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Cover: Mixed media with fine liners, colour pencils, and watercolour background of an Indian funnel web spider. © Elakshi Mahika Molur.



An updated checklist of snakes (Reptilia: Squamata) in northeastern India derived from a review of recent literature

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Abstract: This paper reviews studies of the snakes of northeastern India published between 2001 and 2024 identified from searchable databases, covering diversity, range extension, distribution records, new genus, new species, redescription, rediscovery, and taxonomic revision. This analysis of the literature and publicly available information presents an updated checklist of 126 snake species representing 12 families and 46 genera, along with their distribution across states in northeastern India and their IUCN Red List status. The study also reveals a research gap in some northeastern states that provides opportunities for further regional studies.

Keywords: Assam, Arunachal Pradesh, herpetofauna, Manipur, Meghalaya, Mizoram, Nagaland, ophidian, Sikkim, Tripura.

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Author contributions: BB drafted the manuscript, compiled data from various sources, and prepared the checklist of snakes along with their regional distribution. MJK conceptualized the manuscript and contributed to the study's design. NS enhanced the manuscript's fluency and supervised its preparation. ARB assisted in designing the study.

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INTRODUCTION

The documentation and evaluation of snakes in India date back to the 19th century. Some of the pioneering works on Indian snakes include Günther (1864), Jerdon (1870), Boulenger (1890), Wall (1909a, 1910a, 1911, 1918, 1922a), Cazaly (1914), Smith (1943), Sharma (1976), Das (1991), and Murthy et al. (1993). The reptilian fauna of the country was reported by Aengals et al. (2018), who listed 572 species of reptiles, comprising 304 species of snakes representing 16 families. Later, Deuti et al. (2022) reported the occurrence of 471 amphibians and 681 reptile species from India.

Northeastern India consists of the states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim, which is bordered by Myanmar in the east, Nepal in the west, Bangladesh in the south-west, Bhutan in the north-west, and China in the north. This region covers an area of about 0.26 million km² (Jain et al. 2012). The altitude varies from sea level to 8,600 m at the peak of Kanchenjunga in Sikkim (Chib & Lodrick 2023). Northeastern India has an impressive biodiversity and harbors high endemism in plant and vertebrate species, resulting in its recognition as a biodiversity hotspot (Das & Khosla 2018). Most of the genera and species diversity of snakes in the country are confined to northeastern India and the Western Ghats (Hmar et al. 2020), making conducting proper surveys in these areas important. Some of the pioneering works on the snakes of northeastern India include Cantor (1839), Blyth (1851, 1853, 1854), Gray (1853), Günther (1860), Anderson (1871), Wall (1908, 1909b, 1910b,c, 1922b), Acharji & Kripalani (1951), Talukdar & Sanyal (1978), Mathew (1983, 1992, 1995, 1998), Sanyal & Gayen (1987), Shamungou (1995), Sengupta et al. (2000), and Captain & Bhatt (2000).

Since the start of the 21st century, many scientific articles and guidebooks have been written about the snakes in northeastern India. Some states in the region have been thoroughly studied in the last 23 years, but others still need more research. For instance, some of the northeastern states have seen a lot of research on snake diversity, distribution, and species description, whereas in other states, there hasn't been as much research, so our understanding of snake biodiversity there is limited. The present study aims to address such disparities by providing a comprehensive review of ophidian studies in northeastern India, encompassing well-studied areas and those requiring more attention. Through this review, we endeavor to shed light on the current state of snake research in the region and

identify areas for future study and conservation action.

MATERIALS AND METHODS

We examined 111 research papers published between January 2001 and September 2024. These articles were obtained from online searchable databases such as 'Google Scholar', the 'Reptile Database' and various journals using a combination of keywords such as "snakes", "northeastern India", "reptiles", "herpetofauna", "new records", "new species", "diversity", "rediscovery", and "taxonomic revision of snakes". In our segregation and allocation process, we categorized studies based on the states they focused on or where the snakes were studied. Each article was carefully reviewed to determine its geographic relevance and allocated accordingly. If an article covered multiple states, we reviewed it separately and included it in the appropriate section, ensuring a clear state-wise review. The analysis of previously published papers, especially the recent ones, and the data gathered from other publicly available sources were used to prepare an updated checklist of snakes in northeastern India. We also searched the recent version of the IUCN Red Data List to check their conservation status.

RESULTS

Diversity

In the last two decades or so, several studies have been conducted to understand the diversity of snakes at the district or state level and in the protected and non-protected areas of northeastern India. Pawar & Birand (2001) surveyed to document the herpetofaunal diversity in northeastern India and reported 57 snake species. Later, Ahmed et al. (2009) published a photographic field guide illustrating 101 species out of the 274 species of herpetofauna known from the region. The study also presented a photo gallery of 48 reptile species and a checklist of herpetofauna for the northeast region, enlisting 102 species of snakes. However, our analysis reveals that certain species listed in their checklists have undergone taxonomic revisions, and the distribution of some species has been confined to specific localities. This highlights the dynamic nature of taxonomic status and distribution patterns, emphasizing the importance of periodic reassessment in biodiversity studies.

Multiple research investigations have also

Table 1. Distribution list of the snake species in northeastern India.

	Scientific name	Common name	Distribution in northeastern Indian states	References	IUCN Red List status
	Family: Colubridae				
1	<i>Ahaetulla flavescens</i> (Wall, 1910)	Yellow Vine Snake	¹ AS, ¹ AR, ¹ ML, ¹ MZ	¹ Srikanthan et al. (2022)	NA
2	<i>Ahaetulla longirostris</i> Mirza, Pattekar, Verma, Stuart, Purkayastha, Mohapatra & Patel, 2024	Long-snouted Vine Snake	¹ AS, ¹ ML	¹ Mirza et al. (2024b)	NA
3	<i>Archelaphe bella</i> (Stanley, 1917)	Bella Rat Snake	¹ AS, ² AR, ¹ NL	¹ Uetz et al. (2023) ² Jayaramaiah (iNaturalist observation, 2023)	LC
4	<i>Boiga cyanea</i> (Duméril, Bibron & Duméril, 1854)	Green Cat Snake	¹ AS, ² AR, ³ ML, ⁴ MN, ⁵ MZ, ⁶ NL, ⁷ SK	¹ Smith (1943), ² Borang et al. (2005) ³ Mathew (1995), ⁴ Premjit et al. (2024) ⁵ Lalremsanga et al. (2011), ⁶ Ao et al. (2004), ⁷ Jha & Thapa (2002)	LC
5	<i>Boiga gokool</i> (Gray, 1834)	Eastern Cat Snake	^{1,3,4} AS, ^{2,3,4} AR, ^{3,4} ML, ^{3,4} MN, ⁵ MZ, ³ NL, ⁶ TR, ⁴ SK	¹ Smith (1943), ² Sanyal & Gayen (2006), ³ Das et al. (2010) ⁴ Ahmed et al. (2009), ⁵ Lalremsanga & Lalronunga (2017), ⁶ Nath et al. (2021c)	LC
6	<i>Boiga multifasciata</i> (Blyth, 1861)	Many-banded Cat Snake	¹ AR, ^{1,2} SK	¹ Das et al. (2010), ² Jha & Thapa (2002),	LC
7	<i>Boiga multomaculata ochracea</i> (Theobald, 1868)	Tawny Asian Cat Snake	¹ MZ	¹ Köhler et al. (2023)	NA
	<i>Boiga multomaculata septentrionalis</i> Kohler, Charunrochana, Mogk, Than, Kurniawan, Kadafi, Das Tillack & O'Shea, 2023	Northern Polymorphic Asian Cat Snake	¹ AS, ¹ NL	¹ Köhler et al. (2023)	
8	<i>Boiga quincunciata</i> (Wall, 1908)	Assamese Cat Snake	¹ AS, ² AR, ³ MN, ⁴ MZ	¹ Wall (1908), ² Sanyal & Gayen (2006), ³ Sinate et al. (2022), ⁴ Lalremsanga et al. (2011)	LC
9	<i>Boiga siamensis</i> Nutaphand, 1971	Thai Cat Snake	^{1,4} AS, ² AR, ⁴ ML, ³ MZ, ^{4,6} NL, ⁵ SK	¹ Sarkar et al. (2022), ² Borang et al. (2005), ³ Lalremsanga et al. (2011), ⁴ Smith (1943), ⁵ Jha & Thapa (2002), ⁶ Ao et al. (2004)	LC
10	<i>Boiga stoliczkae</i> (Wall, 1909)	Stoliczka's Asian Cat Snake	¹ AS, ¹ AR, ¹ SK	¹ Köhler et al. (2023)	NA
11	<i>Boiga trigonata</i> (Schneider, 1802)	Common Cat Snake	¹ ML, ² SK	¹ Mathew (1995), ² Smith (1943)	LC
12	<i>Calamaria pavementata</i> Duméril, Bibron & Duméril, 1854	Collared Reed Snake	¹ AS, ^{2,3} ML, ¹ MN, ⁴ MZ	¹ Smith (1943), ² Mathew (1995), ³ Ranade (2022), ⁴ Lalremsanga et al. (2011),	LC
13	<i>Chrysopelea ornata</i> (Shaw, 1802)	Ornate Flying Snake	¹ AS, ² AR, ³ ML, ⁴ MZ, ⁵ NL, ⁶ SK, ⁷ TR	¹ Sengupta et al. (2016), ² Sanyal & Gayen (2006), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Bhupathy et al. (2013), ⁶ Jha & Thapa (2002), ⁷ Majumder et al. (2010)	LC
14	<i>Coelognathus helena</i> (Daudin, 1803)	Indian Trinket Snake	¹ AS, ² MN, ^{2,3} NL	¹ Das et al. (2007), ² Whitaker & Captain (2004), ³ Bhupathy et al. (2013)	LC
15	<i>Coelognathus radiatus</i> (Boie, 1827)	Copper-headed Trinket Snake	^{1,6} AS, ^{2,6} AR, ^{3,6} ML, ^{4,6} MN, ^{5,6} MZ, ⁶ NL, ^{2,6,7} SK, ⁸ TR	¹ Das et al. (2007), ² Whitaker & Captain (2004), ³ Mathew (1995), ⁴ Mathew (2005), ⁵ Lalremsanga et al. (2011), ⁶ Ao et al. (2004), ⁷ Smith (1943), ⁸ Majumder (2012)	LC
16	<i>Cyclophiops doriae</i> (Boulenger, 1888)	Green Grass Snake	¹ AS, ¹ MN	¹ Wall (1924)	LC

	Scientific name	Common name	Distribution in northeastern Indian states	References	IUCN Red List status
17	<i>Dendrelaphis biloreatus</i> Wall, 1908	Gore's Bronzeback	¹ AS, ² AR, ³ MZ, ⁴ SK	¹ Wall (1908), ² Sanyal & Gayen (2006), ³ Biakzuala et al. (2022), ⁴ Jha & Thapa (2002)	LC
18	<i>Dendrelaphis cyanochloris</i> (Wall, 1921)	Blue Bronzeback	¹ AS, ¹ AR, ² MZ, ³ SK	¹ Ahmed et al. (2009), ² Lalremsanga et al. (2011), ³ Jha & Thapa (2002)	LC
19	<i>Dendrelaphis proarchos</i> (Wall, 1909)	Painted Bronzeback	¹ AS, ² AR, ³ ML, ⁴ MZ, ⁵ NL, ⁶ TR, ⁷ SK	¹ Mahananda et al. (2023), ² Borang et al. (2005), ³ Chandramouli et al. (2021), ⁴ Malsawmdawngliana et al. (2022a), ⁵ Bhupathy et al. (2013), ⁶ Purkayastha et al. (2020b), ⁷ Jha & Thapa (2002)	NA
20	<i>Elaphe cantoris</i> (Boulenger, 1894)	Eastern Trinket Snake	^{1,3} AR, ^{2,3} ML, ³ NL, ^{3,4} SK	¹ Borang et al. (2005), ² Mathew (1995), ³ Ao et al. (2004), ⁴ Chettri et al. (2011)	LC
21	<i>Elaphe hodgsoni</i> (Günther, 1860)	Himalayan Trinket Snake	¹ ML, ¹ SK	¹ Whitaker & Captain (2004)	LC
22	<i>Elaphe taeniura</i> Cope, 1861	Striped Trinket Snake	¹ AR, ² MZ, ³ SK	¹ Borang et al. (2005), ² Harit (2010), ³ Jha & Thapa (2002)	VU
23	<i>Euprepophis mandarinus</i> (Cantor, 1842)	Mandarin Rat Snake	¹ AR, ² MZ, ³ NL	¹ Borang et al. (2005), ² Ashaharaza et al. (2019), ³ Bhupathy et al. (2013)	LC
24	<i>Gongylosoma scriptum</i> (Theobald, 1868)	Common Ringneck	¹ MZ	¹ Lalremsanga et al. (2018)	LC
25	<i>Gonyosoma frenatum</i> (Gray, 1853)	Khasi Hills Trinket Snake	¹ AR, ² ML	¹ Borang et al. (2005), ² Smith (1943)	LC
26	<i>Gonyosoma prasinum</i> (Blyth, 1854)	Green Trinket Snake	^{1,4} AS, ^{2,4} AR, ⁴ ML, ⁴ MN, ⁴ MZ, ^{3,4} NL, ⁵ SK	¹ Smith (1943), ² Borang et al. (2005), ³ Bhupathy et al. (2013), ⁴ David et al. (2022), ⁵ Jha & Thapa (2002)	LC
27	<i>Liopeltis frenata</i> (Günther, 1858)	Günther's Reed Snake	¹ AR, ² ML, ³ MZ, ⁴ NL	¹ Borang et al. (2005), ² Mathew (1995), ³ Lalremsanga et al. (2011), ⁴ Ao et al. (2004)	LC
28	<i>Liopeltis rappi</i> (Günther, 1860)	Himalayan Reed Snake	¹ SK	¹ Jha & Thapa (2002)	LC
29	<i>Liopeltis stoliczkae</i> (Sclater, 1891)	Stoliczka's Reed Snake	¹ AR, ² NL, ³ SK	¹ Borang et al. (2005), ² Ao et al. (2004), ³ Jha & Thapa (2002)	LC
30	<i>Lycodon aulicus</i> (Linnaeus, 1758)	Common Wolf Snake	^{1,6} AS, ^{1,6} AR, ^{2,6} ML, ^{1,6} MN, ⁶ MZ, ^{3,6} NL, ^{4,6} SK, ^{5,6} TR	¹ Smith (1943), ² Mathew (1995), ³ Bhupathy et al. (2013), ⁴ Chettri et al. (2011), ⁵ Majumder et al. (2012), ⁶ Whitaker & Captain (2004)	LC
31	<i>Lycodon fasciatus</i> (Anderson, 1879)	Banded Wolf Snake	¹ AS, ² AR, ³ MZ, ² NL	¹ Smith (1943), ² Ao et al. (2004), ³ Lalbiakzuala & Lalremsanga (2017)	LC
32	<i>Lycodon gammiei</i> (Blanford, 1878)	Sikkim False Wolf Snake	¹ AR, ² SK	¹ Mistry et al. (2007), ² Jha & Thapa (2002)	NT
33	<i>Lycodon jara</i> (Shaw, 1802)	Twin-spotted Wolf Snake	¹ AS, ² AR, ³ ML, ⁴ MN, ⁵ MZ, ⁶ TR, ⁷ SK	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Elangbam et al. (2022), ⁵ Lalremsanga et al. (2011), ⁶ Purkaysatha et al. (2020b), ⁷ Chettri et al. (2011)	LC
34	<i>Lycodon septentrionalis</i> (Günther, 1875)	White-banded Wolf Snake	^{1,2} AS, ² AR, ³ ML, ² MZ, ^{2,4} NL, ⁵ SK	¹ Smith (1943), ² Biakzuala et al. (2020b), ³ Mathew (1995), ⁴ Ao et al. (2004), ⁵ Jha & Thapa (2002)	LC
35	<i>Lycodon zawi</i> Slowinski, Pawar, Win, Thin, Gyi, Oo & Tun, 2001	Zaw's Wolf Snake	¹ AS, ¹ ML, ¹ MZ	¹ Slowinski et al. (2001)	LC

	Scientific name	Common name	Distribution in northeastern Indian states	References	IUCN Red List status
36	<i>Oligodon albocinctus</i> (Cantor, 1839)	Light-barred Kukri Snake	^{1,5} AS, ^{2,5} AR, ^{3,5} ML, ⁵ MN, ⁴ MZ, ⁵ NL, ⁶ TR, ^{5,7} SK	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Ao et al. (2004), ⁶ Purkayastha et al. (2020b), ⁷ Jha & Thapa (2002)	LC
37	<i>Oligodon catenatus</i> (Blyth, 1854)	Assam Kukri Snake	¹ AS, ² MZ	¹ Blyth (1854), ² Laibakzuala & Lalremsanga (2020)	LC
38	<i>Oligodon cinereus</i> (Günther, 1864)	Günther's Kukri Snake	¹ AS, ² AR, ³ ML, ⁴ MZ	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011)	LC
39	<i>Oligodon cyclurus</i> (Cantor, 1839)	Cantor's Kukri Snake	¹ AS, ² ML, ³ MZ, ⁴ NL	¹ Smith (1943), ² Mathew (1995), ³ Lalremsanga et al. (2011), ⁴ Bhupathy et al. (2013)	LC
40	<i>Oligodon dorsalis</i> (Gray, 1834)	Bengalese Kukri Snake	¹ AS, ² AR, ³ ML, ⁴ MN, ⁵ MZ, ³ NL	¹ Dey et al. (2022), ² Wall (1910), ³ Smith (1943), ⁴ Mathew (1995), ⁵ Lalremsanga et al. (2011)	LC
41	<i>Oligodon kheriensis</i> Acharji & Ray, 1936	Coral Red Kukri Snake	^{1,2} AS	¹ Sutradhar & Nath (2013), ² Nath et al. (2021a)	LC
42	<i>Oligodon erythrogaster</i> Boulenger, 1907	Nagarkot Kukri Snake	¹ SK	¹ Jha & Thapa (2002)	NT
43	<i>Oligodon erythrorhachis</i> Wall, 1910	Red-striped Kukri Snake	^{1,2} AS, ^{1,2} AR	¹ Wall (1910c), ² Borang et al. (2005)	VU
44	<i>Oligodon juglandifer</i> (Wall, 1909)	Darjeeling Kukri Snake	¹ ML, ² SK	¹ Chandramouli et al. (2021), ² Jha & Thapa (2002)	VU
45	<i>Oligodon melaneus</i> Wall, 1909	Blue-bellied Kukri Snake	¹ AS, ² SK	¹ Das et al. (2022), ² Jha & Thapa (2002)	DD
46	<i>Oligodon melanozonatus</i> Wall, 1922	Abor Hills Kukri Snake	¹ AR	¹ Wall (1922b)	DD
47	<i>Oligodon theobaldi</i> (Günther, 1868)	Theobald's Kukri Snake	^{1,2} ML, ³ NL	¹ Smith (1943), ² Mathew (1995), ³ Ao et al. (2004)	LC
48	<i>Oreocryptophis porphyraceus</i> (Cantor, 1839)	Black-banded Trinket Snake	¹ AS, ^{2,4} AR, ^{3,4} ML, ⁴ MN, ⁵ MZ, ⁴ NL, ^{4,6} SK	¹ Mahananda et al. (2023), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Whitaker & Captain (2004), ⁵ Harit (2016), ⁶ Jha & Thapa (2002)	LC
49	<i>Ptyas korros</i> (Schlegel, 1837)	Indo-chinese Rat Snake	¹ AS, ¹ AR, ² ML, ³ MN, ⁴ MZ, ⁵ NL, ⁶ SK, ⁷ TR	¹ Smith (1943), ² Mathew (1995), ³ Acharji & Kripalani (1951), ⁴ Lalremsanga et al. (2011), ⁵ Ao et al. (2004), ⁶ Jha & Thapa (2002), ⁷ Giri et al. (2017)	NT
50	<i>Ptyas mucosa</i> (Linnaeus, 1758)	Oriental Rat Snake	¹ AS, ² MZ, ³ SK, ⁴ TR	¹ Das et al. (2007), ² Lalremsanga et al. (2011), ³ Jha & Thapa (2002), ⁴ Purkaysatha et al. (2020b)	LC
51	<i>Ptyas nigromarginata</i> (Blyth, 1854)	Green Rat Snake	¹ AS, ² AR, ¹ ML, ¹ NL, ¹ SK	¹ Smith (1943), ² Borang et al. (2005)	LC
	Family: Elapidae				
52	<i>Bungarus bungaroides</i> (Cantor, 1839)	Northeastern Hill Krait	¹ AS, ⁴ AR, ^{1,2} ML, ¹ SK, ³ NL	¹ Smith (1943), ² Mathew (1995), ³ Ao et al. (2004), ⁴ Agarwal et al. (2010)	LC
53	<i>Bungarus fasciatus</i> (Schneider, 1801)	Banded Krait	¹ AS, ¹ AR, ¹ ML, ¹ MZ, ² TR	¹ Ahmed et al. (2009), ² Majumder et al. (2012)	LC
54	<i>Bungarus lividus</i> Cantor, 1839	Lesser Black Krait	¹ AS, ^{2,5} AR, ³ ML, ⁴ NL	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Bhupathy et al. (2013), ⁵ Agarwal et al. (2010)	LC

	Scientific name	Common name	Distribution in northeastern Indian states	References	IUCN Red List status
55	<i>Bungarus niger</i> Wall, 1908	Greater Black Krait	^{1,2} AS, ^{1,2,3} AR, ^{1,2} ML, ⁴ MN, ² MZ, ¹ NL, ¹ SK, ² TR	¹ Ahmed et al. (2009), ² Biakzuala et al. (2021), ³ Agarwal et al. (2010), ⁴ Sinate et al. (2021)	LC
56	<i>Bungarus suzhenae</i> Chen, Shi, Vogel, Ding & Shi, 2021	Suzhen's Krait	¹ MN, ¹ NL	¹ Gerard et al. (2024)	NA
57	<i>Naja kaouthia</i> Lesson, 1831	Monocled Cobra	^{1,2} AS, ^{1,2} AR, ² ML, ³ MN, ⁴ MZ, ² NL, ^{1,2} SK, ⁵ TR	¹ Whitaker & Captain (2004), ² Ao et al. (2004), ³ Acharji & Kripalani (1951), ⁴ Lalremsanga et al. (2011), ⁵ Purkayastha et al. (2020b)	LC
58	<i>Naja naja</i> (Linnaeus, 1758)	Spectacled Cobra	¹ AS, ² ML	¹ Uetz et al. (2023), ² Mathew (1995)	LC
59	<i>Ophiophagus hannah</i> (Cantor, 1836)	King Cobra	¹ AS, ² AR, ³ ML, ⁴ MZ, ⁵ SK, ⁶ TR	¹ Das et al. (2007), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Jha & Thapa (2002), ⁶ Majumder et al. (2012)	VU
60	<i>Sinomicrurus gorei</i> (Wall, 1909)	Gore's Coral Snake	¹ AS, ¹ MN, ¹ MZ, ¹ NL, ² TR	¹ Biakzuala et al. (2023b), ² Deb et al. (2024a)	NA
61	<i>Sinomicrurus maclellandi</i> (Reinhardt, 1844)	Maclelland's Coral Snake	^{1,4} AS, ^{2,4} AR, ^{3,4} ML, ⁴ MN, ^{4,5} MZ, ⁴ NL, ⁶ SK	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Ao et al. (2004), ⁵ Lalremsanga et al. (2011), ⁶ Jha & Thapa (2002)	LC
	Family: Homalopsidae				
62	<i>Enhydris enhydris</i> (Schneider, 1799)	Rainbow Water Snake	¹ AS, ¹ ML, ¹ NL	¹ Ahmed et al. (2009)	LC
63	<i>Ferania sieboldii</i> (Schlegel, 1837)	Siebold's Water Snake	¹ AS, ² AR, ^{2,3} MZ, ^{2,4} NL, ¹ TR	¹ Deb et al. (2023), ² Agarwal et al. (2010), ³ Lalremsanga et al. (2011), ⁴ Smith (1943)	LC
	Family: Natricidae				
64	<i>Amphiesma stolatum</i> (Linnaeus, 1758)	Buff-striped Keelback	^{1,6} AS, ^{2,6} AR, ^{3,6} ML, ⁴ MN, ⁵ MZ, ⁶ NL, ⁶ SK, ^{6,7} TR	¹ Das et al. (2007), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Acharji & Kripalani (1951), ⁵ Lalremsanga et al. (2011), ⁶ Ao et al. (2004), ⁷ Majumder et al. (2012)	LC
65	<i>Fowlea piscator</i> (Schneider, 1799)	Checkered Keelback	^{1,6} AS, ^{2,6} AR, ^{3,6} ML, ⁴ MN, ^{5,6} MZ, ⁶ NL, ⁷ SK, ^{6,8} TR	¹ Das et al. (2007), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Mathew (2005), ⁵ Lalremsanga et al. (2011), ⁶ Ao et al. (2004), ⁷ Jha & Thapa (2002), ⁸ Majumder et al. (2012)	LC
66	<i>Fowlea sanctijohannis</i> (Boulenger, 1890)	St. John's Keelback	¹ AR, ² SK	¹ Borang et al. (2005), ² Chettri et al. (2011)	LC
67	<i>Fowlea schnurrenbergeri</i> (Kramer, 1977)	Bar-necked Keelback	¹ AS	¹ Sengupta et al. (2016)	LC
68	<i>Hebius clerki</i> (Wall, 1925)	Yunnan Keelback	^{1,3} AR, ^{2,3} ML, ³ MZ, ³ NL, ⁴ SK	¹ Borang et al. (2005), ² Mathew (1995), ³ Ao et al. (2004), ⁴ Chettri et al. (2011)	LC
69	<i>Hebius khasiensis</i> (Boulenger, 1890)	Khasi Hills Keelback	^{1,3} AR, ^{2,3} ML, ³ MZ, ³ NL	¹ Borang et al. (2005), ² Boulenger (1890), ³ Ao et al. (2004)	LC
70	<i>Hebius lacrima</i> Purkayastha & David, 2019	Crying Keelback	¹ AR	¹ Purkayastha & David (2019)	DD
71	<i>Hebius modestus</i> (Günther, 1875)	Modest Keelback	¹ AR, ² ML, ³ MZ	¹ Borang et al. (2005), ² Boulenger (1890), ³ Lalremsanga et al. (2011),	LC

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72	<i>Hebius parallelus</i> (Boulenger, 1890)	Striped Keelback	¹ AS, ^{2,3} ML, ^{1,2} SK	¹ Smith (1943), ² Boulenger (1890), ³ Mathew (1995)	DD
73	<i>Hebius taroensis</i> (Smith, 1940)	Kachin Keelback	¹ AR	¹ David et al. (2021)	NT
74	<i>Hebius venningi</i> (Wall, 1910)	Chin Hills Keelback	¹ AR, ² MN, ¹ MZ, ¹ NL	¹ David et al. (2021), ² Hakim (2023)	LC
75	<i>Herpetoreas murlen</i> Lalremsanga, Bal, Vogel & Biakzuala, 2022	Murlen Keelback	¹ MZ	¹ Lalremsanga et al. (2022)	NA
76	<i>Herpetoreas pealii</i> (Sclater, 1891)	Assam Keelback	¹ AS, ¹ AR	¹ Das et al. (2020b)	DD
77	<i>Herpetoreas platyceps</i> (Blyth, 1854)	Himalayan Keelback	¹ AR, ¹ ML, ² SK	¹ Smith (1943), ² Jha & Thapa (2002),	LC
78	<i>Herpetoreas sieboldii</i> Günther, 1860	Sikkim Keelback	¹ SK	¹ Günther (1860)	DD
79	<i>Herpetoreas xenura</i> (Wall, 1907)	Wall's Keelback	¹ ML, ¹ MZ, ² TR	¹ Lalronunga (2020), ² Giri et al. (2017)	NT
80	<i>Rhabdophis bindi</i> Das, Smith, Sidik, Sarker, Boruah, Patel, Murthy & Deepak, 2021	Bindee Keelback	¹ AS, ¹ MZ, ¹ TR	¹ Das et al. (2021)	NA
81	<i>Rhabdophis helleri</i> (Schmidt, 1925)	Heller's Red-necked Keelback	¹ AS, ² AR, ¹ ML, ³ MN, ¹ MZ, ¹ NL, ¹ SK, ⁴ TR	¹ David & Vogel (2021), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Purkayastha et al. (2020b)	NA
82	<i>Rhabdophis himalayanus</i> (Günther, 1864)	Himalayan Keelback	¹ AS, ² AR, ³ ML, ⁴ MZ, ¹ SK, ⁵ NL, ⁶ TR	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Bhupathy et al. (2013), ⁶ Giri et al. (2017)	LC
83	<i>Rhabdophis nuchalis</i> (Boulenger, 1891)	Hubei Keelback	¹ NL	¹ Ahmed & Das (2006)	LC
84	<i>Smithophis arunachalensis</i> Das, Deepak, Captain, Wade & Gower, 2020	Arunachal Rain Snake	¹ AR	¹ Das et al. (2020a)	NA
85	<i>Smithophis atemporalis</i> Giri, Gower, Das, Lalremsanga, Lalronunga, Captain & Deepak, 2019	Mizo Rain Snake	¹ MZ	¹ Giri et al. (2019)	DD
86	<i>Smithophis bicolor</i> (Blyth, 1854)	Two-coloured Rain Snake	¹ AR, ^{1,2} ML, ² MZ	¹ Smith (1943), ² Giri et al. (2019)	LC
87	<i>Smithophis mizoramensis</i> Mirza, Bhardwaj, Lalmuanawma, Choure, Lalremsanga, Vabeiryureilai, Captain, Zagade & Patel, 2024	Mizo Brook Snake	¹ MZ	¹ Mirza et al. (2024a)	NA
88	<i>Trachischium apteii</i> Bhosale, Gowande & Mirza, 2019	Apte's Slender Snake	¹ AR	¹ Bhosale et al. (2019)	NA
89	<i>Trachischium fuscum</i> (Blyth, 1854)	Darjeeling Slender Snake	¹ AS, ² AR, ³ SK	¹ Smith (1943), ² Agarwal et al. (2010) ³ Jha & Thapa (2002),	LC
90	<i>Trachischium guentheri</i> Boulenger, 1890	Rosebelly Slender Snake	¹ SK	¹ Jha & Thapa (2002)	VU
91	<i>Trachischium monticola</i> (Cantor, 1839)	Assam Slender Snake	¹ AR, ² ML	¹ Borang et al. (2005), ² Mathew (1995)	LC
92	<i>Trachischium tenuiceps</i> (Blyth, 1854)	Orange-bellied Slender Snake	¹ AR, ² SK	¹ Borang et al. (2005), ² Jha & Thapa (2002)	DD
93	<i>Trimerodytes yunnanensis</i> Rao et Yang, 1998	Yunnan Annulate Keelback	¹ AR	¹ Nguyen & Vogel (2024)	LC
94	<i>Xenochrophis cerasogaster</i> (Cantor, 1839)	Painted Keelback	¹ AS, ² ML	¹ Smith (1943), ² Mathew (1995)	VU
	Family: Pareidae				
95	<i>Pareas andersonii</i> Boulenger, 1888	Anderson's Slug Snake	¹ MZ, ¹ NL	¹ Vogel et al. (2020)	NA
96	<i>Pareas kaduri</i> Bhosale, Phansalkar, Sawant, Gowande, Patel & Mirza, 2020	Kadur's Slug Snake	¹ AR	¹ Bhosale et al. (2020)	NA
97	<i>Pareas modestus</i> Theobald, 1868	Mountain Slug Snake	¹ MZ	¹ Vogel et al. (2020)	NA

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98	<i>Pareas monticola</i> (Cantor, 1839)	Assam Slug Snake	¹ AS, ² AR, ^{1,3} ML, ⁴ MZ, ¹ NL, ¹ SK, ⁵ TR	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Deb et al. (2024b)	LC
	Family: Pseudaspidae				
99	<i>Psammodynastes pulverulentus</i> (Boie, 1827)	Mock Viper	¹ AS, ¹ AR, ¹ ML, ¹ MZ, ² SK, ³ TR	¹ Ahmed et al. (2009), ² Chettri et al. (2011), ³ Purkayastha et al. (2020b)	LC
	Family: Pseudoxenodontidae				
100	<i>Pseudoxenodon macrops</i> (Blyth, 1854)	Mock Cobra	^{1,5} AS, ^{2,5} AR, ^{3,5} ML, ^{4,5} MZ, ⁵ NL, ^{5,6} SK	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Ao et al. (2004), ⁶ Jha & Thapa (2002)	LC
	Family: Pythonidae				
101	<i>Malayopython reticulatus</i> (Schneider, 1801)	Reticulated Python	¹ MZ	¹ Lalremsanga et al. (2024)	LC
102	<i>Python bivittatus</i> Kuhl, 1820	Burmese Python	¹ AS, ² AR, ³ ML, ⁴ MZ, ⁵ NL, ⁶ SK, ⁷ TR	¹ Purkayastha et al. (2011), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Yanthungbeni et al. (2018), ⁶ Jha & Thapa (2002), ⁷ Purkayastha et al. (2020b)	VU
	Family: Sibynophiidae				
103	<i>Sibynophis collaris</i> (Gray, 1853)	Collared Black-headed Snake	^{1,2} AR, ² ML, ^{1,2} MZ, ² NL, ² SK	¹ Pawar & Birand (2001), ² Ao et al. (2004)	LC
	Family: Typhlopidae				
104	<i>Argyrophis bothriorhynchus</i> (Günther, 1864)	Günther's Blind Snake	¹ AS	¹ Smith (1943),	DD
105	<i>Argyrophis diardii</i> (Schlegel, 1839)	Diard's Blind Snake	^{1,5} AS, ^{1,5} AR, ^{2,5} ML, ^{3,5} MN, ⁴ MZ, ⁵ NL, ^{5,6} TR, ⁷ SK	¹ Whitaker & Captain (2004), ² Mathew (1995), ³ Acharji & Kripalani (1951), ⁴ Lalremsanga et al. (2011), ⁵ Ao et al. (2004), ⁶ Majumder et al. (2012), ⁷ Sinha et al. (2020)	LC
106	<i>Indotyphlops braminus</i> (Daudin, 1803)	Brahminy Blind Snake	¹ AS, ¹ AR, ² ML, ¹ MZ, ³ SK, ⁴ TR	¹ Pawar & Birand (2001), ² Mathew (1995), ³ Jha & Thapa (2002), ⁴ Purkayastha et al. (2020b)	LC
107	<i>Indotyphlops jerdoni</i> (Boulenger, 1890)	Jerdon's Worm Snake	^{1,4} AR, ^{2,4} ML, ³ MZ, ⁴ NL, ⁵ SK	¹ Sanyal & Gayen (2006), ² Mathew (1995), ³ Lalremsanga et al. (2011), ⁴ Ao et al. (2005), ⁵ Jha & Thapa (2002)	LC
108	<i>Indotyphlops tenuicollis</i> (Peters, 1864)	Samagutin Worm Snake	¹ ML, ² NL	¹ Mathew (1995), ² Smith (1943)	DD
	Family: Viperidae				
109	<i>Daboia russelii</i> (Shaw & Nodder, 1797)	Russell's Viper	¹ AS, ² MN, ³ SK	¹ Nath et al. (2019), ² Acharji & Kripalani (1951), ³ Jha & Thapa (2002)	LC
110	<i>Ovophis monticola</i> (Günther, 1864)	Mountain Pit Viper	¹ AS, ¹ AR, ¹ ML, ¹ MN, ² MZ, ¹ NL, ¹ SK	¹ Whitaker & Captain (2004) ² Lalremsanga et al. (2011),	LC
111	<i>Ovophis zayuensis</i> (Jiang, 1977)	Zayuan Mountain Pit Viper	¹ AR	¹ Gerard et al. (2024)	LC
112	<i>Protobothrops himalayanus</i> Pan, Chettri, Yang, Jiang, Wang, Zhang & Vogel, 2013	Himalayan Pit Viper	¹ SK	¹ Pan et al. (2013)	LC
113	<i>Protobothrops jerdonii</i> (Günther, 1875)	Jerdon's Pit Viper	¹ AR, ² ML, ³ MN, ⁴ NL, ⁵ SK	¹ Borang et al. (2005), ² Mathew (1995) ³ Elangbam et al. (2023), ⁴ Ao et al. (2004) ⁵ Jha & Thapa (2002)	LC

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114	<i>Protobothrops kaulbacki</i> (Smith, 1940)	Kaulback's Lance-headed Pit Viper	¹ AR	¹ Uetz et al. (2023)	DD
115	<i>Protobothrops mucrosquamatus</i> (Cantor, 1839)	Brown Spotted Pit Viper	¹ AS, ^{2,3} AR, ³ MZ, ³ NL	¹ Dutta et al. (2024), ² Borang et al. (2005), ³ Ao et al. (2004)	LC
116	<i>Trimeresurus arunachalensis</i> Captain, Deepak, Pandit, Bhatt & Athreya, 2019	Arunachal Pit Viper	¹ AR	¹ Captain et al. (2019)	DD
117	<i>Trimeresurus erythrurus</i> (Cantor, 1839)	Red-tailed Pit Viper	¹ AR, ² ML, ³ MN, ⁴ MZ, ⁵ NL, ^{5,6} SK, ⁷ TR	¹ Borang et al. (2005), ² Mathew (1995) ³ Elangbam et al. (2023), ⁴ Lalremsanga et al. (2011), ⁵ Whitaker & Captain (2004) ⁶ Jha & Thapa (2002), ⁷ Purkayastha et al. (2020b)	LC
118	<i>Trimeresurus mayae</i> Rathee, Purkayastha, Lalremsanga, Dalal, Biakzuala, Muansanga & Mirza, 2022	Maya's Pit Viper	¹ MN, ² MZ	¹ Elangbam et al. (2023), ² Rathee et al. (2022)	NA
119	<i>Trimeresurus medoensis</i> Zhao, 1977	Green Bamboo Leaf Pit Viper	¹ AR	¹ David et al. (2001)	DD
120	<i>Trimeresurus popeiorum</i> Smith, 1937	Pope's Green Pit Viper	¹ AR, ² ML, ³ MZ, ⁴ SK	¹ Borang et al. (2005), ² Mathew (1995), ³ Lalremsanga et al. (2011), ⁴ Jha & Thapa (2002)	LC
121	<i>Trimeresurus salazar</i> Mirza, Bhosale, Phansalkar, Sawant, Gowande & Patel, 2020	Salazar's Pit Viper	^{1,4} AS, ^{1,4} AR, ^{2,4} ML, ³ MN, ⁴ MZ, ⁴ NL, ⁴ SK, ⁵ TR	¹ Mirza et al. (2020), ² Rathee et al. (2021), ³ Elangbam et al. (2023) ⁴ Vogel et al. (2022), ⁵ Chowdhury et al. (2024)	NA
122	<i>Trimeresurus uetzi</i> Vogel, Nguyen & David, 2023	Uetz's Pit Viper	¹ MZ	¹ Biakzuala et al. (2024)	NA
	Family: Xenodermidae				
123	<i>Blythia hmuifang</i> Vogel, Lalremsanga & Vanlalhrima, 2017	Mizoram Ground Snake	¹ MZ	¹ Vogel et al. (2017)	DD
124	<i>Blythia reticulata</i> (Blyth, 1854)	Blyth's Reticulated Snake	¹ AS, ² AR, ³ ML, ¹ MN, ⁴ MZ, ⁵ NL	¹ Smith (1943), ² Borang et al. (2005), ³ Mathew (1995), ⁴ Lalremsanga et al. (2011), ⁵ Ao et al. (2004)	DD
125	<i>Stoliczka khasiensis</i> Jerdon, 1870	Khasi Earth Snake	^{1,2} ML	¹ Smith (1943), ² Mathew (1995)	DD
126	<i>Stoliczka vanhuailianai</i> Lalronunga, Lalmangaiha, Zosangliana, Lalmingliani, Gower, Das & Deepak, 2021	Lushai Hills Dragon Snake	¹ MZ	¹ Lalronunga et al. (2021b)	NA

The numbers 1, 2, 3... in the 'Reference' column correspond with the numbers assigned to the states listed in the 'Distribution in northeastern states' column, confirming the presence of the species in those states.

AR—Arunachal Pradesh | AS—Assam | DD—Data Deficient | LC—Least Concern | ML—Meghalaya | MN—Manipur | MZ—Mizoram | NA—Not Assessed | NL—Nagaland | NT—Near Threatened | SK—Sikkim | TR—Tripura | VU—Vulnerable.

undertaken the task of systematically documenting the diversity of snakes within northeastern states or specific localities, contributing to the broader understanding of regional herpetofauna. These are summarised state-wise as follows:

In Assam, Das et al. (2007) documented the incidence of road mortality among reptiles and recorded the fatalities of 26 snake species along a highway in close proximity to Kaziranga National Park. Das et al. (2009) reported 45 species of reptiles from the Barail Wildlife Sanctuary and the surrounding Cachar District of Assam, which included 23 snake species representing

five families and 19 genera and the study also included the documentation of four individuals of the genus *Rhabdophis* whose species identity remained uncertain. Purkayastha et al. (2011) reported 59 species of reptiles and amphibians from the urban city of Guwahati, which included 23 species of snakes representing five families. Islam & Saikia (2014) recorded 35 snake species in the Jeypore Reserved Forest of Assam and documented the road mortality of 17 of those species. Sengupta et al. (2016) reported 36 species of reptiles including 19 species of snakes from the Deepor Beel wetland of Assam. Baishya & Das (2018) reported the presence of

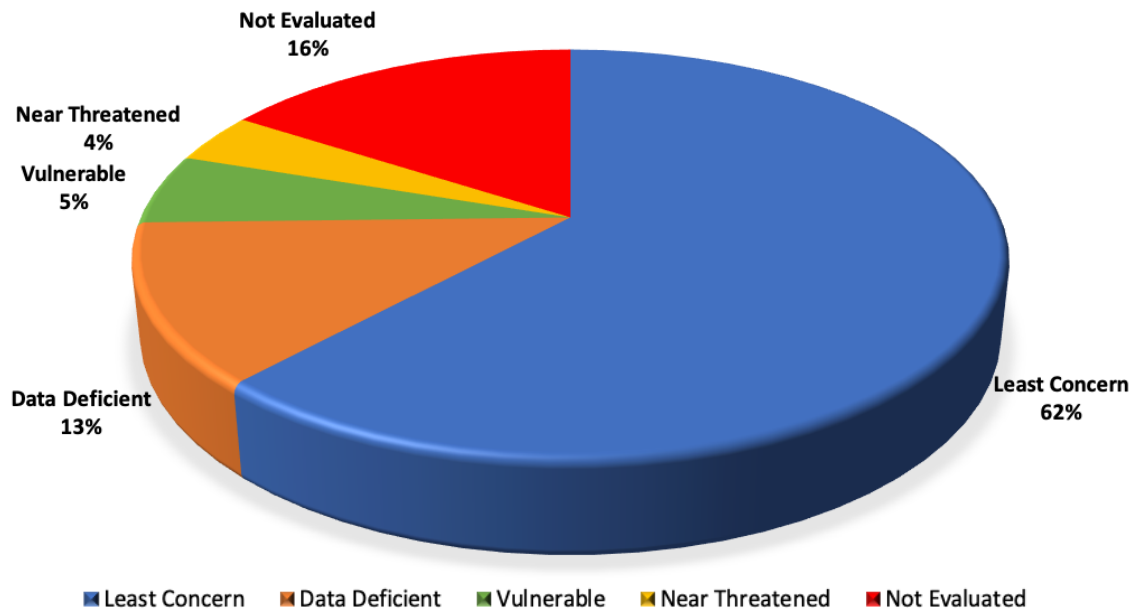


Figure 1. Distribution of snake species of northeastern India across various IUCN Red List categories.

15 snake species belonging to five families in the Nalbari district. Purkayastha (2018) presented the terrestrial vertebrate diversity of Guwahati wherein he reported 29 species of snakes from the city. Sengupta et al. (2019) reported 17 species of snakes from the Dibrugarh and Tinsukia districts of Assam. Purkayastha et al. (2020a) reported 41 species of reptiles comprising 23 species of snakes belonging to five families from Amchang Wildlife Sanctuary, Assam and Mahananda et al. (2023) presented a checklist of the terrestrial vertebrate diversity of the Garbhanga landscape wherein they reported 39 species of snakes.

In Mizoram, Laltanpuia et al. (2008) reported 24 species of snakes from the Mizoram University Campus of Tanhril, Aizawl. Harit (2010) reported 16 species of non-venomous snakes from the Champhai district of the state. Lalremsanga et al. (2011) reported 49 species of snakes representing five families, along with a note on the effects of environmental factors in the distribution of snakes throughout the state. Lalremsanga et al. (2014) reported 19 snake species from the Tamdil National Wetland of Mizoram, including the presence of *Herpetoreas xenura* which is endemic to the Indo-Burma biodiversity hotspot. Lalremsanga & Lalrununga (2017) documented 52 species of snakes from the state. Hmar et al. (2020) reported 28 species of snakes belonging to 20 genera representing seven families from the Reiek Community Reserved Forest in the Mamit district of Mizoram. Also, Malsawmdawngliana et al. (2022a) reported 23 snake species, while Gouda

et al. (2023) reported 20 snake species from the Dampa Tiger Reserve of Mizoram.

In Meghalaya, Chandramouli et al. (2021) documented a comprehensive inventory of herpetofauna, identifying 75 species. The study claimed to report 29 amphibian species, 17 lizard species, and 29 snake species. However, upon our meticulous analysis of their paper, we observed a slight discrepancy, noting 18 species of lizards and 28 species of snakes.

In Arunachal Pradesh, Biswas et al. (2005) conducted a comprehensive examination of the vertebrate fauna within the D'Ering Wildlife Sanctuary, wherein they identified and documented nine distinct species of reptiles, including both venomous and non-venomous snakes. Borang et al. (2005) provided a checklist for the ophidian fauna of the state, which included 67 species representing five families and 31 genera. Sanyal & Gayen (2006) reported 78 species of reptiles from the state, which included 55 species of snakes. Agarwal et al. (2010) reported 23 species of snakes representing 16 genera and belonging to four families from Eaglenest Wildlife Sanctuary, and Sinha et al. (2021) provided a checklist of the herpetofauna diversity of the Zoological Survey of India campus of Itanagar wherein they reported the occurrence of 20 species of snakes representing five families.

In Tripura, Majumder et al. (2012) reported 55 species of reptiles and amphibians from the state, which included 18 species of snakes. Giri et al. (2017) reported 28 species of reptiles, including 12 species of snakes,

from nine biodiversity hotspots, and Purkayastha et al. (2020b) reported 33 species of reptiles, including 19 species of snakes from Rowa Wildlife Sanctuary, Tripura.

In Nagaland, Ao et al. (2004) reported 41 species of snakes with 19 new records from the state. Later, Bhupathy et al. (2013) reported 31 species of snakes with eight new records from the state, and Yanthungbeni et al. (2018) reported five species of snakes from Dimapur.

In Sikkim, Jha & Thapa (2002) published the book "Reptiles & Amphibians of Sikkim" wherein they reported 59 species of snakes belonging to five families. Later, Chettri et al. (2011) conducted surveys in Teesta Valley and Maenam Wildlife Sanctuary and reported 42 species of reptiles including 28 species of snakes. Additionally, they also presented a checklist of 50 amphibian and 88 reptilian species occurring in the region.

In Manipur, Mathew (2005) mentioned the deposition of nine species of reptiles from the state at the Eastern regional station, Zoological Survey of India, Shillong. This collection represented only two species of snakes, *Coelognathus radiatus* and *Fowlea piscator*.

Range Extension and Distribution Records

In the 21st century, several studies reported the discovery of different species of snakes from parts of northeastern India where they were previously not known to exist and this extended the distributional range for those species.

In Assam, Sutradhar & Nath (2013) reported the first record of *Oligodon kheriensis* near Kachugaon Reserved Forest, Kokrajhar district. Nath et al. (2019) reported the first confirmed record of *Daboia russelii* from the state. Nath et al. (2021a) reported new distribution records for *Oligodon kheriensis* from the Bongaigaon, Chirang, Baksa, and Kokrajhar districts of Assam. Dey et al. (2022) reported the first confirmed record of *Oligodon dorsalis* from Assam and Sarkar et al. (2022) presented the distribution records of three cat snake species of the genus *Boiga*, from Assam. Also recently, Dutta et al. (2024) reported the first record of *Protobothrops mucrosquamatus* from Assam based on a live specimen observed in the Karbi-Anlong district of the state.

In Meghalaya, Gayen (2001) reported the first record of *Hebius venningi* from the state based on a specimen collected from the Jaintia Hills district. However, on further analysis, Mathew & Meetei (2004) identified the specimen from Jaintia Hills as *Herpetoreas xenura*. Also, Rathee et al. (2021) reported the occurrence of *Trimeresurus salazar* in the state along with an additional note on its hemipenis.

In Mizoram, Lalremsanga et al. (2011) provided 14 new records of snake species. Lalremsanga et al. (2015) reported four new records for the state. Harit (2016) extended the distribution of *Oreocryptophis porphyraceus* to Mizoram. Lalbiakzuala & Lalremsanga (2017) reported the first record of *Lycodon fasciatus* for Mizoram state. Lalremsanga et al. (2018) reported the first-ever record of *Gongylosoma scriptum* in India from Mizoram. Khan et al. (2019) provided the first-ever record of *Euprepiophis mandarinus* from Mizoram. Lalbiakzuala & Lalremsanga (2019) reported for the first time, the occurrence of *Hebius venningi* in Mizoram. Additionally, Biakzuala et al. (2020a) reported new distributional records for *Lycodon zawi* from all eight districts of Mizoram. Biakzuala et al. (2020b) extended the distribution of *Lycodon septentrionalis* to 10 new localities in Mizoram. Biakzuala et al. (2020c) updated new distributional records for *Blythia reticulata* in Mizoram and Biakzuala et al. (2021) reported new distributional records for *Bungarus lividus* and *Bungarus niger*. Also, Lalbiakzuala et al. (2021) contributed new distributional records of *Amphiesma stolatum* in the state. Later, Lalronunga et al. (2021a) reported new locality records of *Smithophis atemporalis* in Mizoram which extended the distributional range of the species. Lalremsanga et al. (2022) provided three new distributional records for *Gongylosoma scriptum* from Mizoram. Ruatpui et al. (2022) reported new distributional records for *Smithophis atemporalis* and *Smithophis bicolor* from Mizoram. Malsawmdawngliana et al. (2022a) reported new distributional records for 16 species of snakes from the Dampa Tiger Reserve of Mizoram. Biakzuala et al. (2022) evaluated the genus *Dendrelaphis* in Mizoram and provided new distributional records for *D. proarchos* and the first record of *D. biloreatus* from the state. Lalrinsanga et al. (2022) contributed to the morphology, molecular phylogenetics, and new localities of *Gonyosoma prasina* from the state. Malsawmdawngliana et al. (2022b) reported new distributional records of *Stoliczka vanhnuailianai*, which extended the distributional range of the species, and Bal et al. (2023) reported a new locality record of *Hebius venningi* in Murlen National Park of Mizoram. Recently, Biakzuala et al. (2024) reported the first-ever record of *Trimeresurus uetzi* for India, from the state of Mizoram, and Lalremsanga et al. (2024) confirmed the presence of *Malayopython reticulatus* in the state through molecular identification.

In Arunachal Pradesh, David et al. (2001) reported *Trimeresurus medoensis* from the Changlang District of the state. Zambre et al. (2009) reported the occurrence

of one of the three subspecies of *Protobothrops jerdonii* from the Eaglenest Wildlife Sanctuary which was the first record for India. Sheth & Zambre (2012) reported records of *Boiga gokool* for the first time from the western Kameng district of Arunachal Pradesh. Nath et al. (2021b) reported the first record of *Elaphe taeniura* from Itanagar Wildlife Sanctuary based on a road-killed specimen, and Nath et al. (2023) reported the first record of *Trachischium monticola* in the Lower Subansiri district of Arunachal Pradesh.

In Tripura, Nath et al. (2021c) reported the occurrence of *Boiga gokool* in the state for the first time based on a live specimen observed in the Khowai district. Deb et al. (2023) reported the first record of *Ferania sieboldii* from Udaipur town of Tripura. Also, recently, Chowdhury et al. (2024) and Deb et al. (2024a,b) provided new state and district records for *Trimeresurus salazar*, *Sinomicrurus gorei*, and *Pareas monticola* from Tripura.

In Manipur, Sinate et al. (2021) reported the first record of *Bungarus niger* from Moulbem village, Churachandpur district. Subsequently, Sinate et al. (2022) reported the first record of *Boiga quincunciata* from Rovakot village, Churachandpur district. Elangbam et al. (2022) reported the first record of *Lycodon jara* from Khoijuman Khullen village, Bishnupur district. Elangbam et al. (2023) reported the first record of *Trimeresurus mayae*, *T. salazar*, *T. erythrurus*, and *Protobothrops jerdonii* from Manipur, which extended the geographical range of these species and Hakim (2023) reported the first record of Chin Hills Keelback *Hebius venningi*, from Manipur based on a sighting of the species in the Senapati district. Additionally, Premjit et al. (2024) confirmed the occurrence of *Boiga cyanea* in Manipur, leaving Tripura as the only state where this species is yet to be recorded.

Additionally, Ahmed & Das (2006) for the first time reported the occurrence of *Rhabdophis nuchalis* in India from the Nagaland state. Dutta et al. (2013) presented new locality records for *Lycodon zawi* from Mizoram, Meghalaya, and Assam, extending the species' distributional range. Kundu et al. (2021) conducted molecular identity assessments and provided an updated distribution of *Psammodynastes pulverulentus* in northeastern India, and Vogel et al. (2022) extended the distribution of *Trimeresurus salazar* in northeastern India to Mizoram, Nagaland, and Sikkim. Also recently, Gerard et al. (2024) documented the first record of two venomous snake species from India: *Bungarus suzhenae* from the Nagaland-Manipur border and *Ovophis zayuensis* from Arunachal Pradesh.

New Genus and New Species

Over time, northeastern India has consistently played a significant role in enriching the global biodiversity by introducing numerous new species of snakes. This is evident from the fact that in the last decade, one new genus and 16 new snake species have been described from the region.

In Assam, Das et al. (2021) described a new natricine species, *Rhabdophis bindi*, which, until its discovery, was included within the *R. himalayanus* complex. The description of the species was based on specimens collected from the Cachar district of the state, and the distinctiveness of the species from its congeners was validated by morphological and molecular evidence.

In Mizoram, Vogel et al. (2017) described *Blythia hmuifang* with specimens recorded in Aizawl and Serchhip districts using morphological differences with its congeners. Giri et al. (2019) proposed a new genus, *Smithophis*, and added a new species, *S. atemporalis*, to the genus using morphological and molecular data. Lalronunga et al. (2021b) described the new species *Stoliczka vanhnuailianai* belonging to the Xenodermidae family from the Aizawl district, which was distinguished from its congener, *Stoliczka khasiensis* and from *Paraxenodermus borneensis* using distinct morphological features. Rathee et al. (2022) described a new green pit viper species, *Trimeresurus mayae* and Lalremsanga et al. (2022) described the new species *Herpetoreas murlen*, both from the Champhai district of Mizoram. Also recently, Mirza et al. (2024a) described *Smithophis mizoramensis*, the fifth species within the genus with specimens collected from Mizoram.

In Arunachal Pradesh, Bhosale et al. (2019) described the new species *Trachischium aptei* based on specimens collected from Pange camp, Talle Valley Wildlife Sanctuary. Captain et al. (2019) described the new species *Trimeresurus arunachalensis* based on a single specimen collected from Ramda, West Kameng district. Purkayastha et al. (2019) described the new species *Hebius lacrima* with a single specimen from Arunachal Pradesh. Bhosale et al. (2020) described the new species *Pareas kaduri* belonging to the Pareidae family. Das et al. (2020a) described the new natricine species *Smithophis arunachalensis*, restricting its presence to the Lower Dibang Valley and Changlang district. Later, Mirza et al. (2020) described the new pit viper species *Trimeresurus salazar* from Arunachal Pradesh.

Also, Pan et al. (2013) described a new pit viper species *Protobothrops himalayanus* based on specimens collected from southern Tibet, China, and Sikkim, and Slowinski et al. (2001) described a new wolf snake

species *Lycodon zawi* from Myanmar and northeastern India (Mizoram, Assam, and Meghalaya). Additionally, Mirza et al. (2024b) described a new species of vine snake, *Ahaetulla longirostris* from India with specimens collected from Bihar, Meghalaya, and Assam. This discovery invalidates the occurrence of *A. laudankia* in Assam reported by Purkayastha et al. (2021).

Rediscovery and Redescription

Field surveys by different workers have led to the rediscovery of some species believed to be extinct or not seen for a long time. Also, with the advancement in genetic science and with detailed observations, researchers could reexamine and redescribe some previously described species.

In Assam, Das et al. (2022) reported the rediscovery of *Oligodon melaneus* based on a male specimen collected from the Baksa district 112 years after its original description.

In Mizoram, Giri et al. (2019) transferred the species *Rhaphidophis bicolor* to the genus *Smithophis*. Biakzuala et al. (2020b) claimed the rediscovery of *Lycodon septentrionalis* after 60 years of its first collection from Mizoram. They confirmed the occurrence of the species in five different districts of the state. Lalbiakzuala & Lalremsanga (2020) rediscovered *Oligodon catenatus* after 165 years and briefly described a specimen collected from Tamdil wetland, Mizoram. Also, Lalronunga et al. (2020) redescribed the species *Hebius xenura* and transferred it to the genus *Herpetoreas*.

In Arunachal Pradesh, David et al. (2001) reported the occurrence of *Trimeresurus medoensis* in the Changlang district of the state. They also redescribed the type specimens along with an elaborated note that included information on distribution, diagnosis, variation, hemipenis, similar species, sexual dimorphism, etc., of the species. Mistry et al. (2007) redescribed the species *Lycodon gammiei* and provided evidence of it being a valid species. Das et al. (2020b) reported the rediscovery of the species *Hebius pealii* and used phylogenetic results as evidence to transfer it to the genus *Herpetoreas*.

Taxonomic Revision

Many snake species of northeastern India lie in complex groups that are hard to resolve due to their indistinguishable morphology. Various studies have tried to resolve these complexes with the help of advanced molecular techniques and morphological data. Vogel et al. (2011) evaluated the *Dendrelaphis pictus* population of India and resurrected the taxon *Dendrelaphis proarchos* for the northwestern (Indochina) form. Vogel

et al. (2020) assessed the *Pareas margaritophorus-macularius* complex and based on the morphological and genetic data, resurrected the name *Pareas andersonii* for the Indian (Mizoram & Nagaland), Myanmar and China populations as well as also resurrected the taxon *Pareas modestus* for the Indian (Mizoram) and southern Myanmar populations and elevated *P. macularius* to species level. Furthermore, Srikanthan et al. (2022) evaluated the *Ahaetulla prasina* population of northeastern India with which they resurrected the taxon *A. flavescens* and stated that the population of *A. prasina* complex found in northeastern India, in fact, represents *A. flavescens*. Biakzuala et al. (2022) evaluated the genus *Dendrelaphis* in Mizoram using morphological and molecular data. Based on this analysis, they validated the resurrection of *Dendrelaphis proarchos* and proposed that the specimen of *D. pictus* from Hainan, China be transferred to *D. proarchos*. Biakzuala et al. (2023a) evaluated the population of *Bungarus fasciatus* in Asia and suggested that there must be at least three different clades of *B. fasciatus* in Asia and that the distribution of true *B. fasciatus* is limited to Indo-Myanmar zone. Mirza et al. (2023) evaluated the Asian pit vipers (genus *Trimeresurus*) along with the revision of *Trimeresurus popeiorum* and restricted the distribution of the species to northeastern India, southern China, Bangladesh, and northern Myanmar. Additionally, the authors synonymized *T. yingjiangensis* with *T. popeiorum* based on shared morphological, genetic, and distributional data between the two species. Recently, Köhler et al. (2023) conducted molecular analysis and based on the low genetic divergence, placed *Boiga ochracea* in the synonymy of *Boiga multomaculata*, thereby identified two subspecies of *B. multomaculata* namely *B. multomaculata multomaculata* and *B. multomaculata ochracea* and described another new subspecies, *B. multomaculata septentrionalis*. Further, based on significant differences in morphology and genetic data, the authors resurrected the taxon *B. stoliczkae* elevating it to the species level and confined its distribution in India to Sikkim, Arunachal Pradesh, and Assam. Also recently, Biakzuala et al. (2023b) resurrected and elevated *Sinomicrurus gorei* to the species level restricting its distribution to eastern Assam, Manipur, Mizoram, and Nagaland in India. Additionally, Nguyen & Vogel (2024) revised the distribution of *Trimerodytes yunnanensis* and clarified that the specimen previously identified as *T. percarinatus* from northeastern India is, in fact, *T. yunnanensis*. Thus, this revision removes *T. percarinatus* from India's snake fauna list.

DISCUSSION

In the last two decades, comprehensive research efforts have been directed toward understanding the snake fauna of northeastern India. Several studies from different states and regions within the state have successfully reported species that were not recorded earlier, thereby extending the species' geographical range. Other studies have utilized morphological and molecular data and described 16 new species and one new genus from northeastern India within a span of 10 years (2013–2024) highlighting the potential of the region.

Moreover, studies conducted in some of the northeastern states have led to the rediscovery of four species believed to be extinct or undocumented for several decades. These species include *Oligodon melaneus* from Assam, *Herpetoreas pealii* from Arunachal Pradesh, and *Lycodon septentrionalis* and *Oligodon catenatus* from Mizoram. Additionally, studies using molecular data have also reexamined and redescribed four species from northeastern India, namely *Herpetoreas xenura*, *Smithophis bicolor*, *Trimeresurus medoensis*, and *Lycodon gammiei*.

Various workers have also contributed by carrying out taxonomic revisions of different complex species groups found in northeastern India, resulting in the discovery of cryptic species and the resurrection of several taxa, thus enhancing our knowledge of the snake fauna of the region.

From our overall analysis of existing literature, we estimate that northeastern India is home to 126 species of snakes, representing 46 genera and 12 families. According to the IUCN Red List, 78 of these species are of 'Least Concern', 16 species are 'Data Deficient', seven species are 'Vulnerable', five species are 'Near Threatened', and 20 species are yet to be evaluated. Additionally, certain genera, such as *Cyclophiops*, *Gongylosoma*, *Herpetoreas*, *Hebius*, *Liopeltis*, *Traschischium*, *Trimerodytes*, and *Stoliczka*, have received minimal attention and require further investigation. Also, there exists a discernible gap in studies conducted in states such as Manipur, Meghalaya, and Tripura. Despite being home to diverse ecosystems and potential habitats for various snake species, these states have received limited attention in terms of systematic studies. The dearth of comprehensive research in these states poses a considerable challenge in accurately assessing their snake diversity and understanding the ecological dynamics within their respective habitats.

Northeastern India, renowned for its distinctive and captivating geographical features is predominantly characterized by enchanting hilly terrain. It is well-known for being home to 160 scheduled tribes and over 400 other tribal and sub-tribal communities and groups (D'Souza 2018). Every part of the region, including Cherrapunji, with the highest annual rainfall at 11,465 mm, receives over 1,000 mm of rainfall (Dikshit & Dikshit 2014). The combination of these factors collectively impacts the accessibility to a significant part of the region, thereby imposing limitations on extensive fieldwork and comprehensive studies.

Furthermore, the stringent wildlife laws to safeguard the region's diverse flora and fauna pose challenges in designing and conducting studies, as specimen collection for bona fide reasons is a cornerstone of taxonomic studies. Nevertheless, establishing rules and initiatives to better streamline the permit acquisition process and fund allocations for conservation-oriented academic research and conservation projects would act in the interest of inventorying, monitoring, and conserving biodiversity, and hence, prove immensely advantageous to the region and science as a whole. This would facilitate ophidian studies in the region and enhance our understanding of the subject, to identify and resolve the current priorities of snake conservation in northeastern India.

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