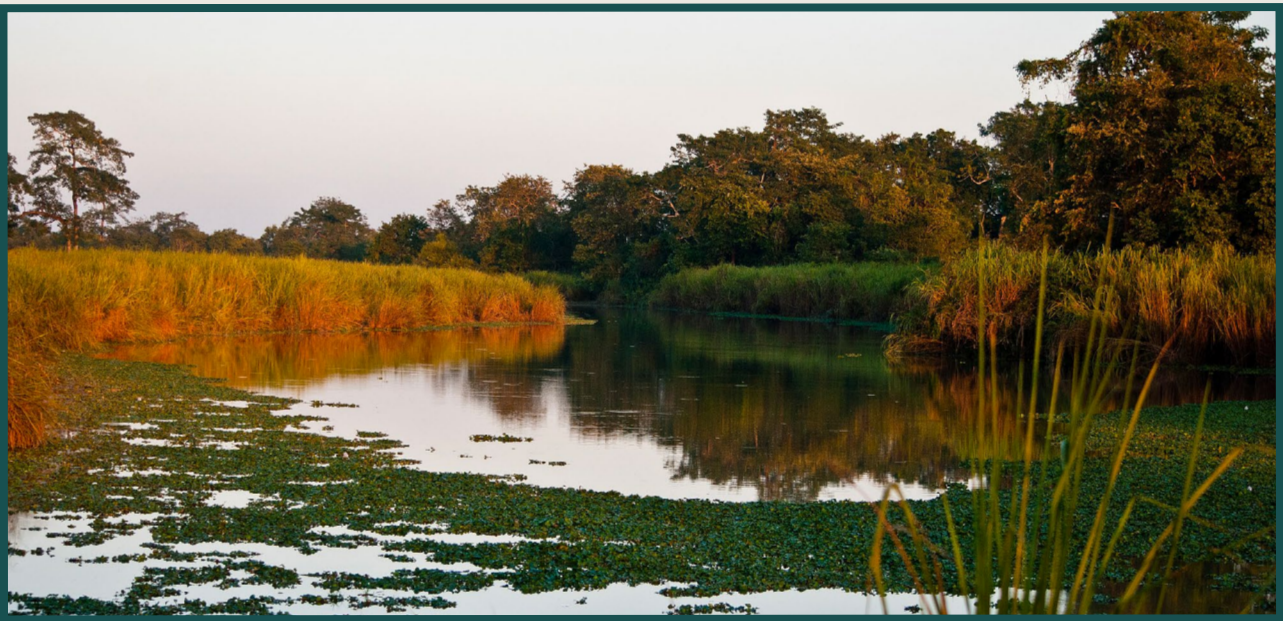
ASSAM

CLOSEST AIRPORT: Jorhat Airport

CLOSEST RAILWAY STATION: Furkating Junction Railway Station

ELEVATION: 40 - 80 m

With the Brahmaputra river flowing through the national park, Kaziranga is an ideal destination for spotting turtles as one walks through the various nature trails in the park. The national park is about 195 km from Guwahati via road. Look out for Assam roofed turtles and Black softshell turtles along the bank of the river. Several snake species, monitor lizards, and tokay geckos can also be spotted in the tropical broad-leaved forests and grasslands of the landscape.



Top: Kaziranga National Park | Bottom: Assam Roofed Turtle

MATCH THE SPECIES TO THEIR HABITAT!



Asian Forest Tortoise



Forest Skink



Assam Roofed Turtle



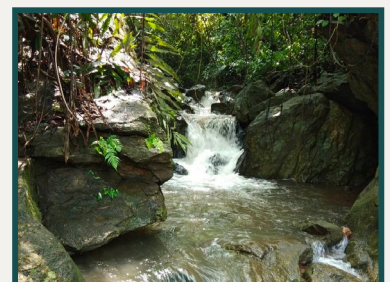
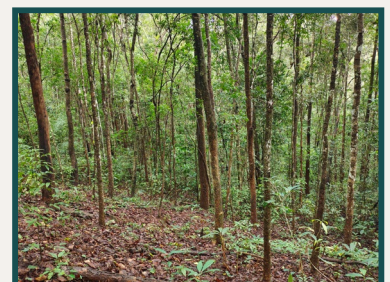
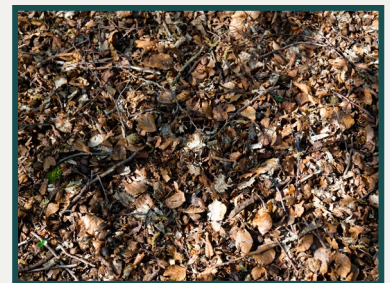
Salazar Pit Viper



Assam Stream Frog

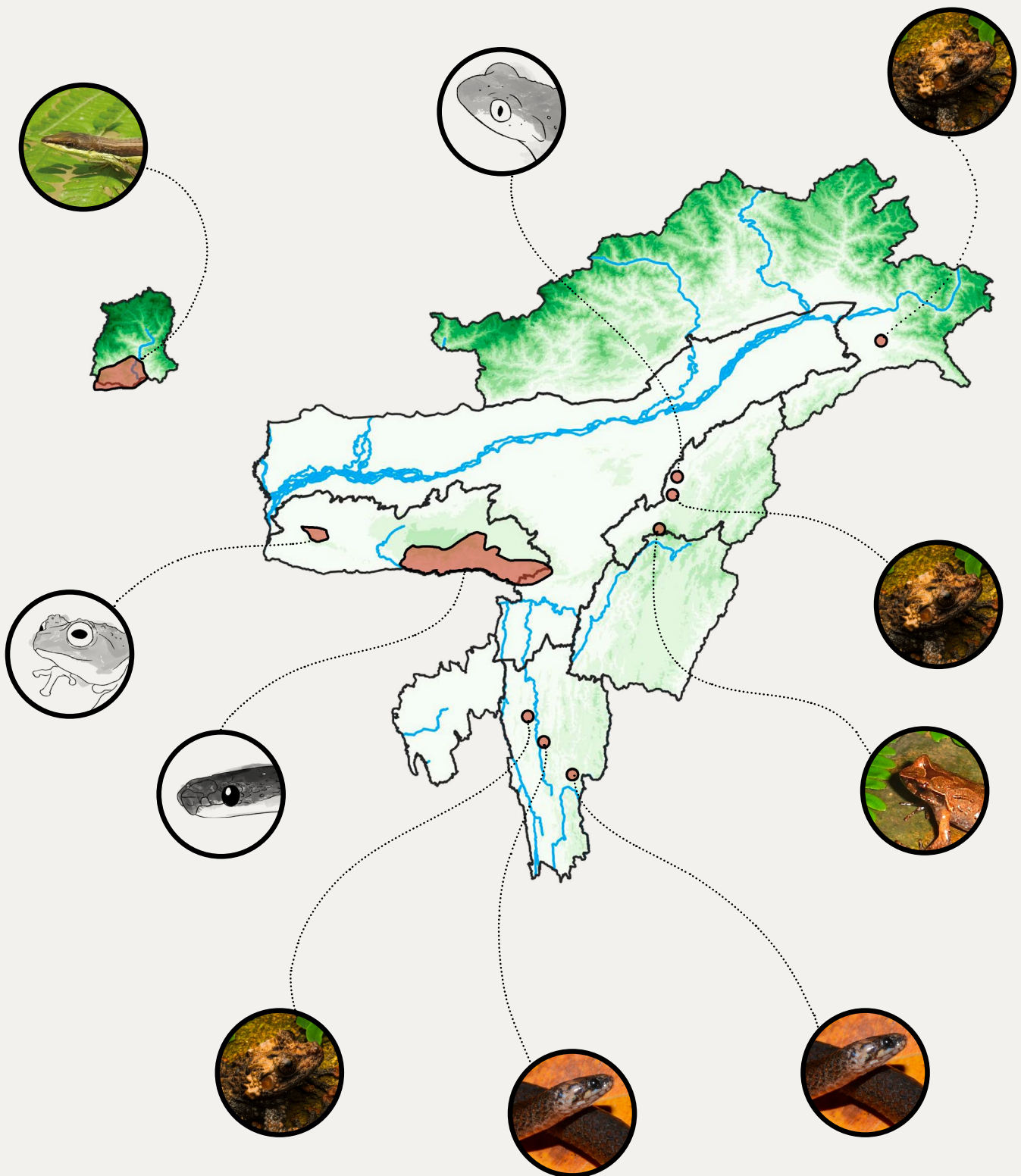


Alpine Toad



Rare, Elusive, and Endangered

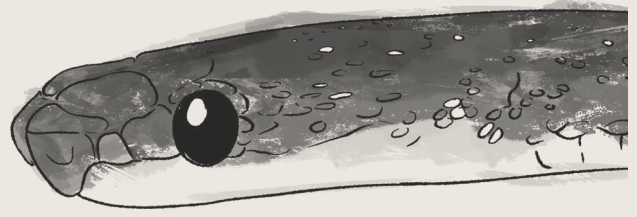
Highlighting a few rare and endangered species from across the Northeast



1

Khasi Earth Snake (*Stoliczka khasiensis*)

Back in 1870, an English zoologist named Thomas Jerdon first described this earth snake. It was documented again in 1904. For the last 120 years, scientists have been searching high and low but haven't found another one of these snakes. It's turned into a real mystery – a species that seems truly lost.



2

Dzükou Valley Horned Frog (*Xenophrys dzukou*)

This horned frog is critically endangered. The scientists who discovered it from Dzükou Valley, surveyed several sites around the region, in the lower slopes of the valley, but couldn't spot any more of these frogs. This frog species only exists in a small part of Dzükou Valley, and that puts them at a much greater risk of extinction.



3

Nagaland Slender-armed Frog (*Leptobrachella lateralis*)

This slender-armed frog has been a real mystery. Scientists are only certain about its existence in the Nhyatsutchu stream in the Wokha district of Nagaland.



4

Kemp's Bush Frog (*Philautus kempiae*)

This is just another elusive and lost species reported from the Garo hills of Meghalaya. Scientists are unsure if it's a valid species or just a variation of an existing one. The only way to be sure is to find and examine an individual from the Garo hills.



5

Sikkim Grass Lizard (*Takydromus sikkimensis*)

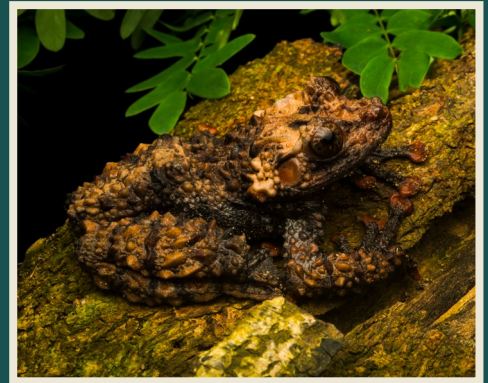
This endangered species of grass lizards is exclusive to the Teesta valley region in Sikkim. However, recent reports reveal that it has also been spotted in Nepal.



6

Nagaland Warty Tree Frog (*Theloderma nagalandense*)

The warty tree frog has been documented in Arunachal Pradesh, Mizoram, and Nagaland. Despite its presumed extensive distribution, it has been observed in only three locations within each of these states. This suggests that it may be a rare species with a potentially sparse population spread across a broader geographic range.



7

Mizoram Ground Snake (*Blythia hmuifang*)

Scientists recently identified this elusive species of ground snakes from the ecologically sensitive Hmuifang mountain in Mizoram. As of now, there's limited knowledge about its ecology, behaviour, or the threats it faces. It's also been spotted in another village in Mizoram, suggesting the possibility that this species might be present in other areas as well.



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SNAKE STORIES FROM THE NORTHEAST

It was believed by the *Moklum Tangsa*, a community from the Tirap district of Arunachal Pradesh, that a great snake once guarded the water on the *Ranggokaa* peak, one of the hills in the Patkai mountain range. One day, the snake and a jungle fowl from Moklum peak decided to let the water out and dug through the hills in two different ways. The water that flowed down the plains formed the two rivers, Tirap and Dihing.

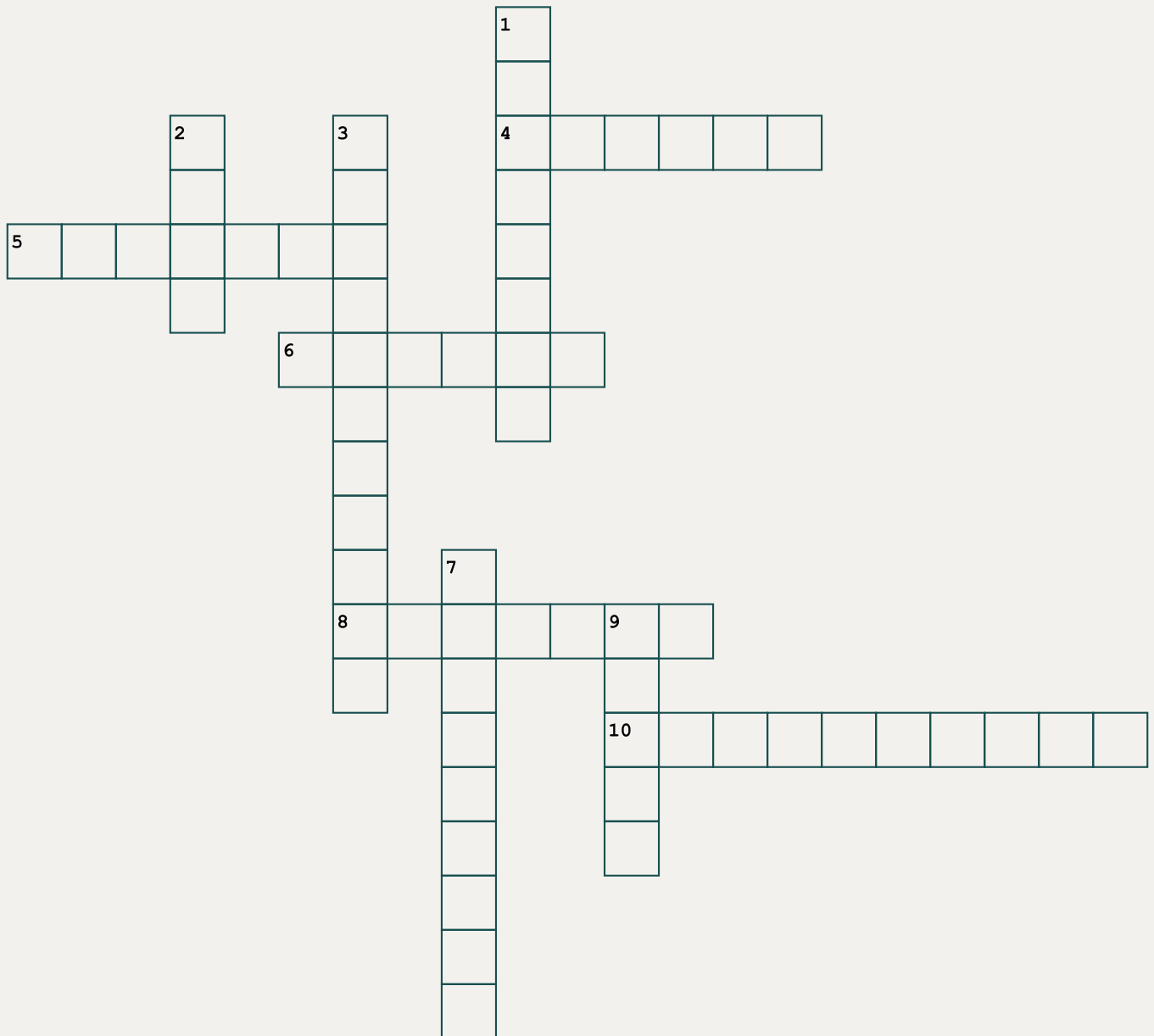
In another *Taraon Mishmi* tale, the rainbow grows out of the head of a great water snake whenever it is hungry. The snake uses the rainbow to climb up to the heavens and ask the gods to provide food. The rainbow elongates along the path that the snake goes.

The *Hrusso* and *Nocte* tribes of Arunachal Pradesh have stories that state that a lake was nothing but water held by a big snake in its coils.

In Assam, there is a common belief that a pair of cobras guard their water, granary (*bharal*), and treasure. The belief is that the cobra pair will lead to the prosperity of the granary. Serpents that dwell in *namghars*, village prayer halls, are considered sacred, and killing them, a sin. Serpents are considered to be the guardian deities of water by many.

Dreams of snakes are interpreted in many ways, but the Assamese consider these to be indications of a coming marriage. The Western *Rengma Naga* communities believe that a dream of a snake foretells a quarrel.

CROSSWORD



ACROSS

4. Reptile with a hard shell (6)
5. The Zaimeng Lake Crocodile Newt (*Tylototriton zaimeng*) is known from this northeast-Indian state (7)
6. Slang for a person who goes herping/herp enthusiast (singular, 6)
8. Critically endangered crocodilian with a long, slender snout (7)
10. Amphibian known to regenerate its lost body parts (10)

DOWN

1. A venomous, green snake that was named after the Harry Potter character "Salazar Slytherin" (3, 5)
2. Body part that snakes and lizards periodically shed (4)
3. Term for the study of reptiles and amphibians (11)
7. Worm-like, limbless amphibian (9)
9. Northeast-Indian state with highest number of freshwater turtle species (5)

Resources

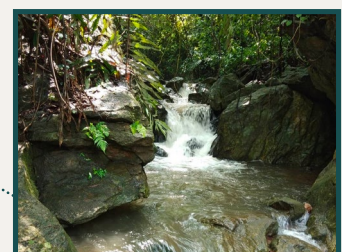
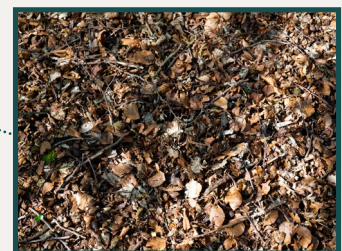
LIST OF BOOKS ON NORTHEAST-INDIAN HERPETOFAUNA

- Pictorial Guide to the Amphibians of the North East India
By Rosamma Mathew and Nibedita Sen
- Amphibians and Reptiles of NorthEast India: A Photographic Guide
By M Firoz Ahmed, Abhijit Das and Sushil K Dutta
- Tortoises and Turtles of Northeast India: Saving them from Extinction!
By A Firoz Ahmed and Abhijit Das
- An Amateur's Guide to the Reptiles of Assam
By Jayaditya Purkayastha
- A Pocket Guide to Amphibians of Namdapha Tiger Reserve
By Abhijit Das and Bitupan Boruah
- Mizoram Rul Chanchin
By HT Lalremsanga and Samuel Lalronunga
- Snakes of Pakke Tiger Reserve: Pictorial Field Guide
By Shradha Rathod, Kime Rambia and Ashok Captain

ANSWERS TO WHO'S THAT HERP?

- | | |
|-------------------------|-------------------------------------|
| 1. Gharial | By <u>Jagged Fang Designs</u> |
| 2. Skink | By <u>Jose Carlos Arenas-Monroy</u> |
| 3. Tokay Gecko | By <u>Steven Traver</u> |
| 4. King Cobra | By <u>V. Deepak</u> |
| 5. Tree Frog | By <u>Vijay Karthick</u> |
| 6. Chamaeleon | By <u>Alex Slavenko</u> |
| 7. Caecilian | By <u>Jose Carlos Arenas-Monroy</u> |
| 8. Rattlesnake | By <u>Gabriela Palomo-Munoz</u> |
| 9. Sea Turtle | By <u>Guillaume Dera</u> |
| 10. Giant Tortoise | By <u>Luca Leicht</u> |
| 11. Fan-throated Lizard | By <u>V. Deepak</u> |
| 12. Iguana | By <u>Jack Mayer Wood</u> |

ANSWERS TO MATCH THE FOLLOWING



ANSWERS TO CROSSWORD

- | | | | |
|----------------|------------|--------------|----------------|
| 1. PIT VIPER | 4. TURTLE | 7. CAECILIAN | 10. SALAMANDER |
| 2. SKIN | 5. MANIPUR | 8. GHARIAL | |
| 3. HERPETOLOGY | 6. HERPER | 9. ASSAM | |

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Researchers flipping rocks: Dr. Basundhara Chettri

FIELD HERPING

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LIFE IN HERPETOLOGY

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HT and the team with a King Cobra: H. T. Lalremsanga

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Stream at Hmuifang: H. T. Lalremsanga

Hmuifang landscape: H. T. Lalremsanga

Maya's Pit Viper (*Trimeresurus mayae*): Parag Shinde

CURRENT HERPETOLOGICAL WORK IN THE NORTHEAST

Aaranyak: Jayanta Kr. Roy

WII: Abhijit Das

FTTF: Anuja Mital

Research group wading through wooded grasslands in the Sailam village, Mizoram: Lal Muansanga

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Nagaland Warty Tree Frog (*Theloderma nagalandense*): Pranoy Kishore Borah

Mizoram Ground Snake (*Blythia hmuifang*): Samuel Lalronunga, Indian Snakes

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Sarma, R. (2017). Folklore of Serpent in North-East India. International Journal in Management & Social Science, 5(6), 337-345.

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