

PROJECT UPDATE
(August to October 2025)
by
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Project Timeline: Project started on 1st of May 2025 and has a duration of exactly 1 year.

Current Project Planning: Preparing reports and publishing research papers regarding surveys as well as awareness programmes conducted and specimens collected during the project period.

Awareness workshops conducted so far: Five workshops completed so far (two in Siju Village, near Siju Cave, South Garo hills district, Meghalaya; one in St John's High School, South Garo hills district, Meghalaya and the remaining two in Mawmluh village, Cherrapunjee, East Khasi Hills District, Meghalaya).

Current field sites partially visited for conducting surveys in the next few months: Jaintia hills, Meghalaya.

Current field sites fully surveyed: Siju Cave and other Limestone Rock Formations, Siju Wildlife Sanctuary, South Garo hills District, Meghalaya; Mawmluh Caves and its associated Limestone Rock Formations, East Khasi Hills District, Meghalaya; Mawsmal Caves and its associated Limestone Rock Formations, East Khasi Hills District, Meghalaya; Nakama Cave and its associated Limestone Rock Formations, South Garo hills District, Meghalaya.

Results and Discussion

I have just completed my monsoon and post-monsoon field surveys alongside three awareness campaigns conducted between 1st August to October 27th including talk regarding herpetofauna conservation as well as snakebite mitigation in the East Khasi hills district and the South Garo hills district of Meghalaya, northeast India. Till now, out of the six mentioned limestone caves, four (two from the Khasi hills and the remaining two from the Garo hills) have already been surveyed. However, one of the caves proposed for study, Krem Umshyrpi (East Khasi Hills), could not be surveyed due to ongoing police investigations following the murder of a tourist close to the project site. Consequently, this site has been replaced with Nakama Cave located in the South Garo Hills. Finally, the remaining two limestone caves in the Jaintia hills could not be surveyed due to logistical constraints and are scheduled for coverage during the pre-monsoon/monsoon period (March–May) in 2026.

During the project period, we published a total of three high-impact research publications: (I) a comprehensive systematic revision of the poorly known natricid snake namely *Hebius khasiensis* species complex from the Indo-Burma region which led to the resurrection of *Hebius gilhodesi* from Myanmar, thereby making *Hebius khasiensis sensu stricto* endemic to northeast India; (II) the first ever record of *Calotes zolaiking*, a rare and poorly known agamid lizard previously considered endemic to Mizoram, from Meghalaya, thereby extending its distributional range by at least 210 kms; and (III) the first genetic data accompanied by a taxonomic revision of *Smithophis bicolor*, a poorly known natricid snake endemic to the Khasi and Garo hills of Meghalaya. Furthermore, this project has resulted in the discovery of a new reptile species from Meghalaya, presently undergoing taxonomic description. Notably, the discovery of *Calotes*

zolaiking in Mawmluh Village, Cherrapunjee, East Khasi Hills District, had a substantial positive impact on local conservation awareness, serving as a powerful catalyst for community-driven habitat protection initiatives, as discussed in details below.

Coming to the field surveys, we surveyed for approximately 20 days in Sohra, Cherrapunjee mostly in early mornings and dusk till mid night in and around Mawmluh as well as Mawsmai Caves surrounded by thick, wet evergreen-montane forests (1200 to 1400 m asl) in association with fast flowing streams, rivers and limestone rock formations. We started the field survey on 2nd August immediately after the permission was granted to us by the Headman of Sohra, East Khasi hills district, Meghalaya.



Fig.1. An overview of the habitat in Sohra/Cherrapunjee, East Khasi hills, Meghalaya, India.

NOTES ON THE HERPETOFAUNA OF CHERRAPUNJEE

Reptilia (overall habitat)

- Despite being mostly misty, wet and foggy climatic conditions during the monsoon (Fig.1), most of the agamid and scincid lizards namely *Calotes maria* (four adult specimens including one gravid), *Calotes cf. irawadi* (two adult specimens), *Calotes jerdoni* (two adult specimens), *Calotes emma* (only a single adult male), *Ptyctolaemus gularis* (one adult male specimen), *Cristidorsa planidorsata* (two adult specimens), *Draco* sp. (a single specimen which couldn't be caught), *Eutropis macularia* (one adult specimen), *Eutropis multifasciata* (three adult specimens), *Sphenomorphus maculatus* (more than ten adult individuals), *Sphenomorphus indicus* (one adult specimen) and *Riopa albopunctata* (one adult specimen) were found to be active during the day, particularly during the presence of sunlight in the mornings.



Fig.2. Tropical evergreen hilly forest landscape of Sohra (Cherrapunjee), East Khasi Hills District, Meghalaya, India, showing densely forested hills and a perennial flowing stream in the valley.

- The agamids (see Table 1) were mostly seen exhibit an arboreal behavior i.e., looking for insects to feed, basking on tree tops or high branches and at times even chasing rival males for territorial marking. However, at night only four agamids namely *Calotes zolaiking* (only two specimens and the first report from Meghalaya), *Calotes maria* (one adult female gravid specimen), *Calotes jerdoni* (one adult female gravid specimen) and *Ptyctolaemus gularis* (one adult male) were observed sleeping either on tree tops or on higher branches (some 8 to 10 feet above the ground).



Fig.3. Mixed microhabitats within ~500 m² surrounding Mawmluh Cave, Cherrapunjee, showing a rocky riverbed with shallow pools and flowing stream (A), adjacent grassland habitat (B), limestone rock formations associated with tropical evergreen forests near the cave entrance (C), and a close view of the Mawmluh Cave entrance with limestone overhang and subterranean stream (D).

- Regarding skinks, all of them were seen either basking during early mornings, running (possibly due to our presence) or feeding on small insects on the forest floor covered with moist or dry leaf litter, tree logs, tree trunks close to water bodies. Not a single skink was

observed sleeping anywhere at night possibly of their nature to retreat into loose soil bunds and crevices after dusk. Among monitor lizards, *Varanus bengalensis* (only two individuals) and *V. salvator* (only one specimen) were seen only twice close to large fast flowing streams during the afternoon.

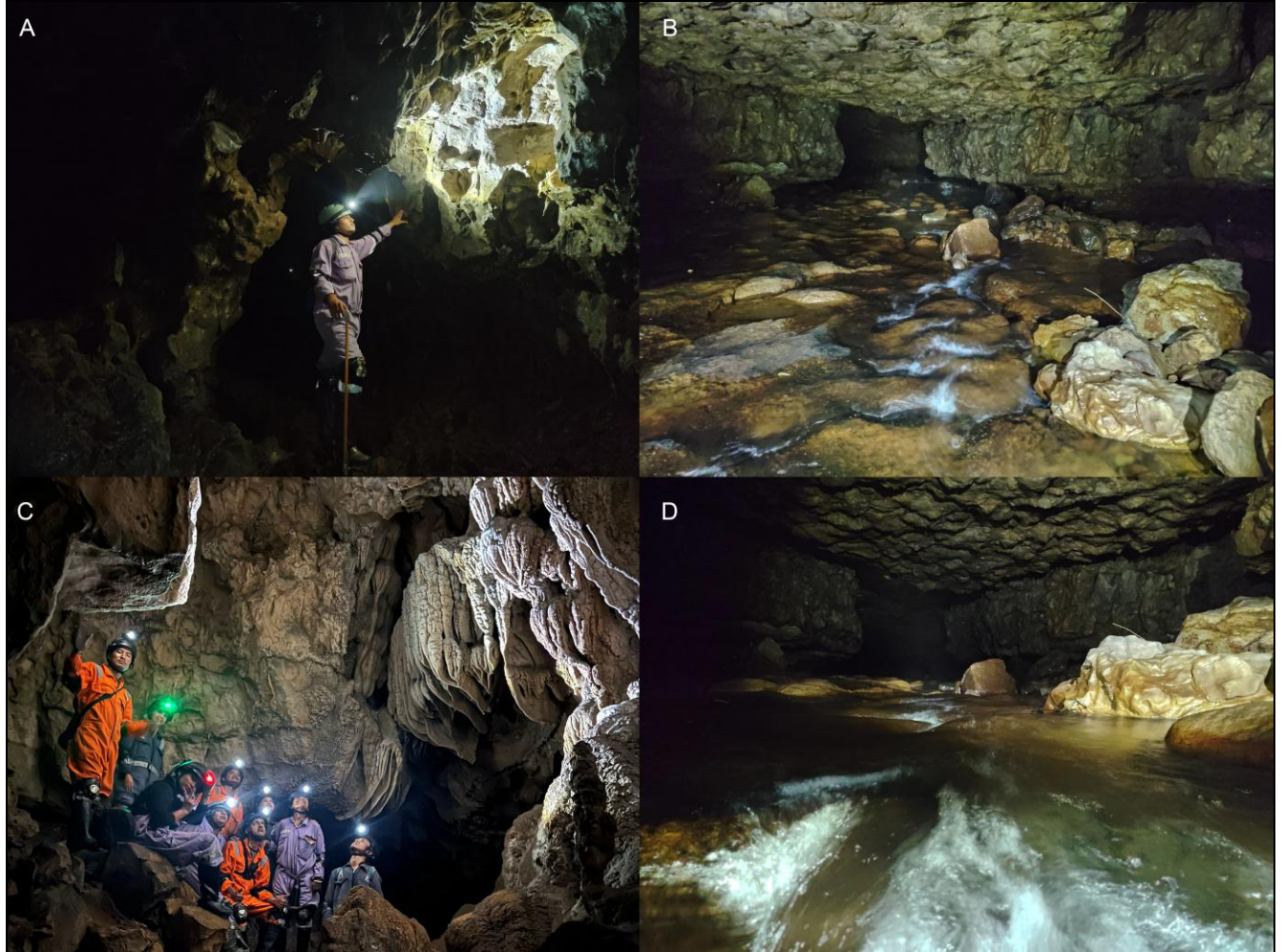


Fig.4. Representative cave microhabitats inside the Mawmluh Cave, Sohra (Cherrapunjee), East Khasi Hills District, Meghalaya, India. A: Limestone wall and ceiling formations inside the cave; B: Shallow subterranean stream flowing over a rocky substrate; C: Cave chamber with flowstone and drapery-like speleothem formations; D: Fast-flowing underground stream forming pools and riffles. This survey was conducted by the team leader of the Rufford Project and the MTAACS team.

- Among snakes, we encountered only seven species in the forest floor during the day between 08:00 h to 14:00 h, out of which four of them were the rarely seen ones namely the *Elaphe cantoris* (a juvenile one), *Pseudoxenodon macrops* (a single adult specimen), *Smithophis bicolor* (a single adult specimen) and *Ptyas nigromarginata* (a single adult specimen) (see Table 1 for their microhabitat preferences) whereas the remaining three

includes the highly venomous species namely *Ophiophagus hannah* (a single specimen), *Naja kaouthia* (a single specimen) and *Trimeresurus mayae* (a single specimen). However, only a single specimen of *Trimeresurus mayae* was encountered during the survey period, at approximately 13:00 h on a cloudy day, resting among bushes within thick forest vegetation, which is consistent with its strictly nocturnal behavior and daytime sheltering habits.

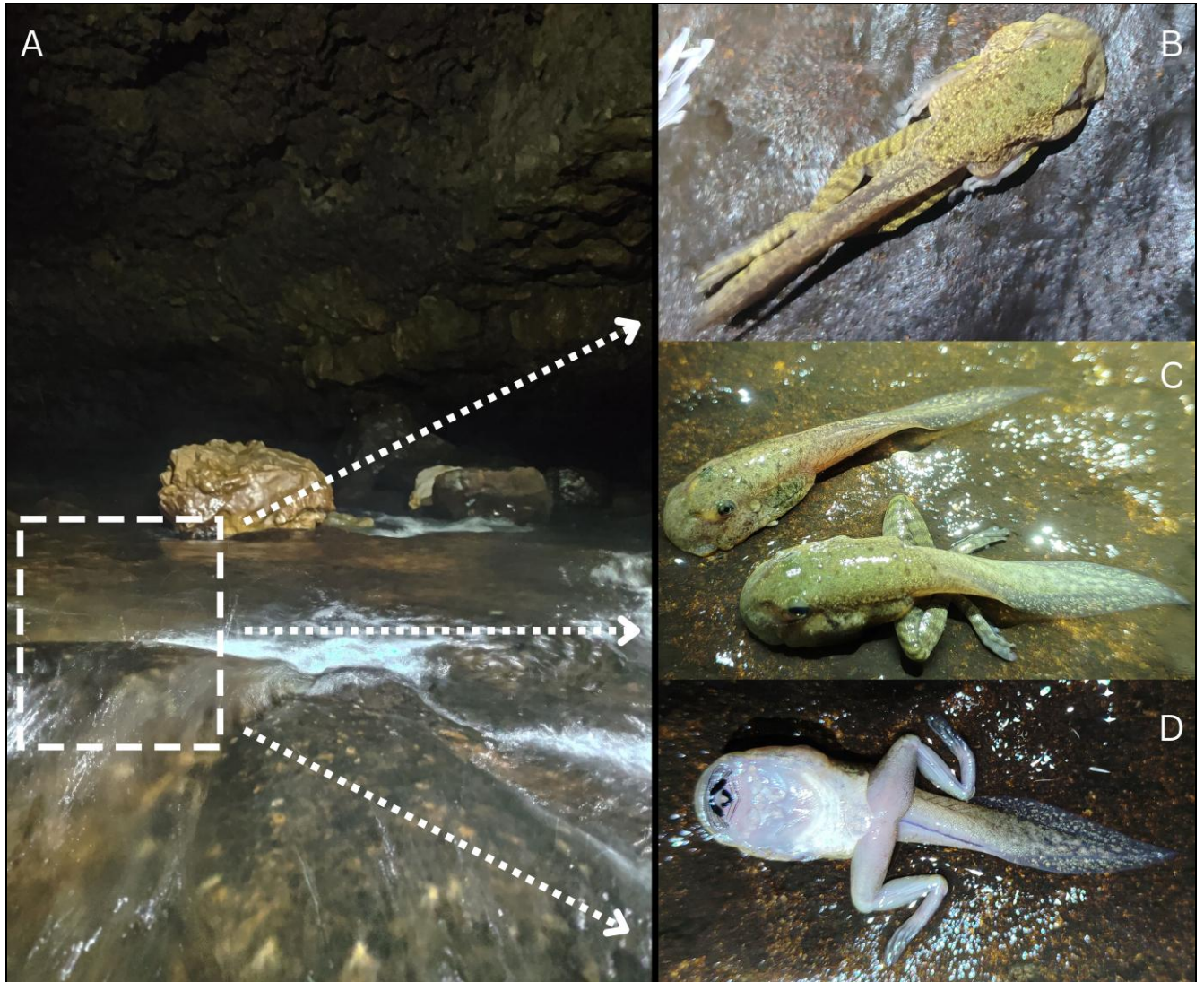


Fig.5. Subterranean stream microhabitat and larval stages of *Amolops* sp. 1 observed inside the Mawmluh Cave, Sohra (Cherrapunjee), East Khasi Hills District, Meghalaya, India. A: Shallow, fast-flowing underground stream over rocky substrate inside the cave; dashed box indicates the area from which *Amolops* sp. 1 larval individuals were recorded. B: A partially developed froglet attached to a wet cave rock submerged in a fast-flowing stream. C: A tadpole and a partially developed froglet resting in wet rocky substrates along the streams. D: Ventral view of a partially developed froglet collected from the wet rocky substrates inside the cave.

- All the encountered geckos namely *Hemidactylus platyurus* (more than ten adult individuals), *H. garnotii* (only two adults and one juvenile) *H. brooki* (only two adults) *H. frenatus* (more than ten adult individuals), *Cyrtodactylus khasiensis* (more than ten adult individuals), *Cyrtodactylus cf. khasiensis* (only three adult individuals) and *Gecko gecko* (only three adult individuals) were observed to be active at night between 18:30 h to midnight with *Hemidactylus platyurus*, *H. garnotii*, *Cyrtodactylus khasiensis*, *Cyrtodactylus cf. khasiensis* and *Gecko gecko* strictly being forest dwellers with a high microhabitat preference of loose soils (filled with moss), tree trunks and rocks (with or without mosses) surrounded by thick forests. However, species such as *H. brooki* and *H. frenatus* were mostly seen in and around human habitations i.e., clinging to walls inside human dominated regions.



Fig.6. Subterranean stream microhabitat and larval stages of *Rhacophorus bipunctatus* observed inside Mawmluh Cave, Sohra (Cherrapunjee), East Khasi Hills District, Meghalaya, India. (A): Water pool formed by the flow of a subterranean hill stream inside the cave; dashed box indicates the area from which *R. bipunctatus* individuals were recorded. (B–C): Partially developed froglets collected from the water pool, observed while deeply submerged.



Fig.7. Habitat conditions in and around Mawsmai Cave, East Khasi Hills District, Meghalaya, India. A–B: Relatively somewhat undisturbed limestone and forested microhabitats surrounding the cave entrance, retaining natural structural complexity and moisture conditions. C–D: Interior sections deep inside the cave showing extensive anthropogenic modification, including concretized pathways, continuous artificial lighting, and heavy tourist movement. Such alterations have resulted in severe degradation of cave microhabitats, likely contributing to the absence of vertebrate and invertebrate fauna within the cave interior.

- The remaining reptilian fauna were encountered to be highly active at night (see Table 1 for further details and microhabitat preferences) which includes some rarely seen and lesser known species such as *Hebius khasiensis* (only a single adult specimen; we recently stabilized this species complex in terms of systematics), *Boiga quincunciata* (only one huge adult female specimen reaching upto 4.5 feet; possibly only the second sighting of this species from Meghalaya), *Lycodon jara* (only one juvenile), *Lycodon zawi* (only two adults), *Lycodon septentrionalis* (rediscovery of this species from the State after more than a century; one adult and one juvenile), *Lycodon fasciatus* (only one

adult specimen i.e., road killed), *Oreocryptophis porphyracea* (only one adult specimen i.e., road killed), *Ovophis* cf. *monticola* (only one road killed specimen) *Protobothrops jerdonii* (only one road killed adult specimen), *Bungarus niger* (a single adult specimen) and *Sinomicrurus macclellandi* (a single adult male). However, a juvenile *Ptyas korros* was also observed sleeping on a branch of a tree some 7 to 7.5 feet above the ground.



Fig.8. Some of the herpetofauna species observed in Sohra, Cherrapunjee, East Khasi hills, Meghalaya. A to O represent Amphibia i.e., A: *Bufoides meghalayanus*; B: *Hoplobatrachus cf. litoralis*; C: *Limnonectes khasianus*; D: *Minervarya pierrei* mating; E: *Minervarya sengupti*; F: *Minervarya teraiensis* mating; G: *Microhyla cf. mymensinghensis*; H: *Microhyla berdmorei*; I: *Amolops* sp. 1; J: *Clinotarsus alticola*; K: *Oddorana chloronata*; L: *Leptobrachium cf. aryatum*; M: *Zhangixalus smaragdinus*; N: *Kurixalus/Chirixalus* sp.; and O: *Ichthyophis* sp. 1 to 20 represent Reptilia i.e., 1: *Cyrtodactylus khasiensis*; 2: *Hemidactylus platyurus*; 3: *Sphenomorphus indicus*; 4: *Sphenomorphus maculatus*; 5: *Eutropis macularia*; 6: *Calotes maria*; 7: *Calotes jerdoni*; 8: *Calotes zolaiking*; 9: *Calotes emma*; 10: *Ptyctolaemus gularis*; 11: *Pseudoxenodon macrops*; 12: *Lycodon septentrionalis*; 13: *Elaphe cantoris*; 14: *Rhabdophis cf. himalayanus*; 15: *Rhabdophis helleri*; 16: *Trimeresurus mayae*; 17: *Trimeresurus salazar*; 18: *Trimeresurus popeiorum*; 19: *Sinomicrurus macclellandi*; and 20: *Naja kaouthia*.

Amphibia (overall habitat)

- Amongst amphibians, all the species were encountered at night between 17:30 h to 12:30 h with specimens being sighted from the beginning of the dusk. Our 20-day survey revealed the presence of 38 amphibian species (see Table 1 for further details and microhabitat preferences) which includes certain rarely seen and poorly known taxa such as *Bufoides meghalayanus* (only three adult specimens of this Critically Endangered and Khasi-hills endemic species), *Minervarya sengupti* (only three adult specimens), *Oddorana mawphlangensis* (only a single adult specimen which could not be caught), *Ingerana borealis* (only two adult specimens), *Leptolalax khasiorum* (only a single adult specimen), *Megophrys cf. megacephala* (only a single adult specimen of this Endangered and endemic species), *Kurixalus/Chirixalus* sp. (only three adult specimens), *Raorchestes shillongensis* (more than twenty individuals of this Critically Endangered were heard calling but only two of them could be caught from higher canopies), *Zhangixalus smaragdinus* (a huge adult female specimen), *Hyla annectans* (a single adult specimen) and *Ichthyophis* sp (a single adult specimen).
- In terms of microhabitat preferences, some of these species were strictly arboreal (such as *Kurixalus/Chirixalus* sp., *Polypedates lecuomystax*, *Polypedates* sp., *Raorchestes* sp. 1, *Raorchestes* sp. 2, *Raorchestes shillongensis*, *Rhacophorus bipunctatus*, *Zhangixalus smaragdinus* and *Hyla annectans*), some were found to be arboreal as well as partially rupicolous in association with or without streams (such as *Bufoides meghalayanus*, *Rhacophorus bipunctatus*, *Zhangixalus smaragdinus* and *Kurixalus/Chirixalus* sp.), some were completely ground-dwelling with a strong association with hill streams (*Limnonectes khasianus*, *Limnonectes* sp., *Amolops* sp. 1, *Amolops* sp. 2, *Clinotarsus alticola*, *Oddorana chloronata*, *Oddorana mawphlangensis*, *Ingerana borealis*, *Megophrys* sp., *Leptolalax khasiorum*, *Leptobrachium cf. aryatum*, *Megophrys robusta*, *Megophrys cf. megacephala* and *Ichthyophis* sp.) and some were ground-dwelling with a

strong preference to temporary pools for breeding within the forest floor (*Hoplobatrachus tigerinus*, *H. cf. litoralis*, *Minervarya pierrei*, *M. nepalensis*, *M. teraiensis*, *M. sengupti*, *Euphlyctis adolfi*, *Hydrophylax leptoglossa*, *Hydrophylax* sp., *Microhyla cf. mymensinghensis*, *Kaloula pulchra* and *Humerana humeralis*). However, members of the genus *Hoplobatrachus* were mostly observed close to rivers and grasslands.



Fig.9. Larval stages of amphibians observed in different microhabitats (see Table 1) within the forest floor in Cherrapunjee, East Khasi hills, Meghalaya. A: Eggs of *Hydrophylax leptoglossa* observed in a temporary pool within the forest floor; B: Tadpoles of *Polypedates leucomystax* observed in a temporary pool within the forest floor; C: A partially developed froglet of *Rhacophorus bipunctatus* observed in a temporary pool within the forest floor; and D: A froglet of *Amolops* sp. 1 observed in a fast-flowing stream close to the Mawmluh Cave entrance.

- Eggs, tadpoles and froglets of many species were also encountered in different microhabitats at night (sometimes even during the day) which includes tadpoles of *Minervarya teraiensis* (observed ground-dwelling with a strong preference to temporary

pools and ponds within the forest floor), *Euphlyctis adolfi* (observed ground-dwelling with a strong preference to temporary pools and still water bodies within the forest floor including open grasslands), *Hydrophylax leptoglossa* (240-250 dark colored dot like eggs embedded in a semi-transparent thin membrane were observed in different still water bodies like temporary pools, lakes and ponds within the forest floor), *Amolops* sp. 1 (15 to 20 tadpoles and 10-11 partially developed froglets were observed sticking/clinging to wet slippery rocks with the help of their ventrally bearing gastromyzophorous abdominal sucker in fast flowing waterfalls), *Clinotarsus alticola* (3 to 4 froglets were observed close to fast flowing streams), *Leptobrachium cf. aryatum* (5 to 7 froglets were observed close to fast flowing streams), *Kurixalus/Chirixalus* sp. (3 froglets were observed close to a small waterfall), *Polypedates lecuomystax* (only two froglets were observed close to a small temporary pool) and *Rhacophorus bipunctatus* (five tadpoles and three partially developed froglets were observed in a still and small temporary pool within the forest floor deep inside the forests).

Table1. A checklist of reptiles and amphibians observed in and around the Mawmluh Cave, East Khasi hills district, Meghalaya. Abbreviations for micro-habitats include GS (Grasslands); TF (Tropical semi-evergreen or evergreen forests in association with rocks and without streams); TFS (Tropical semi-evergreen or evergreen forests in association with rocks and with running hill streams); LC (Inside the Limestone Caves); LCE (Entrance of the Limestone cave surrounded by tropical evergreen or semi-evergreen/montane forests in association with running hill streams); LRF (In and around Limestone Rock Formations surrounded by tropical evergreen/montane forests).

REPTILIA				
Sl no.	Family	Scientific name	IUCN Red List status	Place of observation
1	Gekkonidae	<i>Hemidactylus platyurus</i>	Least Concern	TF, LCE, LRF
2		<i>Hemidactylus garnotii</i>	Least Concern	TF, LCE, LRF
3		<i>Hemidactylus brooki</i>	Least Concern	TF
4		<i>Hemidactylus frenatus</i>	Least Concern	TF
5		<i>Cyrtodactylus khasiensis</i>	Not Evaluated	TF
6		<i>Cyrtodactylus cf. khasiensis</i>	Not Evaluated	LC, LRF, LCE
7		<i>Gecko gekko</i>	Least Concern	TF, LRF
8	Scincidae	<i>Sphenomorphus maculatus</i>	Least Concern	TF, TFS, LRF
9		<i>Sphenomorphus indicus</i>	Least Concern	TF, TFS, LRF
10		<i>Eutropis multifasciata</i>	Least Concern	TF, TFS, LRF
11		<i>Eutropis macularia</i>	Least Concern	TF, TFS, LRF
12		<i>Riopa albopunctata</i>	Least Concern	TF
13	Agamidae	<i>Calotes cf. irawadi</i>	Least Concern	TF
14		<i>Calotes maria</i>	Least Concern	TF, TFS
15		<i>Calotes emma</i>	Least Concern	TF, TFS
16		<i>Calotes jerdoni</i>	Least Concern	TF, TFS

17		<i>Calotes zolaiking</i>	Data Deficient	TF, TFS
18		<i>Calotes paulus</i>	Endangered	TF, TFS
19		<i>Draco</i> sp.		TF, TFS
20		<i>Ptyctolaemus gularis</i>	Least Concern	TF, TFS, LRF, LCE
21		<i>Cristidorsa planidorsata</i>	Least Concern	TF, TFS
22	Varanidae	<i>Varanus bengalensis</i>	Near Threatened	TF, TFS, LRF
23		<i>Varanus salvator</i>	Least Concern	TFS
24	Typhlophidae	<i>Indotyphlops brahminus</i>	Least Concern	TF, TFS, LRF
25		<i>Argyrophis diardii</i>	Least Concern	TF, TFS, LRF
26	Natricidae	<i>Fowlea piscator</i>	Least Concern	GS
27		<i>Herpetoreas xenura</i>	Near Threatened	TFS, LRF, LCE
28		<i>Hebius khasiensis</i>	Least Concern	TFS
29		<i>Rhabdophis helleri</i>	Not Evaluated	TFS
30		<i>Rhabdophis himalayanus</i>	Least Concern	TFS
31		<i>Smithophis bicolor</i>	Least Concern	TFS, LCE
32	Colubridae	<i>Boiga cyanea</i>	Least Concern	TF, TFS, LRF
33		<i>Boiga quincunciata</i>	Least Concern	TF, TFS, LRF
34		<i>Oligodon albocinctus</i>	Least Concern	TF, TFS, LRF
35		<i>Lycodon jara</i>	Least Concern	TF, TFS, LRF, LCE
36		<i>Lycodon zawi</i>	Least Concern	TF, LRF
37		<i>Lycodon septentrionalis</i>	Least Concern	TF, TFS, LRF
38		<i>Lycodon fasciatus</i>	Least Concern	TF
39		<i>Pareas monticola</i>	Least Concern	TF, TFS, LRF, LCE
40		<i>Oreocryptophis porphyracea</i>	Least Concern	TF, TFS
41		<i>Ptyas korros</i>	Near Threatened	TF, TFS
42		<i>Ptyas nigromarginata</i>	Least Concern	TF, TFS
43		<i>Elaphe cantoris</i>	Least Concern	TF, TFS
44	Pssamodynastidae	<i>Pssamodynastes pulverulentus</i>	Least Concern	TF, TFS
45	Pseudoxenodontidae	<i>Pseudoxenodon macrops</i>	Least Concern	TF, TFS
46	Viperidae	<i>Trimeresurus mayae</i>	Not Evaluated	TF, TFS, LRF, LCE
47		<i>Trimeresurus popeiorum</i>	Least Concern	TF, TFS
48		<i>Trimeresurus salazar</i>	Not Evaluated	TF, TFS
49		<i>Ovophis</i> cf. <i>monticola</i>	Least Concern	TF, TFS
50		<i>Protobothrops jerdonii</i>	Least Concern	TF, TFS
51	Elapidae	<i>Bungarus niger</i>	Least Concern	TF
52		<i>Naja kaouthia</i>	Least Concern	TF
53		<i>Ophiophagus hannah</i>	Vulnerable	TFS
54		<i>Sinomicrurus maccllellandi</i>	Least Concern	TF

AMPHIBIA

Sl no.	Family	Scientific name	IUCN Red List status	Place of observation
1	Bufonidae	<i>Duttaphrynus melanostictus</i>	Least Concern	GS

2		<i>Bufoides meghalayanus</i>	Critically Endangered	LRF
3	Dicroglossidae	<i>Hoplobatrachus tigerinus</i>	Least Concern	GS
4		<i>Hoplobatrachus cf. litoralis</i>	Least Concern	TF
5		<i>Limnonectes khasianus</i>	Least Concern	TFS
6		<i>Limnonectes</i> sp.		TFS
7		<i>Minervarya pierrei</i>	Least Concern	GS, TF, LRF
8		<i>Minervarya nepalensis</i>	Least Concern	GS, TF, LRF
9		<i>Minervarya teraiensis</i>	Least Concern	GS, TF, LRF
10		<i>Minervarya sengupti</i>	Endangered	GS, TF, LRF
11		<i>Euphlyctis adolfi</i>	Least Concern	GS
12	Ranidae	<i>Hydrophylax leptoglossa</i>	Least Concern	GS, TF, LRF, LCE
13		<i>Hydrophylax</i> sp.		GS, TF
14		<i>Amolops</i> sp. 1		LCE, TFS, LC
15		<i>Amolops</i> sp. 2		LCE, TFS
16		<i>Clinotarsus alticola</i>	Least Concern	LCE, TFS
17		<i>Humerana humeralis</i>	Least Concern	GS
18		<i>Oddorana chloronata</i>	Least Concern	TFS, LRF
19		<i>Oddorana mawphlangensis</i>	Data Deficient	TFS
20		<i>Ingerana borealis</i>	Least Concern	TFS
21	Megophriidae	<i>Megophrys</i> sp.		TFS, TF
22		<i>Leptolalax khasiorum</i>	Critically Endangered	TFS, LRF
23		<i>Leptobrachium cf. aryatum</i>	Not Evaluated	TFS, TF
24		<i>Megophrys robusta</i>	Least Concern	TFS, TF
25		<i>Megophrys cf. megacephala</i>	Endangered	TFS, TF
26	Rhacophoridae	<i>Kurixalus/Chirixalus</i> sp.		TFS, TF, LRF
27		<i>Polypedates lecuomystax</i>	Least Concern	GS, TFS, TF, LRF
28		<i>Polypedates</i> sp.		TFS, TF
29		<i>Raorchestes</i> sp. 1		LCE, TFS, TF
30		<i>Raorchestes</i> sp. 2		LCE, TFS, TF
31		<i>Raorchestes shillongensis</i>	Least Concern	TFS, TF
32		<i>Rhacophorus bipunctatus</i>	Least Concern	TFS, TF
33		<i>Zhangixalus smaragdinus</i>	Least Concern	TFS, TF
34	Microhylidae	<i>Microhyla</i> <i>cf. mymensinghensis</i>	Least Concern	GS, TF, TFS
35		<i>Microhyla berdmorei</i>	Least Concern	TF, TFS
36		<i>Kaloula pulchra</i>	Least Concern	TF, TFS
37	Hylidae	<i>Hyla annectans</i>	Least Concern	TF, TFS
38	Ichthyophiidae	<i>Ichthyophis</i> sp.		TF, TFS

HERPETOFAUNA INSIDE THE LIMESTONE CAVES

Mawmluh Cave, East Khasi Hills

- Out of 20 days in Sohra/Cherrapunjee, the Mawmluh Cave was surveyed for 15 days thoroughly and is surrounded by limestone rock formations, slow as well as fast flowing streams, waterfalls and even some temporary pools in association with thick semi-evergreen to evergreen forests (1285 to 1300 m asl). The overall habitat inside the Mawmluh cave is predominately composed of distinct limestone elements, formations and speleothems in association with several fast-flowing streams which at times form still water bodies such as pools.
- In Mawmluh Cave, the majority of herpetofaunal species were recorded outside the cave, close to the cave entrance. Nevertheless, a few species were also encountered deeper inside the cave (from 500 m till 4 km inside), predominantly amphibians represented by their larval stages which includes species such as *Amolops* sp. 1 and *Rhacophorus bipunctatus*.
- The larval stages of *Amolops* sp. 1, including tadpoles and recently metamorphosed froglets, were encountered deep inside the cave, from approximately 1.2 km from the cave entrance extending to a further 3.5 km into the cave interior. During the 15-day survey period, more than 50 tadpole individuals and approximately 25 froglets were recorded daily within this stretch. The tadpoles along with the partially developed froglets were consistently observed firmly adhering to wet, slippery limestone rock surfaces while remaining partially or fully submerged in fast-flowing stream channels. This attachment was achieved using a ventrally positioned gastromyzophorous abdominal sucker and individuals frequently occurred in dense aggregations of at-least 20–30 tadpoles on suitable rock faces (see Fig.5). Behaviorally, the tadpoles typically remained motionless for extended periods while attached to the substrate, often blending closely with the surrounding rock surface. However, upon sensing disturbance, particularly when touched, they exhibit an immediate escape response, detaching from their clinging sites and actively swimming away with the current flow.
- Larval stages of *Rhacophorus bipunctatus* were predominantly recorded outside the cave, where congregations of at least 8–10 tadpoles were observed near the cave entrance, particularly within temporary pools formed by fast-flowing streams emerging from the cave interior. In addition, a small number of individuals were also encountered inside the cave, including 3–4 tadpoles and two partially developed froglets recorded approximately 350–500 m from the cave entrance, where they were partially or fully submerged in temporary pools (see Fig.6). Behaviorally, the tadpoles typically remained motionless for extended periods, occupying positions close to the pool bottom or beneath available substrates and closely blending with the surrounding surface. Upon sensing disturbance, especially when physically contacted, they exhibited an immediate escape response, actively swimming away and seeking cover beneath nearby substrates.



Fig.10. Top: The team leader of the project conducting a three-hour capacity-building session with the local nature guides from the MTAACS team. Bottom: A booklet of Butterflies of Cherrapunjee gifted to the team leader of the Rufford project by the MTAACS team.

- Amongst reptiles, only one snake species, *Fowlea piscator*, was recorded. A juvenile individual (approximately 25 cm total length) was observed in close proximity to aggregations of *Amolops* sp. 1 tadpoles, suggesting a possible foraging association.

The presence of *Amolops* sp. and *Rhacophorus bipunctatus* larval stages inside the limestone caves, despite the overall low herpetofaunal diversity within caves, suggests that these microhabitats may function as refugia for early life stages, potentially offering reduced predation pressure and stable microclimatic conditions.

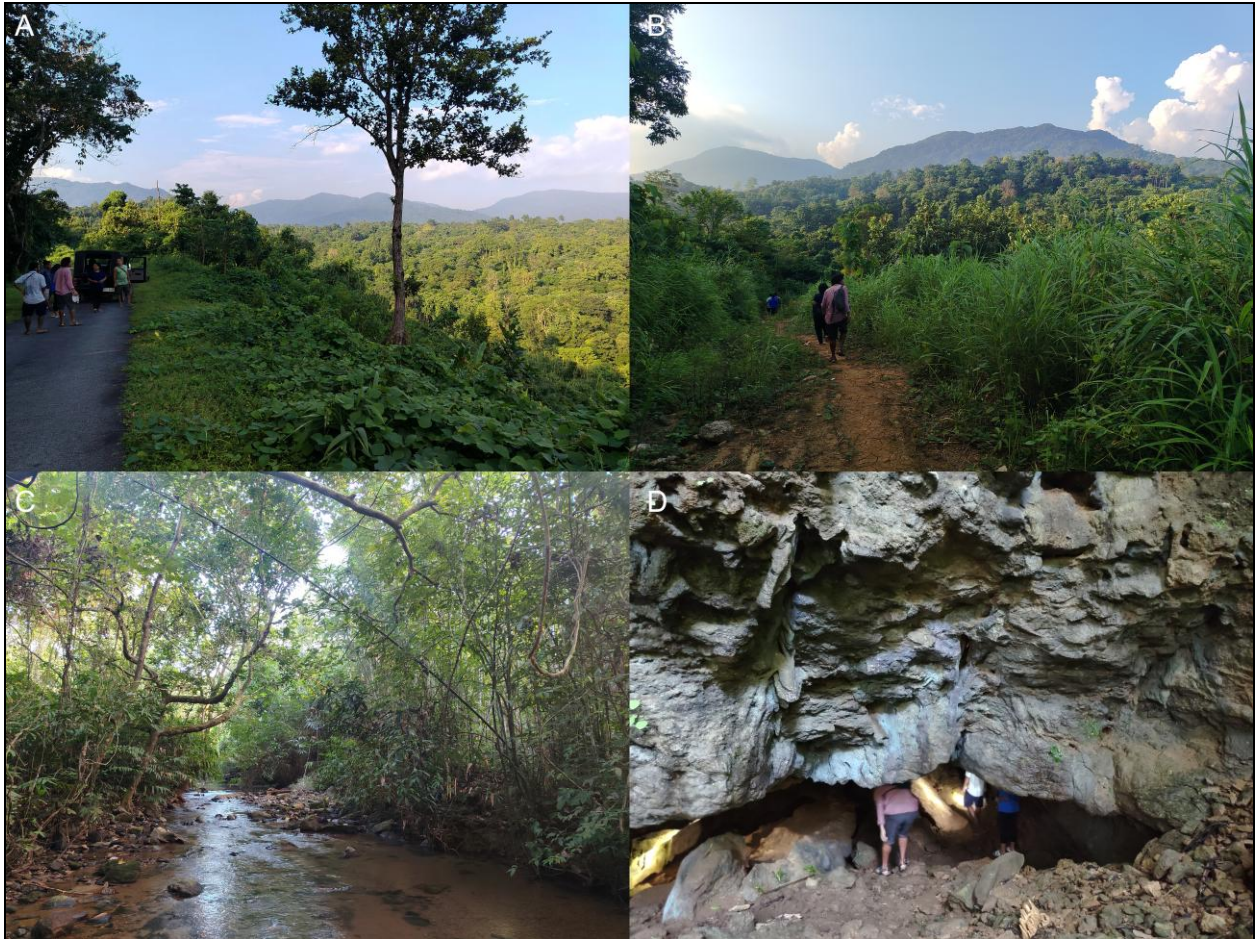


Fig.11. Overview of habitat types in Aruakgre, South Garo Hills District, Meghalaya, India. A–B: Approach routes and surrounding tropical evergreen forest in the Nakama Cave landscape; C: Forest microhabitat within the tropical evergreen forest showing a perennial stream; D: Entrance of Nakama Cave characterized by exposed limestone formations.

HERPETOFAUNA IN AND AROUND THE LIMESTONE ROCK FORMATIONS

Limestone karst topography around the Mawmluh Cave entrance, East Khasi Hills, Meghalaya

- The Mawmluh Cave entrance occurs within a highly heterogeneous assemblage of microhabitats, comprising extensive limestone rock formations continuously colonized by mosses, surrounded by dense wet tropical evergreen–montane forests (1300–1400 m asl), and closely linked to fast-flowing streams, rivers, and seasonally formed temporary pools (see Fig.3).
- During the early morning visit till 15 days, we mostly encountered skinks (more than 10 individuals of *Sphenomorphus maculatus* close to fast flowing streams and 2 or 3 individuals of *Eutropis macularia* under the leaf litters within the forest floor everyday) and certain agamid lizards (only two specimens of *Calotes maria* and a single specimen of *Calotes paulus* throughout the survey above the limestone rock formations surrounded by large trees and tall bushes) amongst reptiles.
- Amongst amphibians, during our early morning visit till 15 days, we only encountered larval stages, particularly tadpoles of various species namely *Minervarya teraiensis* (15 to 20 tadpoles observed being submerged within the temporary pools formed by the hill streams), *Hydrophylax leptoglossa* (240-250 dark colored dot like eggs embedded in a semi-transparent thin membranous sac were observed in different still water bodies like temporary pools, lakes and ponds within the forest floor; a total of three egg sacs were observed), *Amolops* sp.1 (20 to 25 tadpoles and three partially developed froglets were observed sticking/clinging to wet slippery rocks with the help of their ventrally bearing gastromyzophorous abdominal sucker in fast flowing waterfalls close to the entrance of the cave), *Clinotarsus alticola* (3 to 4 froglets were observed in the wet, slippery rocks close to fast flowing streams), *Leptobrachium cf. aryatum* (three froglets were observed in the ground/wet soil close to the fast flowing streams surrounded by thick vegetations) and *Rhacophorus bipunctatus* (two tadpoles and three partially developed froglets were observed submerged in a still and small temporary pool surrounded by thick forest cover some 250 m far from the cave entrance).
- As expected, most of the herpetofauna species were encountered at night between 17:00 h till 12:00 midnight. Regarding amphibians, we encountered *Bufoides meghalayanus*, *Minervarya pierrei*, *M. nepalensis*, *M. teraiensis*, *M. sengupti*, *Hydrophylax leptoglossa*, *Amolops* sp. 1, *Amolops* sp. 2, *Clinotarsus alticola*, *Oddorana chloronata*, *Leptolalax khasiorum*, *Kurixalus/Chirixalus* sp., *Polypedates lecuomystax*, *Raorchestes* sp. 1 and *Raorchestes* sp. 2. Amongst these, *M. nepalensis*, *M. teraiensis*, *Hydrophylax leptoglossa*, *Amolops* sp. 1, *Polypedates lecuomystax* and *Raorchestes* sp. 1 were mostly encountered either with regular sightings or calls (if not sighted) upto more than 10 individuals.
- The members of the genus *Minervarya* and *Hydrophylax* were strongly ground-dwelling with microhabitats including forest floors, temporary pools and even hill streams, some of these individuals of their respective species were also observed breeding in such microhabitats. The members of the genus *Amolops* and other species such as *Clinotarsus*

alticola, *Oddorana chloronata* and *Leptolalax khasiorum* were mostly observed ground dwelling, at times arboreal (hardly 3 to 4 feet above the ground) but with a strong preference to the fast-flowing streams in association with karst associated rocks within the forests with individuals ranging from 10 to 12 on a regular basis.

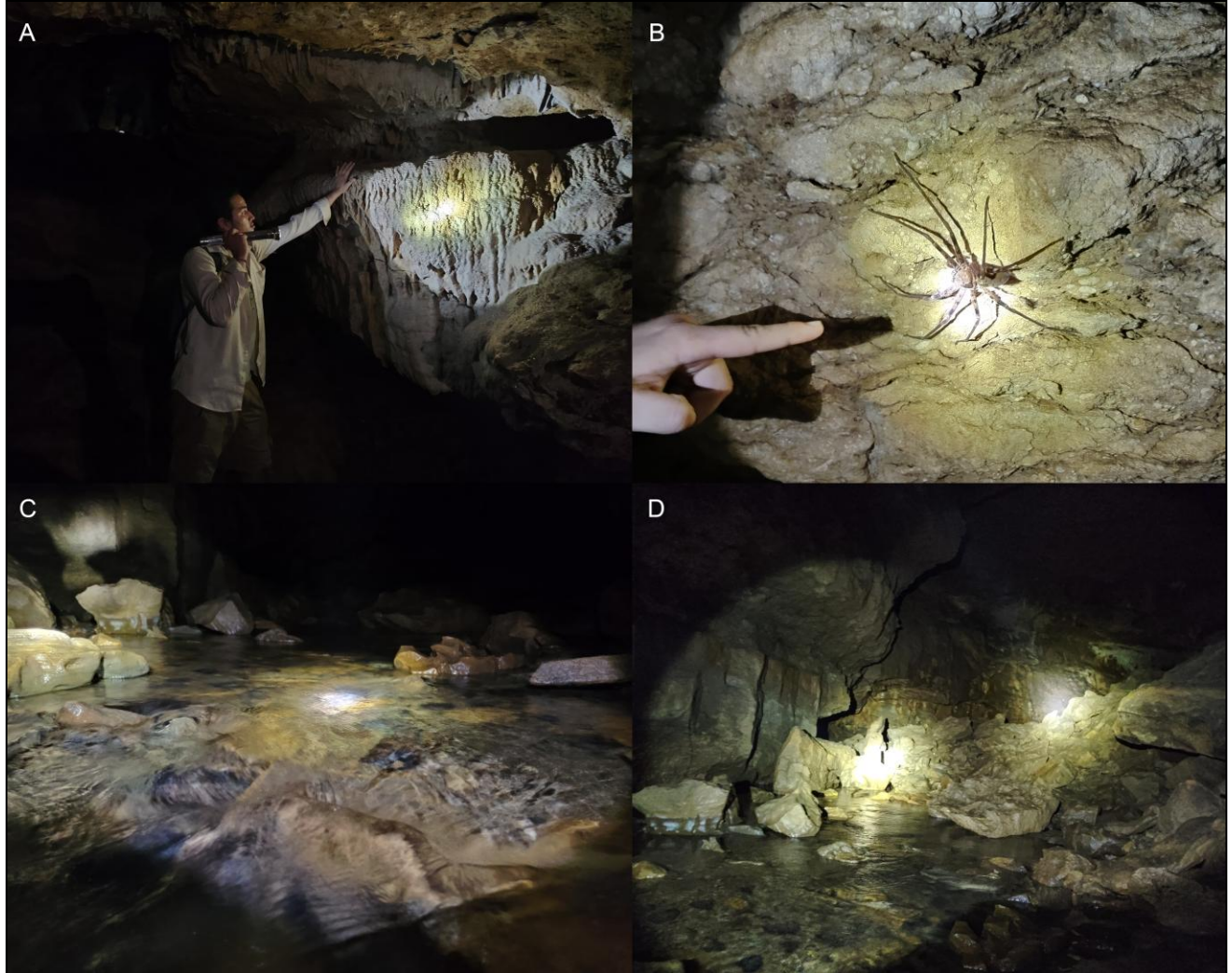


Fig.12. Interior features of Nakama Cave, South Garo Hills District, Meghalaya, India. A: Well-developed limestone speleothems and intact cave walls indicating minimal disturbance. B: Cave-dwelling huntsman spider observed on moist limestone wall surfaces. C–D: Perennial subterranean stream flowing through the cave interior, forming shallow pools and rocky substrates that provide critical microhabitats for cave-associated fauna.

- The encountered members of the family Rhacophoridae i.e., *Kurixalus/Chirixalus* sp., *Polypedates lecuomystax*, *Raorchestes* sp. 1 and *Raorchestes* sp. 2 were found to be mostly arboreal, with certain individuals even calling from a height of 8 to 10 feet (mainly *Raorchestes* sp. 1 and *Raorchestes* sp. 2) with a strong preference to thick evergreen forests very close to the Mawmluh cave entrance surrounded by the limestone

rock formations. However, at times, four or five individuals of *Polypedates leucomystax* and *Kurixalus/Chirixalus* sp. were also observed ground dwelling close to temporary pools possibly for breeding purposes as a mating pair of *P. leucomystax* was also observed in the same spot partially submerged in the water.

- At last, throughout the survey period, we encountered only four adult specimens of the Critically Endangered and micro-endemic *Bufoides meghalayanus*, all of which showed a very strict preference to either arboreal behavior clinging to tree trunks as well as bushes or limestone rock formations often in patches having dense undergrowth of evergreen forests.
- Amongst reptiles, most of the species were encountered at night between 17:00 h till 12:00 midnight which includes geckos such as *Hemidactylus platyurus*, *Hemidactylus garnotii*, *Cyrtodactylus khasiensis*, *Gecko gecko* and snakes such as *Argyrophis diardii*, *Herpetoreas xenura*, *Smithophis bicolor*, *Boiga cyanea*, *Boiga quincunciata*, *Oligodon albocinctus*, *Lycodon jara*, *Lycodon zawi*, *Lycodon septentrionalis*, *Pareas monticola* and *Trimeresurus popeiorum*.
- Amongst geckos, *Hemidactylus platyurus* and *Cyrtodactylus khasiensis* were the most commonly encountered species with regular sightings of at least 10 to 12 individuals in various microhabitats such as the Mawmluh cave entrance, limestone rock formations, and loose soils as well as in large tree trunks surrounded by thick forest cover in association with fast flowing streams. The remaining two encountered species namely *Hemidactylus garnotii* and *Gecko gecko* were occasionally encountered with only three to four individuals encountered throughout the survey in the same microhabitats as described above.
- Amongst snakes, *Herpetoreas xenura* is arguably the most commonly encountered species (a total of 18 sightings throughout the survey period) followed by *Trimeresurus mayae* (a total of 14 sightings throughout the survey period), *Pareas monticola* (a total 6 sightings throughout the survey period) and *Oligodon albocinctus* (a total 6 sightings throughout the survey period) whereas the remaining encountered species of the genus *Lycodon* and *Boiga*, as well as species such as *Argyrophis diardi*, *Smithophis bicolor*, *Trimeresurus popeiorum*, *Ovophis cf. monticola* and *Protobothrops jerdonii* were encountered only by a single specimen throughout the survey.
- Regarding microhabitat preferences, *Herpetoreas xenura* and *Smithophis bicolor* showed a very strong ground-dwelling preference towards fast flowing streams often close to the cave entrance and its associated limestone formations close to the forest floor whereas *Boiga cyanea*, *B. quincunciata*, *Pareas monticola* and *Trimeresurus mayae* displayed a very strong arboreal behavior with sightings in dense forest microhabitats like bushes, small trees, climbers, twigs and branches of medium to small sized trees very close to the

limestone rock formations hardly 200 to 250 m far from the entrance of the cave. All the encountered members of the genus *Lycodon* were encountered in and around the limestone rock formations filled with mosses with the exception of *L. septentrionalis* which was encountered twice (one adult and one juvenile) at an interval of 8 days on the top of a wet limestone rock just 150 m far from the cave entrance in association with fast flowing streams surrounded by climbers and thick vegetations. At last, a juvenile *Oligodon albocinctus* was also encountered exactly within the same microhabitat where the individuals of *Lycodon jara* and *L. zawi* were encountered.

THE CURIOUS CASE OF MAWSMAI CAVES, EAST KHASI HILLS

While surveying the Mawsmmai Cave for the same number of days as mentioned above between 10:00 h till 22:00 h at night, we realized that the cave is almost completely destroyed in terms of its habitat (see Fig.7) regarding herpetofauna and other faunal assemblages because of the following observed reasons:

- The local committees managing tourism at Mawsmmai Cave have installed artificial lighting along much of the cave pathway, enabling tourists to access the cave freely without the assistance of guides. On the other hand, the continuous presence of artificial illumination throughout the day has resulted in persistent and unnatural lighting conditions within the cave interior. During daytime surveys, we did not record a single vertebrate species, including roosting bats, which are otherwise common in undisturbed cave systems. This absence strongly suggests that prolonged artificial lighting has caused significant disturbance to the cave microhabitat, adversely affecting vertebrate occupancy and behavior.
- Unlike other limestone caves, several sections of the cave pathway have been extensively concretized with cement substrates. This modification has resulted in the complete destruction of critical amphibian breeding microhabitats, particularly small perennial streams and ephemeral pools, which have been filled or eliminated due to concretization. Despite conducting intensive nocturnal surveys between 17:00 h and 22:00 h (after tourist access was restricted), no amphibian species were recorded inside the cave. This absence strongly indicates severe habitat degradation and suggests the possibility of local extinction of amphibian populations within this cave system.
- Unlike other well-managed limestone caves, the present site lacks structured planning for tourism and cave conservation. Unregulated tourist movement was observed throughout the day across all seasons, from the monsoon to winter. Additionally, the absence of trained cave guides to educate visitors on essential do's and don'ts has resulted in occasional littering and disturbance within the cave premises. Restricting tourist access during the monsoon season except for authorized personnel such as Forest Department officials and researchers, as practiced in the Mawmluh Cave could serve as an effective

conservation measure. Such regulation would help maintain dark, undisturbed microhabitats that are crucial for cave-dwelling herpetofauna, particularly reptiles, as well as amphibians and chiropterans. Furthermore, zones within the cave that support large bat colonies and other lesser-known cave fauna should be designated as no-entry areas for tourists to minimize disturbance and ensure long-term conservation.

Unfortunately, due to the above reasons, not even a single species of vertebrate as well as invertebrate were encountered inside the cave both during day as well as night. However, in the surrounding limestone rocky patches of the Mawsmai cave, we encountered only *Hemidactylus platyurus* and *Cyrtodactylus khasiensis* at night, suggesting a very strong disturbance towards the microhabitat, possibly due to the mismanagement in terms of tourism. Since we only got two species in and around Mawsmai Cave, hence we are not providing any checklist just for the above two species.

NOTES ON THE HERPETOFAUNA AROUND THE NAKAMA CAVE, SOUTH GARO HILLS

Just like Siju Cave, the Nakama Cave lies in the heart of a thick congregation of mixed moist deciduous to semi-evergreen forests (mostly semi-evergreen) in association with slow as well as fast flowing streams, waterfalls, rivers and limestone rock formations (see Fig.11) (228 to 250 m asl). However, unlike the Siju Cave, we observed that the limestone rock formations are present only around the entrance of the Nakama Cave. The overall habitat inside the Nakama Cave is predominately composed of distinct limestone elements, formations and speleothems in association with several fast-flowing streams which at times form still water bodies such as temporary pools (see Fig.12). We started doing field surveys during both day and night from 2nd October 2025, immediately after the permission was granted to us by the Headman of Aruakgre, South Garo hills district, Meghalaya. However, due to logistical limitations and challenges, we were able to conduct field work only for 8 days. The foothills of Aruakgre forms a continuous congregation of forests towards both eastwards and north-westwards, thereby entering Siju WLS and Nokrek National Park respectively, the latter being the highest elevation of hills in the Garo hills. This large forest patch is home to many vertebrates, some of which are highly endemic to the region.

Reptilia (overall habitat)

- During our survey in the forests of Aruakgre, South Garo hills, we mostly encountered geckos such as *Hemidactylus platyurus*, *H. garnotii*, *H. brooki*, *H. frenatus*, *Cyrtodactylus cf. bapme* and *Gecko gecko*, with *H. platyurus* and *G. gecko* being the most commonly encountered species with sightings ranging from 8 to 12 regularly, followed by *H. frenatus* (four to five individuals regularly), *H. garnotii* as well as *H. brooki* (only three individuals spotted of both the species throughout the survey) and *Cyrtodactylus cf. bapme* (only two adult specimens throughout the survey). All these geckos were

encountered at night between 17:00 h till 12:00 h midnight in microhabitats ranging from large tree trunks, loose soils and large rocks, mostly in close association with streams.



Fig.13. Some of the herpetofauna species observed in the forests of Aruakgre, South Garo hills, Meghalaya (see Table 2 for microhabitat preferences). A–D represent Amphibia i.e, A: *Minervarya pierrei*; B: *Minervarya cf. nepalensis*; C: *Humerana humeralis*; and D: *Amolops cf. siju*; whereas E–T represent Reptilia i.e., E: *Hemidactylus brooki*; F: *Hemidactylus garnotii*; G: *Cyrtodactylus cf. bapme*; H: *Eutropis macularia*; I: *Riopa albopunctata*; J: *Eutropis multifasciata*; K: *Fowlea piscator*; L: *Herpetoreas xenura*; M: *Boiga siamensis*; N: *Oligodon albocinctus*; O: *Lycodon aulicus*; P: *Lycodon jara*; Q: *Dendrelaphis cyanochloris*; R: *Pareas monticola*; S: *Trimeresurus mayae*; and T: *Trimeresurus popeiorum*.

- Most of the agamid and scincid lizards namely *Calotes maria* (two adult specimens), *Calotes cf. irawadi* (three adult specimens), *Calotes jerdoni* (two adult specimens), *Ptyctolaemus gularis* (one adult male specimen), *Eutropis macularia* (one adult specimen), *Eutropis multifasciata* (three adult specimens), *Sphenomorphus maculatus* (more than ten adult individuals) and *Riopa albopunctata* (one adult specimen) were found to be active during the day, particularly during the presence of sunlight in the mornings. The agamids (see Table 2) were mostly seen to exhibit an arboreal behavior i.e., looking for insects to feed, basking on tree tops or high branches and at times even chasing rival males for territorial marking. However, at night only two agamids namely *Calotes maria* (one adult male specimen) and *Calotes jerdoni* (one adult male specimen) were observed sleeping either on tree tops or on higher branches (some 8 to 10 feet above the ground). Regarding skinks, all of them were seen either basking during early mornings, running (possibly due to our presence) or feeding on small insects on the forest floor covered with moist or dry leaf litter, tree logs, tree trunks close to water bodies. Not a single skink was observed sleeping anywhere at night possibly of their nature to retreat into loose soil bunds and crevices after dusk. Among monitor lizards, *Varanus bengalensis* (only two individuals) and *V. salvator* (only one specimen) were seen only twice close to large fast flowing streams during the afternoon.
- Among snakes during the day, we encountered only a single species namely an adult male of a *Dendrelaphis cyanochloris* which is consistent with its strictly diurnal behavior and is the first record of this species from Meghalaya. On a hot scorching day on 3rd October 2025, at around 13:00 h, suddenly the specimen was observed crawling slowly amongst the dry leaf litters within the somewhat shady forest floor. The specimen immediately started to move quickly in response to our presence but we somehow managed to catch it. Upon handling, the specimen readily gave 9 to 10 bites aggressively and inflated its forebody, thereby displaying its bluish interstitial scales just like other congeners. However, other members of this species don't usually bite and are docile in nature.
- The remaining reptilian fauna were encountered at night (see Table 2 for further details and microhabitat preferences) which includes species such as *Fowlea piscator* (only a single adult specimen), *Herpetoreas xenura* (one adult male and a juvenile female), *Boiga siamensis* (an adult male specimen), *Lycodon jara* (one adult female), *Lycodon aulicus* (one adult and one juvenile), *Oligodon albocinctus* (an adult female), *Pareas monticola* (only one adult specimen i.e., road killed), *Pssamodynastes pulverulentus* (three adult male specimens), *Trimeresurus popeiorum* (one adult male specimen) and *Trimeresurus mayae* (two adult male specimens).

Amphibia (overall habitat)

- Amongst amphibians, all the species were encountered at night between 17:30 h to 12:30 h with specimens being sighted from the beginning of the dusk. Our 8-day survey revealed the presence of 25 amphibian species (see Table 2 for further details and microhabitat preferences) which includes certain poorly known taxa such as *Bufoides* cf. *kempiae* (only two adult specimens of this micro-endemic species were encountered), *Leptolalax* cf. *khasiorum* (only a single adult specimen), *Zhangixalus smaragdinus* (a huge adult female specimen), and *Ichthyophis* sp (an adult gravid specimen).



Fig.14. Community outreach and awareness programme conducted at St. John's School, South Garo Hills District, Meghalaya, India. A: Campus of St. John's School, South Garo hills, where

the programme was conducted. B–E: Indoor awareness sessions focusing on snakebite identification, first aid and mitigation measures, and the ecological importance of limestone caves, attended by students and staff. F: Group photograph of participants and organizers following the completion of the outreach programme, with the awareness poster displayed.

- In terms of microhabitat preferences, some of these species were strictly arboreal (such as *Polypedates lecuomystax*, *Raorchestes garo*, *Raorchestes cf. kempiae*, *Raorchestes* sp., *Rhacophorus bipunctatus* and *Zhangixalus smaragdinus*), some were found to be arboreal as well as partially rupicolous in association with or without streams (such as *Bufoides cf. kempiae*, *Rhacophorus bipunctatus* and *Zhangixalus smaragdinus*), some were completely ground-dwelling with a strong association with hill streams (*Limnonectes cf. khasianus*, *Limnonectes* sp., *Amolops cf. siju*, *Amolops* sp., *Clinotarsus alticola*, *Oddorana chloronata*, *Megophrys* sp., *Leptolalax cf. khasiorum*, *Leptobrachium cf. aryatum*, *Megophrys robusta* and *Ichthyophis* sp.) and some were ground-dwelling with a strong preference to temporary pools for breeding within the forest floor (*Minervarya pierrei*, *M. cf. nepalensis*, *M. teraiensis*, *Minervarya cf. shyadrensis*, *Euphlyctis adolfi*, *Hydrophylax leptoglossa*, *Hydrophylax* sp., *Microhyla cf. mymensinghensis* and *Humerana humeralis*).
- Eggs, tadpoles and froglets of many species were also encountered in different microhabitats at night (sometimes even during the day) which includes tadpoles of *Minervarya teraiensis* (observed ground-dwelling with a strong preference to temporary pools and ponds within the forest floor), *Euphlyctis adolfi* (observed ground-dwelling with a strong preference to temporary pools and still water bodies within the forest floor including open grasslands), *Hydrophylax leptoglossa* (240-250 dark colored dot like eggs embedded in a semi-transparent thin membrane were observed in different still water bodies like temporary pools, lakes and ponds within the forest floor), *Amolops cf. siju* (10-11 partially developed froglets were observed sticking/clinging to wet slippery rocks with the help of their ventrally bearing gastromyzophorous abdominal sucker in fast flowing waterfalls), *Clinotarsus alticola* (3 to 4 froglets were observed close to fast flowing streams), *Leptobrachium cf. aryatum* (5 to 7 froglets were observed close to fast flowing streams), *Polypedates lecuomystax* (only two froglets were observed close to a small temporary pool) and *Rhacophorus bipunctatus* (three partially developed froglets were observed in a still and small temporary pool within the forest floor deep inside the forests).

HERPETOFAUNA INSIDE THE NAKAMA CAVE, SOUTH GARO HILLS

- The Nakama Cave was surveyed for 8 days thoroughly and is surrounded by limestone rock formations, slow as well as fast flowing streams, waterfalls and even some temporary pools in association with thick semi-evergreen to evergreen forests (228 to 250 m asl). The overall habitat inside the Nakama cave is predominately composed of distinct

limestone elements, formations and speleothems in association with several fast-flowing streams which at times form still water bodies such as temporary and permanent pools.



Fig.15. Awareness programme on snake conservation and snakebite mitigation conducted at the Office of the Range Forest Officer, Siju Wildlife Range, South Garo Hills District, Meghalaya, India. Following the completion of the indoor awareness session, the project team, including the team leader, Forest Department officials, and the Range Forest Officer, posed for a group photograph with the programme poster.

- In Nakama Cave, the majority of herpetofaunal species were recorded outside the cave, close to the cave entrance. Nevertheless, only a few species were encountered slightly deep inside the cave (from 500 m till 800 m inside), predominantly amphibians represented by their larval stages which only includes a single species namely *Amolops cf. siju*.
- The larval stages of *Amolops cf. siju*, i.e., only recently metamorphosed froglets, were encountered deep inside the cave, from approximately 500 m from the cave entrance extending till 800 m into the cave interior. During the 8-day survey period, only 15 froglets were recorded within this stretch. The partially developed froglets were observed firmly adhering to wet, slippery limestone rock surfaces while remaining partially or fully

submerged in fast-flowing stream channels. This attachment was achieved using a ventrally positioned gastromyzophorous abdominal sucker and individuals frequently occurred mostly solitary on suitable rock faces. Behaviorally, the froglets typically remained motionless for extended periods while attached to the substrate, often blending closely with the surrounding rock surface. However, upon sensing disturbance, particularly when touched, they exhibit an immediate escape response either by jumping or moving away with the stream.

The presence of froglets inside the cave during October provides strong evidence that the post-monsoon period influenced the observed amphibian assemblage. The limited encounter of amphibian species during this time may be attributed to their life-history strategies, wherein most species complete their larval development and metamorphose into juveniles before the onset of winter to enhance survival. Furthermore, the occurrence of *Amolops* sp. larval stages within limestone caves, despite the overall low herpetofaunal diversity recorded in these habitats, suggests that such microhabitats may function as important refugia for early life stages, potentially offering reduced predation pressure and relatively stable microclimatic conditions.

Table2. A checklist of reptiles and amphibians observed in and around the Nakama Cave, South Garo hills, Meghalaya, India. Abbreviations for micro-habitats include TF (Tropical semi-evergreen or evergreen forests in association with rocks and without streams); TFS (Tropical semi-evergreen or evergreen forests in association with rocks and with running hill streams); LC (Inside the Limestone Caves); LCE (Entrance of the Limestone cave surrounded by tropical evergreen or semi-evergreen/montane forests in association with running hill streams); LRF (In and around Limestone Rock Formations surrounded by tropical evergreen/montane forests).

REPTILIA				
Sl no.	Family	Scientific name	IUCN Red List status	Place of observation
1	Gekkonidae	<i>Hemidactylus platyurus</i>	Least Concern	TF, LCE, LRF
2		<i>Hemidactylus garnotii</i>	Least Concern	TF, LCE, LRF
3		<i>Hemidactylus brooki</i>	Least Concern	TF
4		<i>Hemidactylus frenatus</i>	Least Concern	TF
5		<i>Cyrtodactylus cf. bapme</i>	Not Evaluated	TF
6		<i>Gecko gekko</i>	Least Concern	TF, LRF
7	Scincidae	<i>Sphenomorphus maculatus</i>	Least Concern	TF, TFS, LRF
8		<i>Eutropis multifasciata</i>	Least Concern	TF, TFS, LRF
9		<i>Eutropis macularia</i>	Least Concern	TF, TFS, LRF
10		<i>Riopa albopunctata</i>	Least Concern	TF
11	Agamidae	<i>Calotes cf. irawadi</i>	Least Concern	TF
12		<i>Calotes maria</i>	Least Concern	TF, TFS
13		<i>Calotes jerdoni</i>	Least Concern	TF, TFS
14		<i>Ptyctolaemus gularis</i>	Least Concern	TF, TFS, LRF, LCE

15	Varanidae	<i>Varanus bengalensis</i>	Near Threatened	TF, TFS, LRF
16		<i>Varanus salvator</i>	Least Concern	TFS
17	Natricidae	<i>Fowlea piscator</i>	Least Concern	TFS
18		<i>Herpetoreas xenura</i>	Near Threatened	TFS, LRF, LCE
19	Colubridae	<i>Boiga siamensis</i>	Least Concern	TF, TFS, LRF
20		<i>Oligodon albocinctus</i>	Least Concern	TF, TFS, LRF
21		<i>Lycodon jara</i>	Least Concern	TF, TFS, LRF, LCE
22		<i>Lycodon aulicus</i>	Least Concern	TF, LRF
23		<i>Dendrelaphis cyanochloris</i>	Least Concern	TF
24	Pareidae	<i>Pareas monticola</i>	Least Concern	TF, TFS, LRF, LCE
25	Pssamodynastidae	<i>Pssamodynastes pulverulentus</i>	Least Concern	TF, TFS
26	Viperidae	<i>Trimeresurus popeiorum</i>	Least Concern	TF, TFS, LRF, LCE
27		<i>Trimeresurus mayae</i>	Not Evaluated	TF, TFS, LRF

AMPHIBIA

Sl no.	Family	Scientific name	IUCN Red List status	Place of observation
1	Bufoidea	<i>Duttaphrynus melanostictus</i>	Least Concern	TF
2		<i>Bufoidea cf. kempiae</i>		LRF
3	Dicroglossidae	<i>Limnonectes cf. khasianus</i>	Least Concern	TFS
4		<i>Limnonectes sp.</i>		TFS
5		<i>Minervarya pierrei</i>	Least Concern	TF, LRF
6		<i>Minervarya cf. nepalensis</i>	Least Concern	TF, LRF
7		<i>Minervarya teraiensis</i>	Least Concern	TF, LRF
8		<i>Minervarya cf. shyadrensis</i>	Least Concern	TF, LRF
9		<i>Euphlyctis adolfi</i>	Least Concern	TF
10	Microhylidae	<i>Microhyla mymensinghensis</i>	Least Concern	TF
11	Ranidae	<i>Hydrophylax leptoglossa</i>	Least Concern	TF, LRF, LCE
12		<i>Amolops cf. siju</i>	Not Evaluated	LCE, TFS, LC
13		<i>Amolops sp.</i>		LCE, TFS
14		<i>Clinotarsus alticola</i>	Least Concern	LCE, TFS
15		<i>Humerana humeralis</i>	Least Concern	TFS
16		<i>Oddorana chloronata</i>	Least Concern	TFS, LRF
17	Megophriidae	<i>Megophrys sp.</i>		TFS, TF
18		<i>Leptolalax cf. khasiorum</i>		TFS, LRF
19		<i>Leptobranchium cf. aryatum</i>	Not Evaluated	TFS, TF
20		<i>Megophrys robusta</i>	Least Concern	TFS, TF
21	Rhacophoridae	<i>Polypedates leucomystax</i>	Least Concern	TFS, TF, LRF
22		<i>Raorchestes garo</i>	Data Deficient	LCE, TFS, TF
23		<i>Raorchestes cf. kempiae</i>	Critically Endangered	LCE, TFS, TF
24		<i>Raorchestes sp.</i>		TFS, TF
25		<i>Rhacophorus bipunctatus</i>	Least Concern	TFS, TF
26		<i>Zhangixalus smaragdinus</i>	Least Concern	TFS, TF
27	Ichthyophiidae	<i>Ichthyophis sp.</i>		TFS, TF

2/10/26, 5:27 PM TH30 KARMAKAR Rare lizard in Meghalaya fuels grassroots conservation efforts - The Hindu


A

Rare lizard in Meghalaya fuels grassroots conservation efforts

Presence of *Calotes zolaiking* in Mawmluh inspires locals to protect forests impacted by mining and industrial activity

Updated - May 30, 2025 09:45 pm IST - GUWAHATI

RAHUL KARMAKAR



2/10/26, 5:28 PM Rare lizard's discovery in Mawmluh village ignites conservation efforts The Shillong Times

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MEGHALAYA

Rare lizard's discovery in Mawmluh village ignites conservation efforts

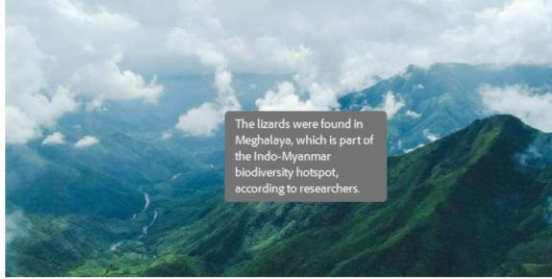
By: By Our Reporter June 2, 2025

SHILLONG, June 1: When a young shopkeeper in Meghalaya spotted an unusual-looking lizard near her home, she had no idea it would lead to a scientific discovery and a renewed push for conservation in the region. Twenty-five-year-old Banyllashisha Wankhar, who runs a grocery shop in Mawmluh village, noticed a garden lizard that looked different from any she had seen before. Her curiosity and that of fellow local nature enthusiast Goldenstar Thongni helped confirm the presence of a species called *Calotes zolaiking* in Meghalaya for the first time. Their involvement has now earned both of them credit as co-authors of a scientific paper published in the journal *Zootaxa*.

WORLD

B Rare scaly creatures — one pregnant — seen for first time in east India forest

By Lauren Liebhaber
May 30, 2025 6:08 PM



<https://www.miamiherald.com/news/nation-world/world/article/307554401.html>

Fig.16. Media coverage highlighting the discovery of the rare agamid lizard *Calotes zolaiking* from Mawmluh village, East Khasi Hills District, Meghalaya, India, and its role in promoting grassroots conservation awareness. A: Coverage in The Hindu emphasizing the conservation significance of the species and threats to its habitat. B: Coverage in Miami Herald reporting the first record of the species from eastern India. C: Coverage in The Shillong Times documenting local community involvement and the resulting conservation response following the discovery.

TALK AND AWARENESS PROGRAMMES REGARDING CONSERVATION OF LIMESTONE CAVES AND SNAKE BITE MANAGEMENT

Coming to the seminars/programmes conducted regarding awareness of herpetofauna and their associated limestone karst habitats in Meghalaya, we conducted a total of three awareness campaigns i.e., one again in Mawmluh Village (Sohra, East Khasi hills) and the other two in the South Garo hills, which are described as follows:

1. SOHRA, EAST KHASI HILLS (see Fig.10)

On 5 August 2025, during fieldwork in Mawmluh Village, East Khasi Hills District, the project team leader conducted a three-hour capacity-building session with 10 local nature guides from the Mawmluh Tourism and Adventure and Conservation Society (MTAACS). The session focused on herpetofaunal identification, their ecological importance and conservation, and the role of limestone caves as critical breeding habitats for amphibians and other cave-associated fauna. The MTAACS team is a well-established and reputed local organization actively involved in eco-tourism activities in Mawmluh Village, including birdwatching, hiking, nature trails, butterfly walks, cave tourism, and wildlife trails. For many participants, this training represented their first formal introduction to limestone karst conservation and its significance for herpetofauna, particularly amphibians. The session is expected to play a crucial role in long-term conservation, as MTAACS members have now begun incorporating herpetofaunal awareness and conservation messaging into their tourism activities and have initiated guided herping tours to educate visitors. In addition, basic snake identification, handling, and conservation principles were taught through hands-on practical demonstrations, using live specimens where appropriate, as well as improvised teaching tools such as pens and notebooks during indoor sessions. Prior to this intervention, snakes were often killed out of fear by local residents. However, following the training, at least five out of the ten participants have developed proficiency in snake rescue and rehabilitation. As a result, incidents of snake killing in Mawmluh Village have significantly declined, with local residents now promptly contacting trained MTAACS members for safe rescue and relocation, reflecting a positive shift in community attitudes toward snake conservation.

2. SOUTH GARO HILLS (see Fig.14 and Fig.15)

- On 14 October 2025, a comprehensive awareness seminar and capacity-building workshop was conducted in the indoor hall of St. John's School, South Garo Hills District, Meghalaya. The programme was held in the esteemed presence of the Respected Father of the School, the Headman of Siju Village, along with more than 300 students. The project team (including the team leader) conducted an intensive three-hour interactive workshop focusing on the basics of snake identification, snakebite management, and the critical dos and don'ts to be

followed during snakebite emergencies. Special emphasis was placed on reducing fear and misinformation surrounding snakes through scientific understanding and awareness. In addition, detailed discussions were held on the ecological importance and conservation of limestone karst habitats, highlighting their role as crucial microhabitats for amphibians and reptiles. The session also covered the threats faced by herpetofauna, particularly habitat degradation and loss associated with limestone quarrying and unregulated human activities. Furthermore, the workshop introduced students to other endemic faunal species of the region, emphasizing habitat loss as a major conservation concern. The programme aimed to foster environmental responsibility, scientific curiosity, and community-level conservation awareness among the students and local stakeholders.

- On 15 October 2025, at the Range Forest Office of Siju Wildlife Sanctuary, South Garo Hills, our team conducted an extensive three-hour capacity-building session for local forest personnel, in the presence of the Respected Forest Ranger Madam. The session covered the fundamentals of snake identification, with emphasis on distinguishing venomous and non-venomous species, and detailed discussions on snakebite management, including critical dos and don'ts to be followed during emergency situations. In addition, the programme highlighted the ecological importance and conservation value of limestone karst habitats, particularly in relation to their role as crucial microhabitats for herpetofauna. A hands-on training component was also included, during which the local forest guards were trained in safe snake rescue techniques, proper handling protocols, and ethical release methods to ensure both human safety and animal welfare. The training further incorporated guidance on systematic data collection and documentation, enabling forest staff to contribute effectively to long-term monitoring and conservation efforts.

CONSERVATION OUTCOMES

The documentation of the rare agamid lizard *Calotes zolaiking* from Mawmluh Village, East Khasi Hills, has resulted in a clear and measurable conservation outcome on the ground. The discovery received wide coverage in reputed national and international newspapers, including The Hindu, The Shillong Times and Miami Herald (see Fig. 16), which highlighted both the biological significance of the species and the conservation value of its habitat. This media attention substantially increased local awareness and pride in the region's unique herpetofaunal diversity. In response, members of the local community voluntarily initiated protection of the forest patches surrounding the discovery site, including the Mawmluh Cave by restricting destructive activities, discouraging indiscriminate tree felling and habitat disturbance, and sensitizing visitors and locals about the ecological importance of the area. The species has since become a local conservation symbol, demonstrating how rigorous

scientific research, while effectively communicating through credible media platforms, can catalyze immediate grassroots conservation action and sustained community-led habitat protection.

With this, I conclude the project update for the period August–October 2025, during which field investigations were successfully completed at four of the six proposed study sites, along with the implementation of five awareness and outreach campaigns.