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continued on the back inside cover

Cover: The nine vultures of India, digital art made on Krita by Dupati Poojitha.



Diversity of snakes (Reptilia: Serpentes) in the Tezpur University Campus, Assam, India

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Abstract: In this study, 15 species of snakes were found in the Tezpur University campus in Assam, northeastern India. The snakes were documented by employing visual encounter survey and rescue calls. Tezpur University campus comprises of a 1.6 km² area with a green cover of approximately 75% and water bodies that serve as the home for wildlife, including reptiles. Numerous chaotic incidents of anxiety and fear due to snake sightings occurred at the campus, highlighting the need for management of snake-human negative interactions. A total of 64 snake sightings were noted during the study period, belonging to Typhlopidae (two species), Colubridae (nine species), Elapidae (three species), and Pythonidae (one species). Among them, three species, namely *Naja kaouthia*, *Bungarus fasciatus*, and *Bungarus lividus*, were venomous. These findings may make a significant contribution to the management of snake-human interactions on campus. In addition, it may serve as a reference for studies of the impact of a gradually urbanising world on snake diversity.

Keywords: Biodiversity, distribution, Indo-Burma hotspot, northeastern India, *Oligodon melaneus*, roadkill, snakebite, squamata, venomous snakes.

Bodo: ৰেবিজিৱসংন্যায়াৰ, সা-সানজা ভাৰতনি আসাম হাদ'ৰসায়াৰ থানায তেজপুৰ মুগুগোলোসালিনি বাদায়াৰ, Visual Encounter Survey আৰো Rescue call আদৰ বাহায়নায়নি গেজেৱোঁ গাসো মোন 15 হারিসানি জিবৌকোৱখো সদাননননে মোননো হাদোমোন। তেজপুৰ মুগুগোলোসালিনি বাদায়াৰ ১.৬ বৰ্গ কিলোমিটাৰনি ওনসোলখো সাগলোৰো, জোৱা ৭৫% সোমখোৰ ওনসোল আৱো দে (ফুলি) বাহাগোকোৰ দে, জায মানবায়গা জিব (reptiles) জো লোগোৰ হাগানি জিব-জুনোকোৱখো থায়া খুলি হোয়। ৰেবিজিৱসংন্যায় মুগুগোলোসালিনি বাদায়াৰ জিবৌ নুনায়নি জাহোনাব জিগাসিনায আৱো নিনায়নি গোৱা জায়ায়কোৰ জাদোমোন। ৰেবিজিৱসংন্যায সমনি গেজেৱোঁ গাসো মা 64 জিবৌ নুনায়ো রেবগালিয খালামনায জাদোমোন, জোৱা Typhlopidae (মোন 2 হারিসা), Colubridae (মোন 9 হারিসা), Elapidae (মোন 3 হারিসা) আৰো Pythonidae (মোন 1 হারিসা) নখ রখি জিবৌকোৰ দৰ্মোন। ৰেবোৱনি গেজেৱোঁ, মণ্যাম হারিসাকোৰ - *Naja kaouthia* (জিবৌ ফেটিগম), *Bungarus fasciatus* (জিবৌ গুবাল) আৰো *Bungarus lividus* (গোসোম গালনি জায়েসে জিবৌ) ফোৱা বিস গোনামোন। ৰেবিজিৱসংন্যায়নি খারিফোৱা কেম্পাসআৱ জিবৌ আৱো মানবসি গেজেৱোঁ জানায দাড়াবাজিবৌ সামলায়নায়াৰ মছ'জাথাব বিহোমা হোনো হাগো। বেনি অনন্বায়োৰা, ৰেব খারিফোৱা জিবৌনি বায়তি রেখাম (diversity) নি সায়াৰ, লাসো-লাসো নোগো এবা বহুৱাৰ গুৰুলায়লানায় (urbanization) মুগুগনি গোহামখো ফৰায়সেন্যায়নি থখায মনসে reference মহৰ খামানি মাবো হোগো।

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INTRODUCTION

The snake-human negative interactions is a frequently underestimated issue, presenting significant challenges to conservation, and public health. The conflict between humans and snakes has existed since time immemorial, and an innate fear of snakes is deeply rooted in humans and other primates (Öhman & Mineka 2003). As a result, snakes become one of the most misunderstood, and feared animals. Snakes feed on various invertebrates and vertebrates (Khormizi et al. 2021), and this diverse prey preference makes the ecological role of each snake species uniquely significant (Forgus 2018; Thacker 2020). Concerningly, the global population of herpetofauna is declining owing to habitat destruction (Gibbons et al. 2000), and urbanisation (Rubbo & Kiesecker 2005; McKinney 2006). Interestingly, some reptiles, including snakes, have adapted to urban settlement (Purkayastha et al. 2011; Parkin et al. 2021; Barhadiya et al. 2022). Moreover, a few studies also revealed that university campuses, can serve as a favourable habitat for snakes due to the conservation of natural habitats maintained for sustainable development (Ahsan et al. 2015; Shome et al. 2022; Janani & Ganesh 2024).

Globally, 1.8–2.7 million people are affected by snakebite each year, resulting in an estimated 80,000–1,38,000 deaths (Ralph et al. 2022). India, home to over 365 snake species (Uetz 2025), reported an average of 58,000 snakebite deaths per year between 2000 and 2019 (Suraweera et al. 2020). Though these deaths are presumably caused by four snake species, namely, *Naja naja*, *Daboia russelii*, *Bungarus caeruleus*, and *Echis carinatus* (big four), other venomous snakes prevalent in that area are also responsible. India being a geographically varied country, has different regions with medically important snakes endemic to that region. For instance, *Naja kaouthia* is distributed across Assam, Arunachal Pradesh, Uttar Pradesh, Bihar, Sikkim, West Bengal, Odisha, Tripura, Mizoram, Nagaland, Meghalaya, and Manipur. *Trimeresurus erythhrurus* is distributed mainly across the northeastern states of Tripura, Meghalaya, Arunachal Pradesh, Sikkim, Mizoram, Manipur, Nagaland, and West Bengal, with isolated records from Odisha, and Andhra Pradesh (Deuti et al. 2021). Many other medically significant snakes, such as *Naja sagittifera*, *Naja oxiana*, *Bungarus fasciatus*, *Bungarus niger*, *Bungarus lividus*, *Ophiophagus hannah*, and *Gloydius himalayanus*, are distributed to some limited ranges within the country (Uetz 2025). They possess the potential of being the cause of snakebite-related medical emergencies in these geographic

ranges. This highlights the need for understanding the distribution of venomous snakes in the country for effective management of snakebite related medical emergencies. On the other hand, snakes play a crucial role in the ecosystem as predators, and mediators of biotic interactions. Despite their secretive nature, aquatic snakes can reach high densities, and consume significant amounts of prey, facilitating energy transfer between aquatic and, terrestrial habitats (Willson & Winnie 2016). Cobras, rat snakes, and snakes that typically feed on rodents contribute greatly to India's grain production and supply. By keeping the rodent population under control, they prevent crop damage, and reduce loss in crop production (Whitaker & Captain 2004). Although snake venom is a lethal mixture primarily composed of proteins and peptides, it holds outstanding therapeutic potential when structurally engineered, as evidenced by clinically used drugs like Captopril, and Tirofiban derived from venom components (Ferreira & de Silva 1965; Gan et al. 1988; Yeow & Kini 2012; Xiao et al. 2017; Munawar et al. 2018). This underscores the need to consider snake conservation for maintaining overall ecosystem integrity (Willson & Winnie 2016), as well as for advancing biomedical research by harnessing snake venom as a valuable bioresource for therapeutic development. Educating people about snake identification, ecology, ethology, and distribution of venomous, and non-venomous snakes may help in avoiding snakebite incidences as well as conserving these fascinating reptiles (Whitaker & Whitaker 2012; Whitaker & Martin 2015).

In the past, studies on herpetofauna were carried out in various parts of northeastern India, including Assam, namely: Barail Wildlife Sanctuary, and the Cachar District of Assam (Das et al. 2009), the urban city of Guwahati (Purkayastha et al. 2011), Jeypore Reserved Forest of Assam (Islam & Saikia 2014), Deepor Beel (Sengupta et al. 2016), Nalbari District of Assam (Baishya & Das 2018), and Guwahati University campus (Gogoi et al. 2023). No systematic study was carried out at the Tezpur University campus, which is home to various flora, and fauna.

The present study aims to understand the diversity of snakes present in the Tezpur University campus, Assam, India. Documenting the various species of snakes found in this campus may contribute to the management of herpetofauna, and mitigation of human-snake negative interactions.

MATERIALS AND METHODS

Study area

Tezpur University Campus (TUC) is located in the Sonitpur District of Assam, India (26.696° N, 92.835° E). Tezpur University Campus is on 1.06 km^2 of land, bounded by concrete walls, and stands 12 km away from Tezpur City, and about 30 km away from Nameri National Park. The campus comprises various academic buildings, staff quarters, sports playground, two water bodies, a botanical garden, and green cover area of approximately 75% of the total land (Image 1). The campus houses approximately 4,000 residents. The average high temperature in Tezpur during summer is around 31°C , while the average winter low temperature is around 13°C . It receives an average annual rainfall of about 1,749 mm and has an average relative humidity of 74% (World Weather Online 2024).

Methodology

The study was carried out from June 2021–May 2024. A visual encounter survey (Crump & Scott Jr. 1994) was employed to carry out the study. Random searches along the paths as well as active searches by flipping wood logs, tins, and leaf litter were employed to find snakes at the suitable spots. Field surveys were done in the morning at 0600–1100 h, and at 1800–2100 h in the evening to find the snakes in their natural habitat. Deceased snakes found on roads were also included in the study. Rescue calls were attended irrespective of the time, and the snakes detected were also included in the list. Coordinates of sighting points were recorded using Google Maps on a mobile phone. Specimens were photographed and identified using relevant literature, then either released into their natural habitat or handed over to forest officials for safe release into the forest.

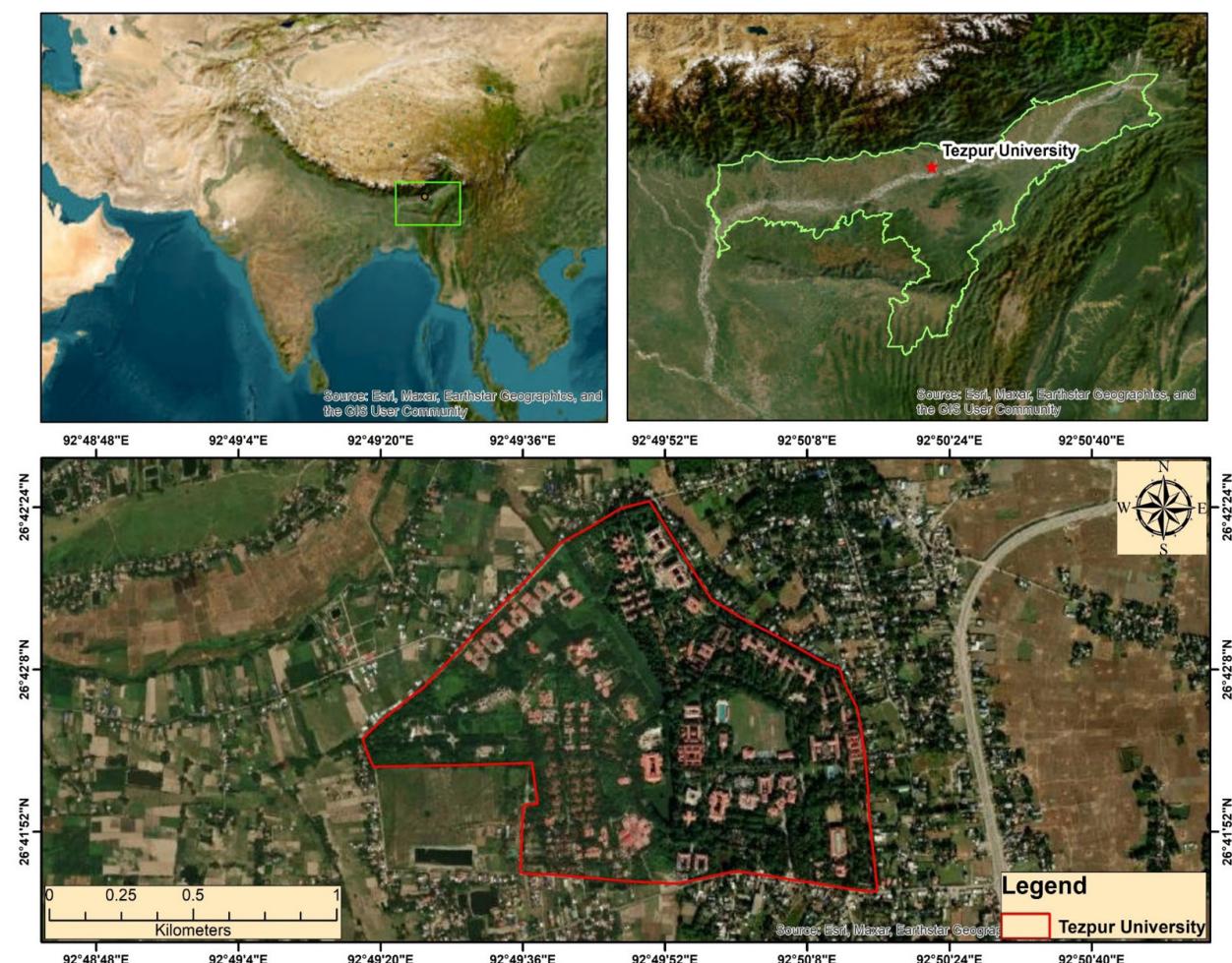


Image 1. Study area—Tezpur University campus.

GIS analysis

A map showing the location points of snake sightings, along with a spatial distribution density map, was created using ArcGIS 10.7.1. To create a spatial distribution density map, a 100 m² fishnet grid covering the study area was generated. This grid was overlaid with the recorded species presence points. Next, only those grid cells where the species were observed, were selected filtering out the rest. Within these selected grid cells, centroid points using the "Calculate Geometry" tool were calculated to represent the central location of species presence. These centroid points served as input for the inverse distance weighted (IDW) interpolation technique, which estimates density by weighting closer points more heavily. The IDW parameters that includes the number of snake sightings, search radius, and cell size, were carefully adjusted to optimise accuracy. The resulting raster map displayed species density distribution, highlighting areas of higher, and lower occurrence. Finally, the output was validated by comparing it with field observations to ensure the reliability of the generated spatial distribution map.

RESULTS

During this study, a total of 64 snake sightings were obtained inside the TUC, resulting in a record of 15 species (Table 1). Among them, two species belonged to Typhlopidae, nine species were Colubridae, three were Elapidae, and one to the Pythonidae family. Among the reported species, three species, namely, *Naja kaouthia*, *Bungarus fasciatus*, and *Bungarus lividus*, were venomous. One species, *Boiga gokool* was mildly venomous and not medically important, and 11 were non-venomous. The species belonging to the Colubridae family was recorded to be the most abundant at TUC, followed by Elapidae, then Typhlopidae and Pythonidae. At the species level, *Lycodon aulicus* (n = 12) was the most abundant, followed by *Ptyas mucosa* (n = 9). Species-wise numbers of snake encounters are shown in Figure 1a. The highest number of snakes were encountered during the months of July–September in the study period (Figure 1b). Details of date, time, and microhabitat where snakes were sighted are provided in Supplementary Table 1.

One species recorded from TUC in this study, namely *Python bivittatus*, was listed as 'Vulnerable', while 13 species were enlisted in the 'Least Concern' category, and one species, *Oligodon melaneus* was enlisted under the 'Data Deficient' category of the IUCN Red List

(Table 1). Furthermore, from the recorded snakes, one species, *Python bivittatus* was protected under Schedule I, and three species, *Naja kaouthia*, *Ptyas mucosa*, and *Fowlea piscator* were listed under Schedule II, while the remaining others were listed under Schedule IV of the Wildlife (Protection) Amendment Act 2022 (Table 1).

During the study, different snakes were detected at various places of the campus, such as gardens, administrative building premises, staff quarters, departmental areas, unnamed roads, and hostels (Figure 2a). Highest spatial density of snakes was detected on the road near Kanchenjunga Men's Hostel, followed by Pobitora Madam Curie Women's Hostel, Chandraprabha Saikiani Bhawan Bus Stop, and the Department of Molecular Biology and Biotechnology (Figure 2b). Photographs of snakes encountered in the TUC are shown in Image 2.

DISCUSSION

Closed campuses like university campuses are reported to be a safe habitat for various flora and fauna, including snakes. These campuses can serve as model ecological units for studying wildlife diversity, assessing the influence of environmental, and anthropogenic factors, and extrapolating findings to broader landscapes or communities. Despite being relatively secure habitats, factors such as infrastructure development, and the resulting shrinkage of natural vegetation can negatively impact snake diversity. Such disturbances may contribute to the observed variation in species richness and composition across different university campuses. The number of species (n = 15) recorded from Tezpur University in our study represents 18.29% and 3.56% of total species of Assam and India, respectively. This level of ophidian diversity in TUC revealed by our study is relatively lower compared to other university campuses where similar studies were carried out. For instance, in a study, a total of 19 species of snakes belonging to eight families were recorded from Guwahati University campus (Gogoi et al. 2023). A total of 23 species of snakes, including the big four were recorded in an urban college campus of Madras Christian College, Chennai (Janani & Ganesh 2024). Recently, Vanlalhrauaia et al. (2024) reported 42 snake species under 31 genera belonging to seven families from Mizoram University campus, Mizoram. A total of 36 species of snakes belonging to 22 genera and five families were reported from Chittagong University Campus, Bangladesh (Ahsan et al. 2015).

Table 1. List of snakes documented from Tezpur University Campus.

Family	Scientific name	Common name	Venom type	IUCN Red List status	Wildlife (Protection) Amendment Act 2022 status	Distribution in India	No. of sightings obtained
Typhlopidae	<i>Argyrophis diardii</i>	Diard's Blind Snake	Non-venomous	Least Concern	Schedule IV	Tripura, Sikkim, Manipur, Meghalaya, Assam, Mizoram, Arunachal Pradesh, Nagaland	Roadkill: 02
	<i>Indotyphlops braminus</i>	Brahminy Blind Snake	Non-venomous	Least Concern	Schedule IV	Throughout India	Live: 04
Colubridae	<i>Lycodon aulicus</i>	Indian Wolf Snake	Non-venomous	Least Concern	Schedule IV	Throughout India, including Lakshadweep but not the Andaman & Nicobar Islands	Live: 08 Roadkill: 03
	<i>Ptyas mucosa</i>	Indian Rat Snake	Non-venomous	Least Concern	Schedule II	Throughout India, from sea level to 4,000 m	Live: 08 Roadkill: 01
	<i>Fowlea piscator</i>	Checkered Keelback	Non-venomous	Least Concern	Schedule II	Throughout India	Live: 03 Roadkill: 02
	<i>Coelognathus radiatus</i>	Copper-headed Trinket Snake	Non-venomous	Least Concern	Schedule IV	Tripura, Manipur, Meghalaya, Assam, Arunachal Pradesh, Uttarakhand, Madhya Pradesh, Chhattisgarh, Odisha, West Bengal, Sikkim, Bihar, Himachal Pradesh, Mizoram, Nagaland	Live: 03 Roadkill: 03
	<i>Coelognathus helena</i>	Common Trinket Snake	Non-venomous	Least Concern	Schedule IV	Throughout India, up to Jammu & Kashmir (Poonch) in the north, to Manipur and the Naga Hills in the Northeast.	Roadkill: 01
	<i>Dendrelaphis bilineatus</i>	Painted Bronzeback Snake	Non-venomous	Least Concern	Schedule IV	West Bengal, Assam, Arunachal Pradesh, Mizoram	Live: 02 Roadkill: 01
	<i>Oligodon melaneus</i>	Blue-bellied Kukri Snake	Non-venomous	Data Deficient	Schedule IV	West Bengal (Tindharia, Darjeeling), Assam (Barengabari, Manas National Park).	Roadkill: 01
	<i>Amphiesma stolatum</i>	Buff Striped Keelback	Non-venomous	Least Concern	Schedule IV	Tripura, Sikkim, Manipur, Meghalaya, Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Madhya Pradesh, Chhattisgarh, Odisha, Uttar Pradesh, Assam, Bihar, Maharashtra, Arunachal, Punjab, Himachal Pradesh, Jammu and Kashmir, Mizoram, Telangana, Nagaland	Live: 04 Roadkill: 01
	<i>Boiga gokool</i>	Arrowback Tree Snake	Venomous, not medically important	Least Concern	Schedule IV	West Bengal (Darjeeling), Assam, Manipur, Meghalaya, Nagaland, Arunachal Pradesh, Odisha, Uttar Pradesh, Tripura	Roadkill: 01
Elapidae	<i>Bungarus lividus</i>	Lesser Black Krait	Venomous	Least Concern	Schedule IV	Meghalaya, Assam, Arunachal Pradesh, Nagaland	Live: 03
	<i>Bungarus fasciatus</i>	Banded Krait	Venomous	Least Concern	Schedule IV	Meghalaya, Assam, West Bengal, Bihar, Odisha, Uttar Pradesh, Maharashtra, Haryana, Madhya Pradesh, Arunachal Pradesh, Andhra Pradesh, Tripura, Mizoram, Telangana	Live: 03
	<i>Naja kaouthia</i>	Monocled Cobra	Venomous	Least Concern	Schedule II	Manipur, Meghalaya, Assam, Arunachal Pradesh, Uttar Pradesh, Bihar, Sikkim, West Bengal, Odisha, Tripura, Mizoram, Nagaland	Live: 03 Roadkill: 01
Pythonidae	<i>Python bivittatus</i>	Burmese Python	Non-venomous	Vulnerable	Schedule I	Assam, Tripura, Sikkim, Meghalaya, Mizoram, Arunachal Pradesh, Nagaland, Uttar Pradesh	Live: 06

Note: Distribution data was adopted from Whitaker & Captain 2004; Ahmed et al. 2009; Basfore et al. 2024; and Uetz 2025.

Oligodon melaneus, a species documented in the study site was an interesting finding. This species was originally described from Darjeeling, West Bengal in 1909 (Wall 1909). Then it was rediscovered from Barengabari, a village situated on the southern border of Manas National Park, Assam, in 2022 after 112 years of its original discovery (Das et al. 2022). The report stated that the discovery was based on a fresh roadkill specimen and that was the third known specimen of that species. So far, no other report of the sighting of *Oligodon melaneus*

has been reported. The roadkill specimen documented in this study might be the fourth documented specimen of the *Oligodon melaneus*. Finding such a rarely sighted snake in the TUC highlights the biodiversity significance of the campus. Records of the numbers of snakes killed on the road revealed the risk for herpetofauna and conservation issues in the campus. Findings of this study will serve as a reference for future studies dealing with the assessment of biodiversity at the Tezpur University campus as well as other gradually urbanising localities.

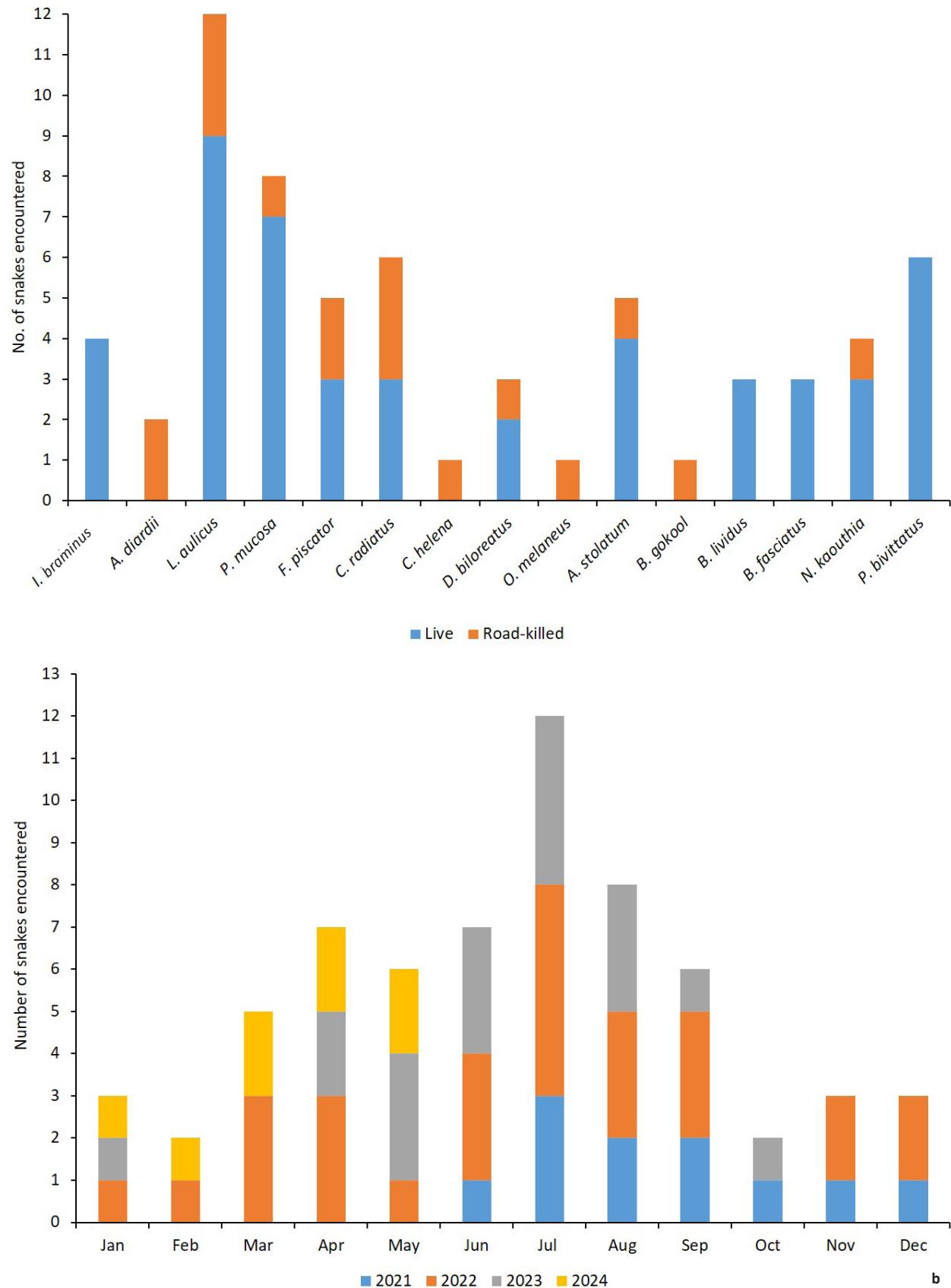


Figure 1. a—bar diagram showing the number of species-wise snakes encountered at Tezpur University campus during the study period | b—bar diagram showing number of month-wise snakes encountered at Tezpur University campus during the study period.



Figure 2. a—map showing location of snakes encountered at Tezpur University campus during the study | b—map showing density of spatial documented snakes.



Image 2. Photographs of snakes documented at Tezpur University campus: A—*Indotyphlops braminus* (Daudin, 1803) | B—*Argyrophis diardii* (Schlegel, 1839) | C—*Lycodon aulicus* (Linnaeus, 1758) | D—*Fowlea piscator* (Müller, 1887) | E—*Ptyas mucosa* (Linnaeus, 1758) | F—*Coelognathus radiatus* (Boie, 1827) | G—*Coelognathus helena* (Daudin, 1803) | H—*Oligodon melaneus* (Wall, 1909) | I—*Amphiesma stolatum* (Linnaeus, 1758) | J—*Dendrelaphis biloreatus* (Wall, 1908) | K—*Python bivittatus* (Kuhl, 1820) | L—*Boiga gokool* (Gray, 1834) | M—*Bungarus fasciatus* (Schneider, 1801) | N—*Bungarus lividus* (Cantor, 1839) | O—*Naja kaouthia* (Lesson, 1831). Green label indicates non-venomous species, orange label indicates venomous but not medically important, and red label indicates venomous species. © Mahari J. Basumatary.

Three venomous species of snakes documented at the TUC in the present study are *Naja kaouthia*, *Bungarus fasciatus*, and *Bungarus lividus*. These venomous snakes are prevalent in many parts of northeastern India and possess the potential to cause snakebite-related medical emergencies. A recent study reported that elapid snakes, including *Naja kaouthia*, *Bungarus fasciatus*, and *Bungarus niger* were responsible for 21.5% of snakebite cases presented to the Demow Model Hospital, Sivasagar, Assam (Kakati et al. 2023).

Suggested conservation strategies

Snakes play an important role in the ecosystem as a predator as well as prey for some animals. They are biocontrol agents of pests like mice and rats. The present study revealed that 73% of encountered species of snakes in the present study were non-venomous. They were harmless, if not beneficial. Still, the presence of three venomous species of snakes (*Naja kaouthia*, *Bungarus fasciatus*, and *Bungarus lividus*) found in campus has the potential to cause medical emergencies. Therefore, to avoid unfortunate medical emergencies related to snakebite, campus dwellers are suggested to be aware of the identity, and diversity of snakes at the campus.

Translocation of animals to their own natural habitat is the best practice to conserve wildlife and to avoid negative interactions. However, in our case, almost all of the snakes rescued in the campus were released back into the forested area of the campus. In one case, a rescued *Naja kaouthia* was handed over to forest officials with the purpose of releasing it to the wild. In two cases, large individuals of *Python bivittatus* were also handed over to the forest officials for translocation.

Notably, the green coverage within the campus is shrinking gradually as a greater number of buildings are being built. This may impact the diversity of snakes and other wildlife from the campus. Additionally, many roadkill snakes detected during the study revealed that there is a challenge for the herpetofauna for coexistence in the campus. Therefore, vehicle owners, and drivers are urged to exercise greater caution while navigating the area.

REFERENCES

Ahmed, M.F., A. Das & S.K. Dutta (2009). *Amphibians and Reptiles of Northeast India: A Photographic Guide*. Aaranyak, Guwahati.

Ahsan, M.F., I.K.A. Haidar & M.M. Rahman (2015a). Status and diversity of snakes (Reptilia: Squamata: Serpentes) at the Chittagong University Campus in Chittagong, Bangladesh. *Journal of Threatened Taxa* 7(14): 8159–8166. <https://doi.org/10.11609/jott.2431.7.14.8159-8166>

Baishya, B. & A.N. Das (2018). A preliminary survey on diversity and distribution of snake fauna in Nalbari district of Assam, north eastern India. *Asian Resonance* 7: 25–31.

Barhadiya, G., J. Purkayastha, A.K. Saha & C. Ghosh (2022). Snakes in the city: Spatial and temporal assessment of snake encounters in urban Delhi, India. *Scientific Reports* 14(1): 5506. <https://doi.org/10.1038/s41598-023-50373-0>

Basfore, B., M.J. Kalita, N. Sharma & A.R. Boro (2024). An updated checklist of snakes (Reptilia: Squamata) in northeastern India derived from a review of recent literature. *Journal of Threatened Taxa* 16(11): 26131–26149. <https://doi.org/10.11609/jott.8741.16.11.26131-26149>

Bauchot, R. (2006). *Snakes: A Natural History*. Sterling Publishing Company, Inc., New York, 220 pp.

Crump, M.L. & N.J. Scott, Jr. (1994). Visual encounter surveys. Chapter 2, pp. 84–92. In: Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.A.C. Hayek & M.S. Foster (eds.). *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians*. Smithsonian Institution Press, xix + 364pp.

Das, A., U. Saikia, B.H.C.K. Murthy, S. Dey & S.K. Dutta (2009). A herpetofaunal inventory of Barail Wildlife Sanctuary and adjacent regions, Assam, north-eastern India. *Hamadryad* 34(1): 117–134.

Deuti, K., R. Aengals, S. Raha, S. Debnath, P. Sathiyaselvam & S.R. Ganesh (2021). On further specimens of the Pit viper *Trimeresurus erythrurus* (Cantor, 1839) (Squamata: Viperidae), with description of a topotype and range extension to the Godavari Basin, peninsular India. *Journal of Animal Diversity* 3(1): 110–119.

Ferreira, S.H. & M.R. de Silva (1965). Potentiation of bradykinin and eleodoisin by BPF (bradykinin potentiating factor) from *Bothrops jararaca* venom. *Experientia* 21(6): 347–349. <https://doi.org/10.1007/BF02144709>

Forgus, J.J. (2018). *Functional Importance of Snakes in a Strandveld Ecosystem*. University of the Western Cape, 100 pp.

Gan, Z.R., R.J. Gould, J.W. Jacobs, P.A. Friedman & M.A. Polokoff (1988). Echistatin, a potent platelet aggregation inhibitor from the venom of the viper, *Echis carinatus*. *The Journal of Biological Chemistry* 263(36): 19827–19832.

Gibbons, J.W., D.E. Scott, N.A.J. Ryan, K.A. Buhlmann, T.D. Tuberville, B.S. Metts, J.L. Greene, T. Mills, Y. Leiden, S. Poppy & C.T. Winne (2000). The global decline of reptiles, déjà vu amphibians. *BioScience* 50(8): 653–666. [https://doi.org/10.1641/0006-3568\(2000\)050\[0653:TGDORD\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2000)050[0653:TGDORD]2.0.CO;2)

Gogoi, T., S. Buragohain & M.J. Kalita (2023). A preliminary study on diversity of snakes rescued from Gauhati University Campus, Assam. *Biological Forum — An International Journal* 15(6): 361–366.

Islam, M. & P.K. Saikia (2014). A study on the road-kill herpetofauna of Jeypore Reserve Forest, Assam. *NeBIO* 5(1): 78–83.

Janani, S. & S.R. Ganesh (2024). Urban college campuses as safer refuge for wildlife perceived as dangerous: a case study on snakes in Madras Christian College, Chennai, India. *Journal of Fauna Biodiversity* 1(2): 86–95. <https://doi.org/10.70206/jfb.v1i2.10635>

Kakati, H., S. Giri, A. Patra, S.J. Taye, D. Agarwalla, H. Boruah & K. Mukherjee (2023). A retrospective analysis of epidemiology, clinical features of envenomation, and in-patient management of snakebites in a model secondary hospital of Assam, North-east India. *Toxicon* 230: 107175. <https://doi.org/10.1016/j.toxicon.2023.107175>

Khormizi, M.Z., B. Safaei-Mahroo, M.J. Najafabadi, A. Salemi, H.D. Dehnavi, M.N. Meybodi & H. Ghaffari (2021). Diversity and distribution of snake fauna (Squamata: Serpentes) in Yazd Province, Iran. *Herpetology Notes* 14: 1449–1462.

McKinney, M.L. (2006). Urbanization as a major cause of biotic homogenization. *Biological Conservation* 127(3): 247–260.

Munawar, A., S. Ali, A. Akrem & C. Betzel (2018). Snake venom peptides: tools of biodiscovery. *Toxins* 10(11): 474. <https://doi.org/10.3390/toxins10110474>

Öhman, A. & S. Mineka (2003). The malicious serpent: snakes as a prototypical stimulus for an evolved module of fear. *Current Directions in Psychological Science* 12(1): 5–9.

Parkin, T., C.J. Jolly, A. de Laive & B. von Takach (2021). Snakes on an

urban plain: temporal patterns of snake activity and human—snake conflict in Darwin, Australia. *Austral Ecology* 46(3): 449–462.

Purkayastha, J., M. Das & S. Sengupta (2011). Urban herpetofauna: a case study in Guwahati City of Assam, India. *Herpetology Notes* 4(2011): 195–202.

Ralph, R., M.A. Faiz, S.K. Sharma, I. Ribeiro & F. Chappuis (2022). Managing snakebite. *Thebmj*, 376: e057926. <https://doi.org/10.1136/bmj-2020-057926>

Rubbo, M.J. & J.M. Kiesecker (2005). Amphibian breeding distribution in an urbanized landscape. *Conservation Biology* 19(2): 504–511. <https://doi.org/10.1111/j.1523-1739.2005.000101.x>

Sengupta, S., J. Purkayastha, M. Das & B.K. Baruah (2016). Herpetofaunal assemblage of Deeporbeel Ramsar Site of Assam, India. *Research Journal of Contemporary Concerns* 10&11(B): 52–57.

Shome, A.R., M.M. Alam, M.F. Rabbe, M.M. Rahman & M.F. Jaman (2022). Ecology and diversity of wildlife in Dhaka University Campus, Bangladesh. *Dhaka University Journal of Biological Sciences* 30(3): 429–442. <https://doi.org/10.3329/dujbs.v30i3.59035>

Suraweera, W., D. Warrell, R. Whitaker, G. Menon, R. Rodrigues, S.H. Fu & P. Jha (2020). Trends in snakebite deaths in India from 2000 to 2019 in a nationally representative mortality study. *eLife* 9: 1–37. <https://doi.org/10.7554/eLife.54076>

Thacker, A.J. (2020). Great Lakes Snake: Estimating the Occupancy and Detection Probabilities of the Eastern Massasauga Rattlesnake *Sistrurus catenatus*. M.Sc. Thesis. Grand Valley State University.

Uetz, P. (ed.) (2025). The Reptile Database. <http://www.Reptile-Database.Org>. Accessed on 25.iv.2024.

Vanlalhruaia, P.C., Malsawmsangi, Ht. Decemson & H.T. Lalremsanga (2024). An updated checklist of snakes in the Mizoram University Campus, Mizoram. Conference: National Seminar on Recent Trends in Biodiversity Status and Conservation. Held on 27–28 March 2024 at the Department of Zoology, Assam Don Bosco University, Guwahati, Abstract PP1: 34. <https://doi.org/10.13140/RG.2.2.27741.22245>

Wall, F. (1909). Notes on snakes from the neighbourhood of Darjeeling. *The Journal of the Bombay Natural History Society* 19: 337–357.

Whitaker, R. & A. Captain (2004). *Snakes of India: The Field Guide*. Draco Books, Tamil Nadu, India, 495 pp.

Whitaker, R. & S. Whitaker (2012). Venom, antivenom production and the medically important snakes of India. *Current Science* 103(6): 635–643.

Whitaker, R. & G. Martin (2015). Diversity and distribution of medically important snakes of India pp. 115–136. In: *Toxicology: Clinical Toxicology in Asia Pacific and Africa*. Springer, Netherlands.

Willson, J.D. & C.T. Winne (2016). Evaluating the functional importance of secretive species: a case study of aquatic snake predators in isolated wetlands. *Journal of Zoology* 298(4): 266–273. <https://doi.org/10.1111/jzo.12311>

World Weather Online (2024). Tezpur, India Weather Averages — Monthly Average High and Low Temperature — Average Precipitation and Rainfall days — World Weather Online. Accessed on 13.xi.2025.

Xiao, H., H. Pan, K. Liao, M. Yang & C. Huang (2017). Snake venom PLA2, a promising target for broad-spectrum antivenom drug development. *BioMed Research International* 2017 <https://doi.org/10.1155/2017/6592820>

Yeow, C. & R.M. Kini (2012). From snake venom toxins to therapeutics—cardiovascular examples. *Toxicon* 59(4): 497–506. <https://doi.org/10.1016/j.toxicon.2011.03.017>

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Supplementary Table 1. Snake sighting details: coordinates, date, time, and microhabitat.

Snake	Latitude (° N)	Longitude (° E)	Condition	Date	Time (h)	Place and microhabitat where snake was observed
<i>Indotyphlops brahminus</i>	26.697	92.832	Live	05.vii.2021	1903	On a tarmac road near department of Environmental science
<i>Indotyphlops brahminus</i>	26.696	92.829	Live	03.vi.2022	1803	On a tarmac road near bus stand
<i>Indotyphlops brahminus</i>	26.701	92.833	Live	21.xii.2022	1925	On a roadside patch of grass
<i>Indotyphlops brahminus</i>	26.698	92.835	Live	11.viii.2023	1905	Under a pile leaf litter near Kendriya Vidyalaya
<i>Argyrophis diardii</i>	26.697	92.832	Road-kill	03.vi.2021	1815	On tarmac road behind department of physics
<i>Argyrophis diardii</i>	26.699	92.832	Road-kill	08.vii.2022	2115	On tarmac road near department of Mass Communication and Journalism
<i>Lycodon aulicus</i>	26.699	92.832	Road-kill	24.viii.2021	1915	On tarmac road near cafeteria
<i>Lycodon aulicus</i>	26.697	92.829	Road-kill	03.i.2022	2000	Parking area in front of Scholars home
<i>Lycodon aulicus</i>	26.703	92.829	Road-kill	11.i.2022	2035	On a tarmac road near department of Business Administration
<i>Lycodon aulicus</i>	26.697	92.831	Live	03.ii.2022	Not recorded	In the garden in front of department of Molecular Biology and Biotechnology
<i>Lycodon aulicus</i>	26.699	92.831	Live	10.vi.2022	2215	Inside a room on the second floor of PMCWH
<i>Lycodon aulicus</i>	26.700	92.831	Live	19.xi.2022	2330	Inside a bathroom on the second floor of PMCWH
<i>Lycodon aulicus</i>	26.700	92.832	Live	14.xii.2022	1910	In a hallway, Kapili Women's Hostel
<i>Lycodon aulicus</i>	26.702	92.827	Live	03.i.2023	1716	In the grass covered play ground near school of engineering
<i>Lycodon aulicus</i>	26.702	92.833	Live	17.iv.2023	2115	Inside a bathroom of staff quarter near essential
<i>Lycodon aulicus</i>	26.705	92.829	Live	07.vii.2022	2025	Inside a bathroom, staff quarter
<i>Lycodon aulicus</i>	26.700	92.837	Live	16.ii.2023	2205	In a hallway on the third floor of Saraihat CV Raman Men's Hostel
<i>Ptyas mucosa</i>	26.699	92.833	Road-kill	14.viii.2021	1957	On a tarmac road near gymnasium
<i>Ptyas mucosa</i>	26.697	92.831	Live	07.iii.2022	1305	In the garden in front of department of Molecular Biology and Biotechnology
<i>Ptyas mucosa</i>	26.703	92.828	Live	24.iv.2022	1135	In a secondary forest near department of Electronics and Communication Engineering
<i>Ptyas mucosa</i>	26.699	92.834	Live	10.viii.2022	1456	In a garden near Chemical Sciences
<i>Ptyas mucosa</i>	26.698	92.828	Live	12.viii.2022	1530	Inside a room, staff quarter
<i>Ptyas mucosa</i>	26.697	92.827	Live	21.iv.2023	1930	In the garden of driver's colony
<i>Ptyas mucosa</i>	26.702	92.832	Live	23.v.2023	0930	Courtyard, Bordoichila Women's Hostel
<i>Ptyas mucosa</i>	26.701	92.833	Live	17.viii.2023	0845	Grass covered playground
<i>Ptyas mucosa</i>	26.703	92.831	Live	26.v.2024	0730	Secondary forest , near water tank, B type quarter
<i>Fowlea piscator</i>	26.699	92.833	Live	30.x.2021	1750	In a garden near the department of Chemical Science
<i>Fowlea piscator</i>	26.699	92.836	Live	07.iii.2022	1000	Secondary forest, near the Saraihat CV Raman Men's Hostel
<i>Fowlea piscator</i>	26.699	92.832	Live	24.iv.2022	1315	In a the garden along the road in front of Pobitora Madam Curie Women's Hostel
<i>Fowlea piscator</i>	26.699	92.833	Road-kill	09.xi.2022	Not recorded	On a tarmac road near Gymnasium
<i>Fowlea piscator</i>	26.701	92.831	Road-kill	17.i.2024	Not recorded	On a tarmac road near Niribili pond
<i>Coelognathus radiatus</i>	26.698	92.836	Live	11.vii.2021	1103	Secondary forest near animals welfare Club
<i>Coelognathus radiatus</i>	26.700	92.836	Live	03.iii.2022	1610	In a hallway
<i>Coelognathus radiatus</i>	26.704	92.830	Live	17.viii.2022	Not recorded	In a staircase of building
<i>Coelognathus radiatus</i>	26.700	92.830	Road-kill	27.ix.2022	Not recorded	On a tarmac road, near Vice Chancellor's residence
<i>Coelognathus radiatus</i>	26.700	92.830	Road-kill	09.v.2023	1945	On a tarmac road, near Vice Chancellor's residence

Snake	Latitude (°N)	Longitude (°E)	Condition	Date	Time (h)	Place and microhabitat where snake was observed
<i>Coelognathus radiatus</i>	26.700	92.835	Road-kill	29.iii.2024	Not recorded	On a tarmac road, bus stop, near Patkai Men's Hostel
<i>Coelognathus helena</i>	26.699	92.833	Road-kill	23.v.2022	2003	On a tarmac road, near the office of Dean, Students' Welfare
<i>Dendrelaphis biloreatus</i>	26.699	92.830	Live	16.vi.2023	1130	In a room on the ground floor, department of Assamese
<i>Dendrelaphis biloreatus</i>	26.700	92.829	Live	08.iii.2024	1530	On a branch of a Hibiscus plant, in a garden, Quarter B16
<i>Dendrelaphis biloreatus</i>	26.700	92.830	Road-kill	11.ix.2021	2006	On a tarmac road, bus stop near Chandraprabha Saikiani Bhawan
<i>Oligodon melaneus</i>	26.701	92.833	Road-kill	24.vi.2022	2104	On a tarmac road, near the originating point of the path leading to Jiri Women's Hostel
<i>Amphiesma stolatum</i>	26.697	92.833	Live	24.iv.2022	0815	Garden near shopping complex
<i>Amphiesma stolatum</i>	26.697	92.833	Live	17.viii.2022	1045	Garden near amenity centre
<i>Amphiesma stolatum</i>	26.700	92.832	Live	07.iii.2024	0844	Garden in front of Subansiri Womens Hostel
<i>Amphiesma stolatum</i>	26.697	92.836	Live	23.iv.2024	0730	Garden, Kendriya Vidyalaya
<i>Amphiesma stolatum</i>	26.697	92.832	Road-kill	18.v.2024	1345	On a tarmac road, between the amenity centre and the electric substation
<i>Boiga gokool</i>	26.696	92.832	Road-kill	16.vi.2023	1537	On a tarmac floor, near Department of Environmental Science
<i>Bungarus lividus</i>	26.701	92.833	Injured	19.viii.2022	2055	On a tarmac road, near Kanchenjunga Men's Hostel
<i>Bungarus lividus</i>	26.701	92.833	Live	18.viii.2023	1905	On a roadside grass patch near Essentials
<i>Bungarus lividus</i>	26.698	92.832	Live	21.x.2023	Not recorded	On a courtyard in front of Academic Building II
<i>Bungarus fasciatus</i>	26.701	92.831	Live	04.xii.2021	Not recorded	On a tarmac road, near Niribili pond
<i>Bungarus fasciatus</i>	26.701	92.830	Live	08.vii.2022	Not recorded	On a grass patch near Niribili pond
<i>Bungarus fasciatus</i>	26.699	92.831	Live	19.viii.2023	Not recorded	On a grass patch near Academic Building 1
<i>Naja kaouthia</i>	26.698	92.834	Live	17.ix.2021	1635	In the courtyard of the administrative building
<i>Naja kaouthia</i>	26.700	92.837	Live	23.i.2022	1826	In the courtyard of Saraihat CV Raman Men's Hostel
<i>Naja kaouthia</i>	26.701	92.836	Live	16.vi.2023	1940	In a hallway of Choraideu Men's Hostel
<i>Naja kaouthia</i>	26.699	92.835	Road-kill	11.viii.2023	Not recorded	On a tarmac road, Near Community Hall
<i>Python bivittatus</i>	26.703	92.832	Live	13.vii.2021	1630	Secondary forest near Jiri Women's Hostel
<i>Python bivittatus</i>	26.701	92.832	Live	10.vii.2022	1955	Garden near swimming pool
<i>Python bivittatus</i>	26.704	92.830	Live	15.ix.2022	1825	In a drain along the road leading to B-type quarters
<i>Python bivittatus</i>	26.699	92.829	Live	03.v.2023	1905	On a tarmac road, C- Type quarter
<i>Python bivittatus</i>	26.699	92.829	Live	11.vii.2023	1445	On a branch of a Litchee plant near the C-type quarters
<i>Python bivittatus</i>	26.698	92.828	Live	12.ix.2023	1230	In a secondary forest near the children park

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