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Cover: Oil painting of Humpback Whale *Megaptera novaeangliae*. © R. Mahesh.

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ARTICLE

Herpetofauna of the Chitwan-Annapurna Landscape, Nepal: a comprehensive species checklist including occurrence in protected areas, with suggested conservation recommendations

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Abstract: We present an up-to-date species list of all known amphibians and reptiles of the Chitwan-Annapurna Landscape (CHAL), comprising a total of 140 species that includes 35 amphibian and 105 reptile species, representing 63% of amphibians and 71% of reptiles known from Nepal. Of the six protected areas in the CHAL, Chitwan National Park has the highest species richness of herpetofauna (n=90), followed by Annapurna Conservation Area (n = 73 species), Parsa National Park (n = 58), Shivapuri-Nagarjun National Park (n = 53), Langtang National Park (n = 47) and Manaslu Conservation Area (n = 45). Data from the IUCN Red List shows that the herpetofauna of the CHAL includes four Critically Endangered reptile species, six Endangered species (five reptiles and one amphibian) and eight Vulnerable species (five reptiles and three amphibians). We recommend more inclusive conservation measures to ensure the long-term conservation of the full range of biodiversity in the Chitwan-Annapurna Landscape.

Keywords: Amphibians, biodiversity, connectivity, distribution pattern, endemism, reptiles, species richness, type locality Himalaya.

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INTRODUCTION

Anthropogenic activities have accelerated the loss of global biodiversity, and there are growing concerns that we are experiencing a sixth mass extinction event (Pimm et al. 2014; Chen et al. 2025). Globally, over one million species are at risk of extinction (Tollefson 2019). The Living Planet Report documented that population sizes of wild vertebrates have decreased, on average, by 73% between 1970 and 2020 (WWF 2024).

Amphibians and reptiles are among the vertebrate groups most vulnerable to ongoing environmental change (Cordier et al. 2021). As ectotherms, their physiology, distribution, and survival are linked to climatic conditions, rendering them particularly sensitive to habitat degradation, land-use change, and climate warming (Frishkoff et al. 2015). Globally, 21% of reptile species are threatened with extinction (Cox et al. 2022), while amphibians face even higher risks, with more than 41% of species currently threatened (Luedtke et al. 2023). Despite this vulnerability, herpetofauna remain consistently underrepresented in conservation planning and policy, particularly outside formal protected areas (PAs).

Vertebrate populations in human-dominated landscapes, particularly those outside of PAs, are declining at rates that are, on average, five times higher than inside PAs (Nowakowski et al. 2023). The consequences of losing species and their cascading effects can lead to regional biodiversity collapses (Young et al. 2016; Carné & Vieties 2024). PAs are essential for halting biodiversity loss, but their effectiveness depends on strategic location, management quality, and the specific anthropogenic and environmental pressures they face (Geldmann et al. 2019). In Nepal, conservation outside of the PAs is often not a priority (Gautam et al. 2022; Bhattarai et al. 2025b).

PAs have been established to preserve species, ecosystems, and genetic diversity (MFSC 1988; Bhattarai et al. 2025c). However, they are often not complete ecological units, and in response to the growing challenges of long-term biodiversity conservation (for example, identifying and protecting future climate refugia, and understanding species' range shifts), various governments have established entire conservation landscapes. In Nepal, five such priority landscapes exist. One is the Chitwan-Annapurna Landscape (CHAL), which connects habitats and PAs across the diverse elevational gradients of central Nepal. The CHAL extends from the lowlands of the Terai to the trans-Himalayan region and includes six PAs (MFSC 2015). Since its establishment, the governance and management of the CHAL have been guided by 10-year plans (MFSC 2015). The current 2016–2025 Strategy and Action Plan is now due for renewal, and it has been observed that its focus on the conservation of selected large mammal species such as Greater One-horned Rhinoceros and Bengal Tiger, in the lowlands, and Snow Leopard, in the High Himalayas, is at the expense of the protection of lesser-known species, including amphibians and reptiles.

Geographically, the CHAL is located in central Nepal and includes seven Global 200 priority ecoregions, recognized for high biodiversity (Olson et al. 2001; Olson & Dinerstein 2002). The geographical position of the CHAL, its environmental and biogeographic heterogeneity, supports floral and faunal assemblages comprising elements from both the eastern and western Himalayas (KMTNC 1998; NTNC 2020; Bhattarai et al. 2025b).

Amphibians and reptiles are not typically considered among the priority species for conservation and management (Bhattarai et al. 2017, 2020; Rawat et al. 2020). Exceptions include Gharial *Gavialis gangeticus*, Burmese python *Python bivittatus*, and Golden Monitor Lizard *Varanus flavescens*; these species are listed in Schedule-I as protected priority species in Nepal's National Parks and Wildlife Conservation Act, 1973 (2029 BS).

Knowledge of the herpetofauna of the CHAL remains limited, despite recent field surveys that have resulted in the description of five previously unknown species (Bhattarai et al. 2025a,b) and indications that additional undescribed taxa are likely present. Undescribed species are inherently vulnerable, as they lack formal recognition and are therefore excluded from conservation assessments and management frameworks (Lees & Pimm 2015; Moura & Jetz 2021; Liu et al. 2022; Carné & Vieties 2024; Li et al. 2025). Consequently, many amphibian and reptile species may face extinction before they are formally documented. Strengthening the knowledge base is therefore essential for informing future conservation planning, particularly as Nepal revises its landscape-level conservation strategies under accelerating climate and land-use change. This study addresses a knowledge gap by providing an updated checklist of amphibians and reptiles of the CHAL, including information on species occurrence within PAs and identification of conservation priorities.

METHODS

Study Area

The Chitwan-Annapurna Landscape (CHAL) was conceived in 1999 to maintain north-south ecological connectivity through the range of eco-physiographic zones existing across Nepal's significant elevational range. The CHAL covers 32,090 km^2, almost 22% of Nepal's land area, across 19 districts (Arghakhanchi, Gulmi, Palpa, Baglung, Parbat, Myagdi, Mustang, Syangja, Kaski, Tanahun, Lamjung, Gorkha, Manang, Rasuwa, Nuwakot, Dhading, Nawalparasi, Chitwan, and Makwanpur). It encloses the entire Gandaki river basin and its tributaries namely: Kali Gandaki, Seti, Marsyangdi, Daraundi, Budhi Gandaki, Trishuli, and Narayani/East Rapti. Altitudinally, the CHAL extends from the tropical lowland Terai (200m) through the alpine high mountains to the cold and dry trans-Himalayan region (above 4,000 m) (MFSC 2015). The highest peaks within the CHAL exceed 8,000 m. The CHAL includes six protected areas including four national parks (Langtang, Chitwan, Shivpuri-Nagarjun, and Parsa), and two conservation areas, namely Annapurna and Manaslu (Figure 1).

Compilation of Species List and Threat Status

We compiled a list of all amphibian and reptile species known to be present in the CHAL (Table 1) based on direct field observations and published records (including those of recently described species (Bhattarai et al. 2025a,b).

Direct observations were made during visual encounter surveys (Heyer et al. 1994) at 12 survey locations positioned along elevational and habitat gradients within the CHAL. These survey locations were established by the Government of Nepal and other conservation agencies in 2016 to study the impact of climate change on local fauna and flora across the landscape. Given the complex terrain, transit between the 12 survey locations was often by circuitous routes; and direct observations of herpetofauna observed as we moved through the diverse habitats within the CHAL were also documented (Image 1).

All individuals recorded as direct observations were identified to species level based on morphological

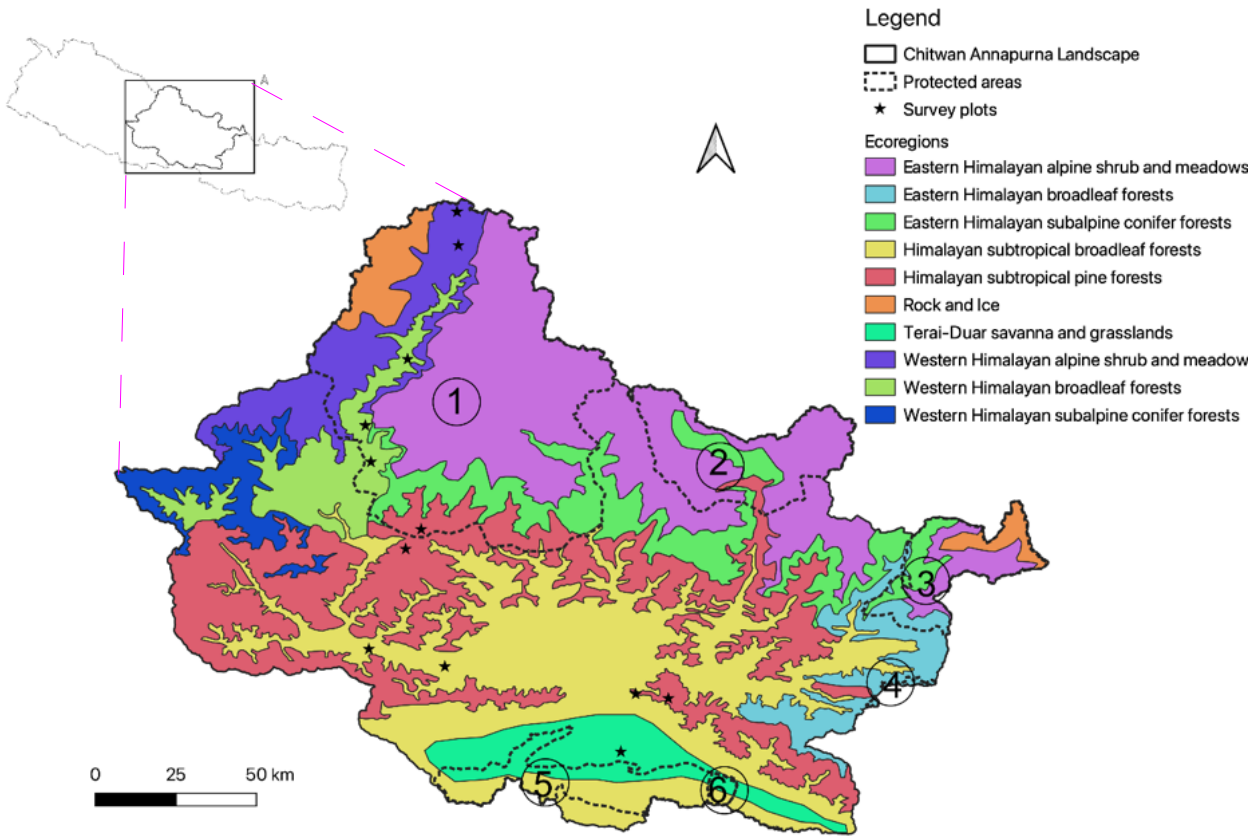

Figure 1. Chitwan-Annapurna Landscape including ecoregions (coloured shading) and protected areas. Dotted lines indicate PA boundaries: 1—Annapurna Conservation Area | 2—Manaslu Conservation Area | 3—Langtang National Park | 4—Shivapuri Nagarjun National Park | 5—Chitwan National Park | 6—Parsa National Park. Inset shows the location of the Chitwan-Annapurna Landscape within Nepal.

characteristics, and photographic documentation, using standard field guides, and taxonomic literature (Smith 1935; Schleich & Kästle 2002; Shah & Tiwari 2004; Whitaker & Captain 2004; Lajmi et al. 2016; Das & Das 2017; David & Vogel 2021; Garg & Biju 2021; Gowande et al. 2021; Khatiwada et al. 2021; Amarasinghe et al. 2022; Vogel et al. 2022; Köhler et al. 2023).

Records contributing to our checklist of the CHAL were also compiled from the following published works: Smith (1951), Swan & Levinton (1962), Kramer (1977), Ouboter (1986), Nanhoe & Ouboter (1987), Zug & Mitchell (1995), Tillack & Grossmann (2001), Schleich & Kästle (2002), Tillack et al. (2003), Shah & Tiwari (2004), Aryal et al. (2010), Pokhrel et al. (2012), Kästle et al. (2013), Pokhrel & Thakuri (2017), Shrestha & Shah (2017), Bhattarai et al. (2018, 2020, 2025c), Pandey et al. (2018), Baral et al. (2020), Gautam et al. (2020), Thapa & Shah (2020), and Baral & Kadariya (2025).

We excluded two amphibian, three lizard, and three snake species reported from the Annapurna Conservation Area by Baral & Kadariya (2025) from Table 1. These species, and the reasons for their exclusion are the skink, *Ablepharus ladacensis*: recent molecular studies (Bragin et al. 2024; Bragin et al. 2025) restrict this species to the western Himalaya of India. Earlier observations of *A. ladacensis* from Nepal are likely to be *A. himalayanus* or a new species yet to be described. Similarly, the agamid lizard, *Japalura major* is currently known to be geographically restricted to the western Himalaya of India and Pakistan (Wang et al. 2019). Consequently, earlier records of *Japalura major* from CHAL need further verification and may represent misidentifications of *J. tricarinata*. Likewise, Nepal Bent-toed Gecko *Cyrtodactylus nepalensis* is known to be distributed in far-western Nepal and reported observations of this species in Annapurna Conservation Area most likely represent *C. chitwanensis,* recently described by Bhattarai et al. (2025a). The frogs *Polypedates himalayensis* and *Zhangixalus smaragdinus* (syn. *Rhacophorus maximus*) are representative species of the eastern Himalaya, with their westernmost known distribution limited to eastern Nepal (Pradhan et al. 2018; Khatiwada et al. 2021). Reports of *P. himalayensis* from the Annapurna Conservation Area are likely to reflect misidentifications of *P. maculatus*. There are no verifiable historical records of *Z. smaragdinus* from CHAL; therefore, this species was excluded from the present checklist. However, there is a report of this species from Arghakhanchi District in western Nepal (Shah & Tiwari 2004).

The snakes—*Trimerusurus albolabris*, *T. erythrurus*, and *T. yunannensis*—have historical unverified records from Nepal and recent taxonomic studies suggest that such historical records represent misidentifications of the congener *T. sepentrionalis* which has its type locality in the CHAL (Sharma et al. 2013; Vogel et al. 2022). The distribution and taxonomy of *Trimerusurus* sp. in Nepal is poorly understood and requires further work, including independent verified confirmation of their presence in Nepal.

For taxonomic nomenclature, Frost (2025) was used for amphibians, and Uetz et al. (2025) was followed for reptiles. However, following the taxonomic revision by Bragin et al. (2024), we treated *Ablepharus capitaneus* rather than *Scincella capitanea*. We followed Jablonski et al. (2026) for *Gloydius* from CHAL, Nepal.

The conservation status of each species listed in Table 1 is reported using the IUCN Red List categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) (IUCN 2025). Recently described species which have not yet been listed were treated as not assessed (NA).

RESULTS

Species Richness

We documented a total of 140 herpetofaunal species from the Chitwan–Annapurna Landscape (CHAL), comprising 35 amphibian species and 105 reptile species (Table 1, Image 2–4). Many species previously described in the literature were also observed during field work (indicated by the number '1' in Table 1), however, one species of snake, the Common Slug Snake *Pareas* cf. *monticola* (Image 4F), and four species of gecko, not previously reported as occurring in the area, were observed during our field work. Descriptions of all four geckos have recently been published (Bhattarai 2025a,b).

The 140 species presented in Table 1 account for 63% of Nepal's known amphibian species (Frost 2025) and 71% of the country's reptile species (Uetz et al. 2025). The amphibians included 35 species of frogs and toads and one species of caecilian. Among the recorded amphibians, the family Dicroglossidae was the most speciose, with 16 species, followed by Ranidae (five species), Microhylidae, and Rhacophoridae (four species each), Bufonidae (three species), Megophryidae (two species), and Ichthyophiidae (one species). Among the reptiles, snakes comprised the largest group with 62 species, followed by lizards with 29 species, turtles with

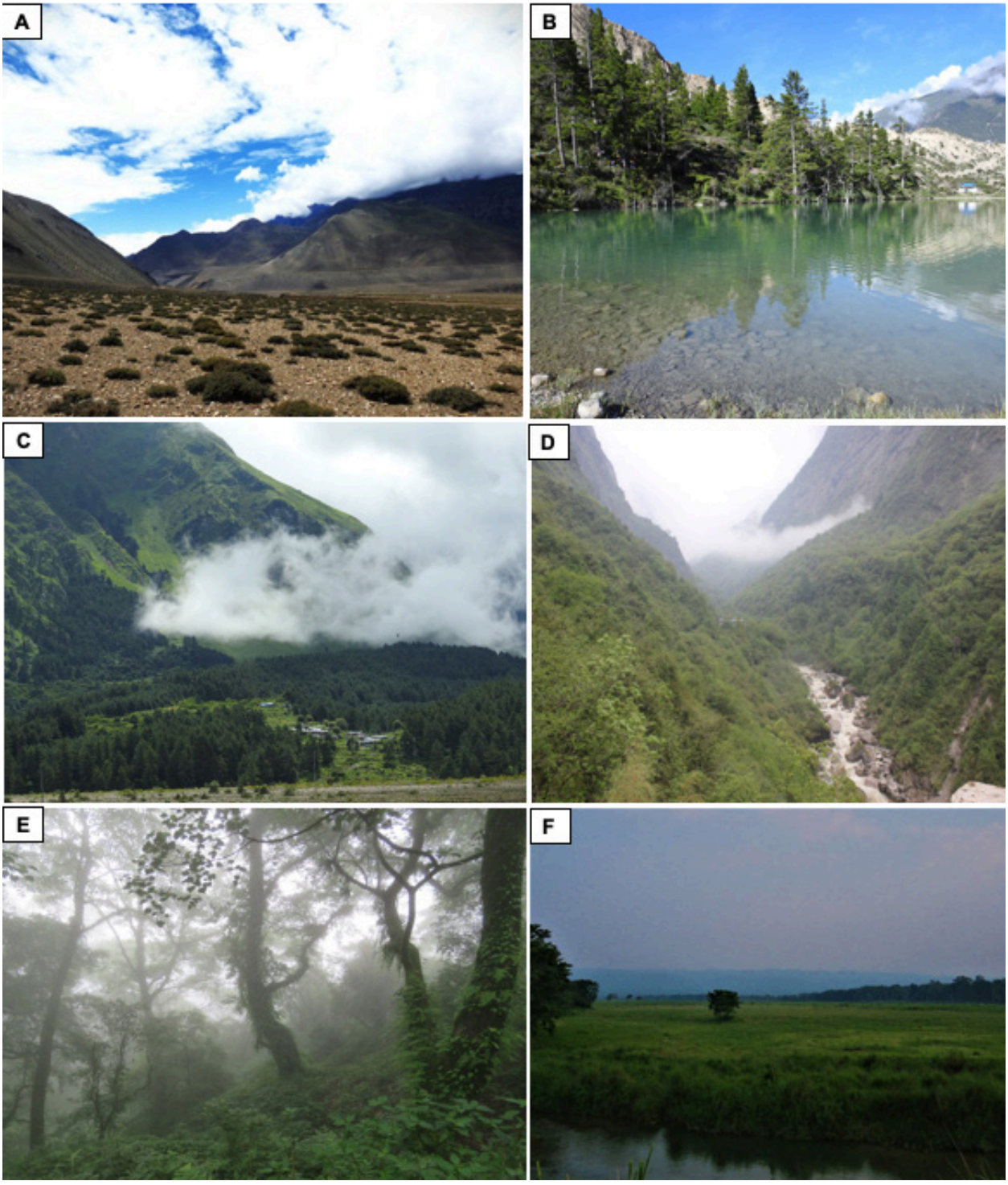

Image 1. Representative habitats of Chitwan-Annapurna Landscape: A—Typical high-altitude habitat from Upper Mustang where *Phrynocephalus theobaldi* occurs | B—Type locality of Mustang Frog, Dhumba Tal | C,D—Typical mid-hills forest habitat in Annapurna Conservation Area | E—Cloud forest habitat of upper Chitwan, type locality of Mahabharat Cascade Frog | F—Grassland habitat of Chitwan National Park. © Santosh Bhattarai.

11 species, and crocodiles with two species. The 29 lizard species comprised seven species of agamids, 10 species of geckos belonging to two families (including four newly described species recorded during field surveys for this study), ten species of skinks, and two species of monitor lizards (Table 1).

Table 1. List of herpetofauna species in Chitwan-Annapurna Landscape (CHAL) with their IUCN Red List status and noting their recorded presence (+) in the six Protected areas of the CHAL.

	Species name	Common name	Red List	ACA	MCA	LNP	SNNP	CNP	PNP	Data sources	Remarks
AMPHIBIANS											
Family: Bufonidae Gray, 1825											
1	*Duttaphrynus himalayanus* (Günther, 1864)	Himalayan Toad	LC	+	+	+	+			1,2,3,4	
2	*Duttaphrynus melanostictus* (Schneider, 1799)	Common Asian Toad	LC	+	+	+	+	+	+	1,2,3,4,5,8	
3	*Firouzophrynus stomaticus* (Lütken, 1864)	Marbled Toad	LC		+			+	+	1,2,3,4,5,8	
Family: Microhylidae Günther, 1858 (1843)											
4	*Microhyla nilphamariensis* Howlader, Nair, Gopalan & Merilä, 2015	Nilphamari Narrow-mouth Frog	LC	+		+	+	+	+	1,5,8	
5	*Uperodon globulosus* (Günther, 1864)	Globular Balloon Frog	LC					+	+	1,2,3,5,8	
6	*Uperodon taprobanicus* (Parker, 1934)	Painted Frog	LC					+	+	1,2,3,5,8	
7	*Uperodon systoma* (Schneider, 1799)	Marbled Balloon Frog	LC						+	1,2,3	
Family: Dicroglossidae Anderson, 1871											
8	*Euphlyctis adolfi* (Gunther, 1860)	Skittering Frog	LC	+		+	+	+	+	1,8	
9	*Fejervarya orissaensis* (Dutta, 1997)	Odisha Cricket Frog	LC					+	+	1,8	
10	*Hoplobatrachus tigerinus* (Daudin, 1802)	Indian Bull Frog	LC	+			+	+	+	1,2,3,5,8	
11	*Minervarya chilapata* Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed & Dutta, 2009	Chilapata Rainpool Frog	VU					+		1,8,9	
12	*Minervarya nepalensis* (Dubois, 1975)	Nepal Cricket Frog	LC	+	+	+	+	+		1,2,3,4,8	
13	*Minervarya pierrei* (Dubois, 1975)	Pierre's Cricket Frog	LC					+		1,2,3,8	
14	*Minervarya* cf *syhadrensis* (Annandale, 1919)	Syhadra Cricket Frog	LC	+				+	+	1,2,3,4,8	
15	*Minervarya teraiensis* (Dubois, 1984)	Terai Cricket Frog	LC					+	+	1,2,3,8	
16	*Nanorana blanfordii* (Boulenger, 1882)	Blandford's Paa Frog	LC	+	+	+				1,2,3,4	
17	*Nanorana liebigii* (Günther, 1860)	Liebig's Paa Frog	LC	+	+	+	+			1,2,3,4	
18	*Nanorana minica* (Dubois, 1975)	Nepal Paa Frog	LC	+						4	
19	*Nanorana* cf *parkeri* (Stejneger, 1927)	High Himalaya Paa Frog	LC	+	+					1,2,3,4	
20	*Nanorana polunini* (Smith, 1951)	Langtang Paa Frog	LC			+				1,2,3,4	
21	*Nanorana rostandi* (Dubois, 1974)	Mustang Paa Frog	LC	+	+					1,2,3,4	
22	*Ombrana sikimensis* (Jerdon, 1870)	Sikkim Frog	LC	+	+					1,4	
23	*Sphaerotheca maskeyi* (Schleich & Anders, 1998)	Maskey's Burrowing Frog	LC	+				+	+	1,4	
Family: Megophryidae Bonaparte, 1850											
24	*Scutiger boulengeri* (Bedriaga, 1898)	Boulenger's High Altitude Toad	LC	+	+					1,4	
25	*Xenophrys zhangi* (Ye & Fei, 1992)	Zhang's Horned Toad	LC	+	+	+	+			1,4	
Family: Ranidae Batsch, 1796											
26	*Amolops formosus* (Günther, 1876)	Assam Cascade Frog	LC	+	+	+	+			1,2,3,4	
27	*Amolops mahabharatensis* Khatiwada, Shu, Wang, Zhao, Xie & Jiang, 2020	Mahabharat Torrent Frog	VU	+	+	+	+	+	+	1,4	
28	*Amolops monticola* (Anderson, 1871)	Mountain Cascade Frog	EN	+						1,4	
29	*Hylarana chitwanensis* (Das, 1998)	Chitwan Frog	DD					+		8	
30	*Hylarana tytleri* Theobald, 1868	Yellow-striped Frog	LC					+		8	
Family: Rhacophoridae Hoffman, 1932 (1858)											
31	*Chirixalus dudhwaensis* Ray, 1992	Dudhwa Reed Frog	VU					+		8	

	Species name	Common name	Red List	ACA	MCA	LNP	SNNP	CNP	PNP	Data sources	Remarks
32	*Polypedates maculatus* (Gray, 1830)	Common Tree Frog	LC	+	+	+	+	+	+	1,2,3,4,5,8	
33	*Polypedates taeniatus* (Boulenger, 1906)	Six-lined Bush Frog	LC					+		1,2,3,8	
34	*Polypedates zed* (Dubois, 1987)	Narayanghat Whipping Frog	DD							1,2,3,8	From Narayan-ghat
Family: Ichthyophiidae Taylor, 1968											
35	*Ichthyophis sikkimensis* Taylor, 1960	Sikkim Caecilian	LC	+						1, 10	Chitwan, Dhading, Palpa and Kaski districts
REPTILES											
Family: Crocodylidae Cuvier, 1807											
36	*Crocodylus palustris* Lesson, 1831	Mugger Crocodile	VU					+	+	2,3,5,9	
Family: Gavialidae Adams 1854											
37	*Gavialis gangeticus* (Gmelin, 1789)	Gharial	CR					+		2,3,9	
Family: Geoemydidae Theobald 1868											
38	*Batagur dhongoka* (Gray, 1834)	Three-striped Roofed Turtle	CR					+		2,3,9	
39	*Cyclemys gemelli* Fritz, Guicking, Auer, Sommer, Wink & Hundsdörfer, 2008	Assam Leaf Turtle	NT							11	Hetauda
40	*Melanochelys tricarinata* (Blyth, 1856)	Tricarinate Hill Turtle	EN					+	+	2,3,8,12	
41	*Melanochelys trijuga* (Schweigger,1812)	Black Pond Turtle	LC					+	+	2,3,8,12	
42	*Pangshura smithii* (Gray, 1863)	Brown Roofed Turtle	NT					+		2,3,8,12	
43	*Pangshura tecta* (Gray, 1830)	Indian Roofed Turtle	VU					+		2,3,8,12	
44	*Pangshura tentoria* (Gray, 1834)	Indian Tent Turtle	LC					+		2,3,8,12	
Family: Testudinidae Batsch, 178											
45	*Indotestudo elongata* (Blyth, 1854)	Elongated Tortoise	CR					+	+	2,3,5,8,12	
Family: Trionychidae Gray, 1835											
46	*Chitra indica* (Gray 1831)	Narrow-headed Softshell Turtle	EN					+		2,3,8,12	
47	*Lissemys punctata* (Bonnaterre, 1789)	Indian Flapshell Turtle	VU					+	+	2,3,8,12	
48	*Nilssonia gangetica* (Cuvier, 1825)	Gangetic Softshell Turtle	EN					+		2,3,8,12	
49	*Nilssonia hurum* (Gray, 1830)	Peacock Softshell Turtle	EN					+		2,3,8,12	
Family: Agamidae Gray, 1827											
50	*Calotes vultousus* (Harlan, 1825)	Common Garden Lizard	LC	+	+	+	+	+	+	1,8	
51	*Japalura tricarinata* (Blyth, 1853)	Three-keeled Mountain Lizard	LC	+	+	+	+			1,2,3,4, 8	
52	*Japalura variegata* (Gray, 1853)	Variagated Lizard	LC	+			+			1,2,3,4,12	
53	*Laudakia tuberculata* (Gray, 1827)	Rock Lizard	LC	+	+	+		+		1,2,3,4,12	
54	*Phrynocephalus theobaldi* (Blyth, 1863)	Toad-headed Agama	LC	+						1,2,3,4	
55	*Sitana fusca* Schleich & Kästle,1998		CR						+	1,2,3,5,12	
56	*Sitana sivalensis* Schleich, Kästle & Shah, 1998	Sivalik Fan-throated Lizard	LC					+		9	
Family: Eublepharidae Boulenger, 1883											
57	*Eublepharis macularius* (Blyth, 1854)	Common Leopard Gecko	LC							12	Nawalpur
Family: Gekkonidae Gray, 1825											
58	*Cyrtodactylus annapurnaensis* Bhattarai,Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	ACAP Bent-toed Gecko	NA	+						1, 6	

	Species name	Common name	Red List	ACA	MCA	LNP	SNNP	CNP	PNP	Data sources	Remarks
59	*Cyrtodactylus chitwanensis* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	Chitwan Bent-toed Gecko	NA							1,6	Chitwan, Tanahun
60	*Cyrtodactylus karanshahi* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	Karan's Bent-toed Gecko	NA		+					1,6	Gorkha
61	*Cyrtodactylus makwanpurgadhiensis* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Olson, Hogan & Wright, 2025	Makwanpur Gadhi Bent-toed Gecko	NA							1,7	Makwan-pur
62	*Hemidactylus* cf. *kushmorensis* Murray, 1884	Kushmore Gecko	NA	+			+	+	+	1,9	
63	*Hemidactylus flaviviridis* (Rüppell, 1835)	Yellow-bellied House Gecko	LC	+		+	+	+	+	1,2,3,4,5,8, 12	
64	*Hemidactylus frenatus* (Duméril & Bibron, 1836)	Common House Gecko	LC	+			+	+	+	1,2,3,4,5, 8,12	
65	*Hemidactylus garnotii* (Duméril & Bibron, 1836)	Fox Gecko	LC	+		+	+			1,2,3,4	
66	*Hemidactylus platyurus* (Schneider, 1797)	Flat-tailed Gecko					+			1, 4	
Family: Scincidae Gray, 1825											
67	*Ablepharus himalayanus* (Günther, 1864)	Himalayan Ground Skink	LC	+	+	+				1,2,3,4	
68	*Ablepharus mahabharatus* (Eremchenko, Shah & Panfilov, 1998)	Mahabharat Ground Skink	DD				+			1,2,3,	Makwan-pur
69	*Ablepharus capitaneus* (Ouboter, 1986)	Large Ground Skink	LC	+						1,2,3,4	
70	*Ablepharus nepalensis* (Eremchenko & Helfenberger, 1998)	Nepal Ground Skink	DD	+	+	+	+	+		1,2,3,4	
71	*Ablepharus sikimmensis* (Blyth, 1854)	Sikkim Ground Skink	LC	+	+	+	+	+		1,2,3,4	
72	*Eutropis carinata* (Schneider, 1801)	Common Ground Skink	LC	+	+	+	+	+	+	1,2,3,4	
73	*Eutropis macularia* (Blyth, 1853)	Bronze Ground Skink	LC	+				+	+	1,2,3,4	
74	*Eutropis trivittata* (Hardwicke & Gray, 1827)	Striped-ground skink	LC					+	+	1,2,3	
75	*Riopa albopunctata* (Gray, 1846)	White-spotted Supple Skink	LC					+	+	1,2,3	
76	*Sphenomorphus maculatus* (Blyth, 1853)	Spotted Forest Skink	LC	+		+	+	+	+	1,2,3,4,5, 8,12	
Family: Varanidae Merrem, 1820											
77	*Varanus bengalensis* (Daudin, 1802)	Bengal Monitor	NT	+	+	+	+	+	+	1,2,3,5, 8,12	
78	*Varanus flavescens* (Hardwicke & Gray, 1827)	Golden Monitor	EN	+				+	+	1,2,3,4, 5,8, 12	
Family: Erycidae Bonaparte, 1831											
79	*Eryx conicus* (Schneider, 1801)	Common Sand Boa	NT					+	+	1,2,3,5, 8,12	
80	*Eryx johnii* (Russell, 1801)	Red Sand Boa	NT					+	+	1,5,8	
Family: Pythonidae Fitzinger, 1826											
81	*Python bivittatus* Kuhl, 1820	Burmese Python	VU	+	+	+	+	+	+	1,2,3,4,5, 8,12	
Family: Colubridae Oppell, 1811											
82	*Ahaetulla laudankia* Deepak, Narayanan, Sarkar, Dutta & Mohapatra, 2019	Laudanka Vine Snake	LC					+		8,13	
83	*Ahaetulla longirostris* Mirza, Pattekar, Verma, Stuart, Purkayastha, Mohapatra & Patel, 2024	Long-snout Vine Snake	NA					+		1, 8	
84	*Anguiculus rappi* (Günther, 1860)	Himalayan Striped-necked Snake	LC	+	+	+	+			1,2,3,4	

	Species name	Common name	Red List	ACA	MCA	LNP	SNNP	CNP	PNP	Data sources	Remarks
85	*Boiga forsteni* (Duméril, Bibron and Duméril, 1854)	Forsten's Cat Snake	LC						+	1,4	
86	*Boiga stoliczkae* (Wall, 1909)	Tawny Cat Snake	LC	+	+	+	+	+	+	1,2,3,4,8, 12	
87	*Boiga siamensis* (Nutaphand, 1871)	Siamese Cat Snake	LC					+		1, 8, 12,14	
88	*Boiga trigonata* (Schneider, 1802)	Common Cat Snake	LC	+		+	+	+	+	1,2,3,4,5,8, 12,14	
89	*Boiga multifasciata* Blyth, 1861	Many-banded Cat Snake	LC	+	+	+	+			1,2,3,4	
90	*Boiga westermanni* (Reinhardt, 1863)	Indian Egg-eating Snake	LC					+	+	2,3,8	
91	*Chrysopelea ornata* (Shaw, 1802)	Ornate Flying Snake	LC					+		1,2,3,5,8, 12, 14	
92	*Coelognathus helena* (Daudin, 1803)	Common Trinket Snake	LC	+			+	+	+	1,2,3,4,5,8, 12,14	
93	*Coelognathus radiatus* (Boie, 1827)	Copper-headed Trinket Snake	LC	+		+	+	+	+	1,2,3,4,5,8, 12,14	
94	*Dendrelaphis tristis* (Daudin, 1803)	Common Bronze-back Tree Snake	LC	+	+	+	+	+	+	1,2,3,4,5,8, 12,14	
95	*Dendrelaphis proarchos* Wall, 1909	Eastern Bronze-back Tree Snake	NA					+		1, 8	
96	*Elaphe hodgsoni* (Günther, 1860)	Himalayan Trinket Snake	LC	+	+	+	+			1,2,3,4	
97	*Gongylosoma calamaria* (Günther, 1858)	Calamaria Reed Snake	LC					+		8	
98	*Lycodon aulicus* (Linnaeus, 1758)	Common Wolf Snake	LC	+			+	+	+	1,2,3,4,5,8, 12,14	
99	*Lycodon jara* (Shaw, 1802)	Twin-spotted Wolf Snake	LC					+	+	1,2,3,5,8, 12,14	
100	*Lycodon striatus* (Shaw, 1802)	Barred Wolf Snake	LC					+		1,8,12,14	
101	*Oligodon erythrogaster* Boulenger, 1907	Nagarkot Kukri Snake	NT	+	+	+	+			1,2,3,4	
102	*Oligodon kheriensis* Acharji & Ray, 1836	Coral Red Kukri Snake	LC					+		8,14	
103	*Oligodon russelius* (Daudin, 1803)	Russell's Kukri Snake	NA	+				+	+	1,2,3,4,5,8, 12,14	
104	*Oreocryptophis porphyraceus* (Cantor, 1839)	Black-banded Trinket Snake	LC	+		+	+			1,2,3,4	
105	*Ptyas mucosa* (Linnaeus, 1758)	Common Rat Snake	LC	+	+	+	+	+	+	1,2,3,4,5,8, 12,14	
106	*Sibynophis collaris* (Gray, 1853)	Collared Black-headed Snake	LC	+	+	+	+			1,2,3,4	
107	*Sibynophis sagittarius* (Cantor, 1839)	Cantor's Black-headed Snake	LC					+	+	1,2,3,4	
Family: Homalopsidae Bonaparte, 1845											
108	*Enhydris enhydris* (Schneider, 1799)	Rainbow Water Snake	LC					+		2,3,8,14	
109	*Ferania sieboldii* (Schlegel, 1837)	Siebold's Water Snake	LC					+		2,3,8,14	
Family: Psammophidae Bourgeois, 1968											
110	*Psammophis condanarus* Merrem, 1820	Common Sand Snake	LC					+		8	
Family: Psammodynastidae Das, Greenbaum, Brecko, Pauwels, Ruane, Pirro & Merilä, 2024											
111	*Psammodynastes pulverulentus* (Boie, 1827)	Common Mock Viper	LC					+		8,14	
Family: Natricidae Bonaparte, 1838											
112	*Amphiesma stolatum* (Linnaeus, 1758)	Striped Keelback Snake	LC	+	+	+	+	+	+	1,2,3,4,5,8, 12,14	
113	*Atretium schistosum* (Daudin, 1803)	Olive Keelback Snake	LC							1,8	Nawalpur
114	*Fowlea piscator* (Schneider, 1799)	Checkered Keelback Snake	LC	+	+	+	+	+	+	1,2,3,4,5,8, 12,14	
115	*Fowlea sanctijohannis* (Boulenger, 1890)	St. John's Keelback Snake	LC	+	+					1,4	

	Species name	Common name	Red List	ACA	MCA	LNP	SNNP	CNP	PNP	Data sources	Remarks
116	*Herpetoreas platyceps (*Blyth, 1854)	Mountain Keelback Snake	LC	+	+	+	+	+		1,2,3,4,8	
117	*Rhabdophis helleri* Schmidt, 1925	Red-necked Keelback Snake	NA	+	+	+	+	+		1,2,3,4,8	
118	*Rhabdophis himalayanus* (Günther, 1864)	Himalayan Keelback Snake	LC	+	+	+	+			1,2,3,4	
119	*Trachischium laeve* Peracca, 1904	Olive Worm-eating Snake	LC	+	+	+	+			1,2,3,4	
120	*Trachischium tenuiceps* (Blyth, 1854)	Yellow-bellied Worm-eating Snake	DD	+	+	+	+			1,2,3	
121	*Xenochrophis cerasogaster* (Cantor, 1839)	Painted Keelback Snake	VU					+		8	
Family: Pseudoxenodontinae McDowell, 1987											
122	*Pseudoxenodon macrops* (Blyth, 1855)	False Cobra	LC	+		+	+			1,2,3,4	
Family: Pareidae Romer, 1956											
123	*Pareas monticola* (Cantor, 1839)	Common Slug Snake	LC							1	Chitwan
Family: Elapidae F. Boie, 1827											
124	*Bungarus caeruleus* (Schneider, 1801)	Common Krait	LC					+	+	1,2,3,5, 8,12, 14	
125	*Bungarus fasciatus* (Schneider, 1801)	Banded Krait	LC					+	+	1,2,3,5, 8,12, 14	
126	*Bungarus lividus* Cantor, 1839	Lesser Black Krait	LC					+	+	1,2,3,4,5, 8,12, 14	
127	*Bungarus niger* Wall, 1908	Greater Black Krait	LC	+						2,3,4, 15	
128	*Naja kaouthia* Lesson, 1831	Monocled Cobra	LC	+		+	+	+	+	1,2,3,4,8	
129	*Naja naja* (Linnaeus, 1758)	Common Cobra	LC					+	+	1,2,3,5,8, 12, 14	
130	*Ophiophagus hannah* (Cantor, 1836)	King Cobra	VU	+	+	+	+	+	+	1,2,3,4,5, 8, 12, 14	
131	*Sinomicrurus macclellandi* (Reinhardt, 1844)	MacClelland's Coral Snake	LC	+			+	+		1,2,3,4,5, 8,12	
Family: Typhopidae Merrem, 1820											
132	*Argyrophis diardii* (Schlegel, 1839)	Diard's Blind Snake	LC					+	+	14	
133	*Indotyphlops braminus* (Daudin, 1803)	Common Blind Snake	LC	+			+	+	+	1,2,3,4,5,8, 12, 14	
Family: Viperidae Oppel, 1811											
134	*Gloydius nepalensis* Jablonski, Tillack, Mahlow-Tillack, Petzold, Wilzo, Das, Idrees, Baniya, Masroor & Hofmann, 2026	Himalayan Pit Viper	LC	+	+					1,2,3,4	
135	*Ovophis monticola* (Günther, 1864)	Mountain Pit Viper	LC	+	+	+	+			1,2,3,4	
136	*Protobothrops himalayanus* Pan, Chettri, Yang, Jiang, Wang, Zhang & Vogel, 2013	Habu Pit Viper	LC	+	+					1,4	
137	*Daboia russelii* (Shaw & Noddor, 1797)	Russell's Viper	LC					+	+	1,2,3,5,8, 12, 14	
138	*Trimeresurus salazar* Mirza, Bhosale, Phansalkar, Sawant, Gowande & Patel, 2020	Salazar Pit Viper	NA					+	+	1,8	
139	*Trimeresurus septentrionalis* Kramer, 1977	Nepal Pit Viper	LC	+	+	+	+			1,2,3,4,5,8, 12	
140	*Trimeresurus tibetanus* Huang, 1982	Tibetan Pit Viper	LC			+				16	

ACA—Annapurna Conservation Area Project | MCA—Manaslu Conservation Area Project | LNP—Langtang National Park | SNNP—Shivapuri-Nagarjun National Park | CNP—Chitwan National Park | PNP—Parsa National Park. IUCN Status: LC—Least Concern | DD—Data Deficient | NT—Near Threatened | VU—Vulnerable | EN—Endangered | CR—Critically Endangered. Data Sources: 1—This study | 2—Schleich & Kastle (2002) | 3—Shah & Tiwari (2004) | 4—Baral & Kadariya (2025) | 5—Bhattarai et al. (2018) | 6—Bhattarai et al. (2025a) | 7—Bhattarai et al. (2025b) | 8—Bhattarai et al. (2025c) | 9—Gautam & Bhattarai (2022) | 10—Thapa & Shah (2020) | 11—Rai (2025) | 12—Bhattarai et al. (2020) | 13—Rawat et al. (2020) | 14—Pandey et al. (2018) | 15—Tillack & Grossmann (2001) | 16—Tillack et al. (2003).

IUCN Red List Status

The IUCN status of all species recorded in the CHAL is noted in Table 1. Of the total amphibian species recorded, four are classified as globally threatened. The Mountain Cascade Frog *Amolops monticola* is listed as EN, while the Chilapata Rain-pool Frog *Minervarya chilapata*, Mahabharat Cascade Frog *Amolops mahabharatensis*, and Dudhwa Reed Frog *Chirixalus dudhwaensis* are categorized as VU (IUCN 2025). In addition, 28 species are listed as LC. Two species, namely Narayanghat Whipping Frog *Polypedates zed*, and Chitwan Frog *Hylarana chitwanensis* are listed as DD.

Among the reptiles, four species, namely Gharial *Gavialis gangeticus*, Three-striped Roofed Turtle *Batagur dhongoka*, Elongated Tortoise *Indotestudo elongata*, and Dark Sitana *Sitana fusca*, are listed as Critically Endangered (CR), whereas five species, namely Tri-carinate Hill Turtle *Melanochelys tricarinata*, Narrow-headed Soft-shell Turtle *Chitra indica*, Gangetic Soft-shell Turtle *Nilssonia gangetica*, Peacock Soft-shell turtle *Nilssonia hurum*, and Golden Monitor Lizard *Varanus flavescens*, are categorized as EN. Five species, namely, Mugger Crocodile *Crocodylus palustris*, Indian Roofed Turtle *Pangshura tecta*, Indian Flap-shell Turtle *Lissemys punctata*, Burmese Python *Python bivittatus*, and Painted Keelback *Xenochrophis cerasogaster*, are listed as VU. Five species are listed as NT, 72 species are listed as LC, three species are listed as DD.

Type Localities of Herpetofauna in Chitwan-Annapurna Landscape

Among the 140 known herpetofauna species in CHAL, 16 species (Table 2) (seven amphibians and nine reptiles) were described from the CHAL and have type localities within the CHAL. Of these, four species of amphibians, namely Maskey's Burrowing Frog *Sphaerotheca maskeyi*, Chitwan Frog *Hylarana chitwanensis*, Mustang Frog *Nanorana rostandi*, and Langtang Frog *Nanorana polunini*, have type localities within the protected area system, whereas three species, namely Mahabharat Torrent Frog *Amolops mahabharatensis*, Narayanghat Whipping Frog *Polyepedates zed*, and Nepal Cricket Frog *Minervarya nepalensis*, were described from areas outside of the Protected Area system. Similarly, of the nine reptiles which have type localities in the CHAL, only three, namely ACAP Bent-toed Gecko *Cyrtodactylus annapurnaensis*, Nepali Pit-Viper *Gloydius nepalensis* and Karan's Bent-toed Gecko *Cyrtodactylus karanshahi*, are described from locations within the PAs (Table 2).

Protected Area Coverage

Information about the known presence of each species in each of the six PAs of the CHAL is provided in Table 1. Chitwan National Park supports the largest number of records (90) of herpetofauna species, followed by the Annapurna Conservation Area (73), Parsa National Park (58), Shivapuri–Nagarjun National Park (53), Langtang National Park (47), and Manaslu Conservation Area (45) (Table 1). However, many species were documented from locations outside of the protected area system. For example, the recently described Chitwan Bent-toed Gecko *Cyrtodactylus chitwanensis* was recorded from Chitwan and Tanahun districts beyond the boundaries of the PAs (Bhattarai et al. 2025a). Similarly, the ACAP Bent-toed Gecko *Cyrtodactylus annapurnaensis* was also observed in the hills on the northern side of Fewa Lake in Pokhara; and in Bahundanda, Lumjung near the Annapurna Conservation Area, but outside its border. The Common Leopard Gecko *Eublepharis macularius*, Olive Keelback *Atretium schistosum*, and Forsten's Cat Snake *Boiga forsteni* have been reported from Nawalparasi District, and the Common Slug Snake *Pareas monticola* was recorded from the Gairibari–Shaktikhor area in Chitwan District. No records for these species are reported from within the PA network in CHAL.

Elevation range of species

The distribution of amphibians and reptiles in CHAL can be categorized into three major groups, namely lowland species, mid-elevation species and Himalayan species (Figure 2). The lowland species include amphibian species such as Burrowing frogs *Uperodon* spp., Dudhwa Reed Frog *Chirixalus dudhwaensis*, and Chitwan Frog *Hylarana chitwanensis*, Yellow-striped Frog *Hylarana tytleri*, Terai Bush Frog *Polypedates taeniatus*, and reptiles specifically turtles, crocodiles and the agamid lizard of the genus *Sitana* sp. The amphibian species exclusively occupying the mid hills are cascade frogs of the genus *Amolops*, Sikkim Frog *Ombrana sikimensis* and Zhang's Horned Frog *Xenophrys zhangi*. However, we recorded individuals of the Mahabharat Cascade Frog *Amolops mahabharatensis* at low elevation streams in Jugedi, Chitwan, and Tanahun. Reptiles such as forest lizards of the genus *Japalura*, Rock Lizard *Laudakia tuberculata*, Large Ground Skink *Ablepharus capitaneus*, Black-banded Trinket Snake *Oreocryptophis porphyraceus*, False Cobra *Pseudoxenodon macrops*, Himalayan Trinket Snake *Elaphe hodgsoni*, and Mountain Pit-viper *Ovophis monticola* are also considered mid-hill species. The high elevation Himalayan endemics include

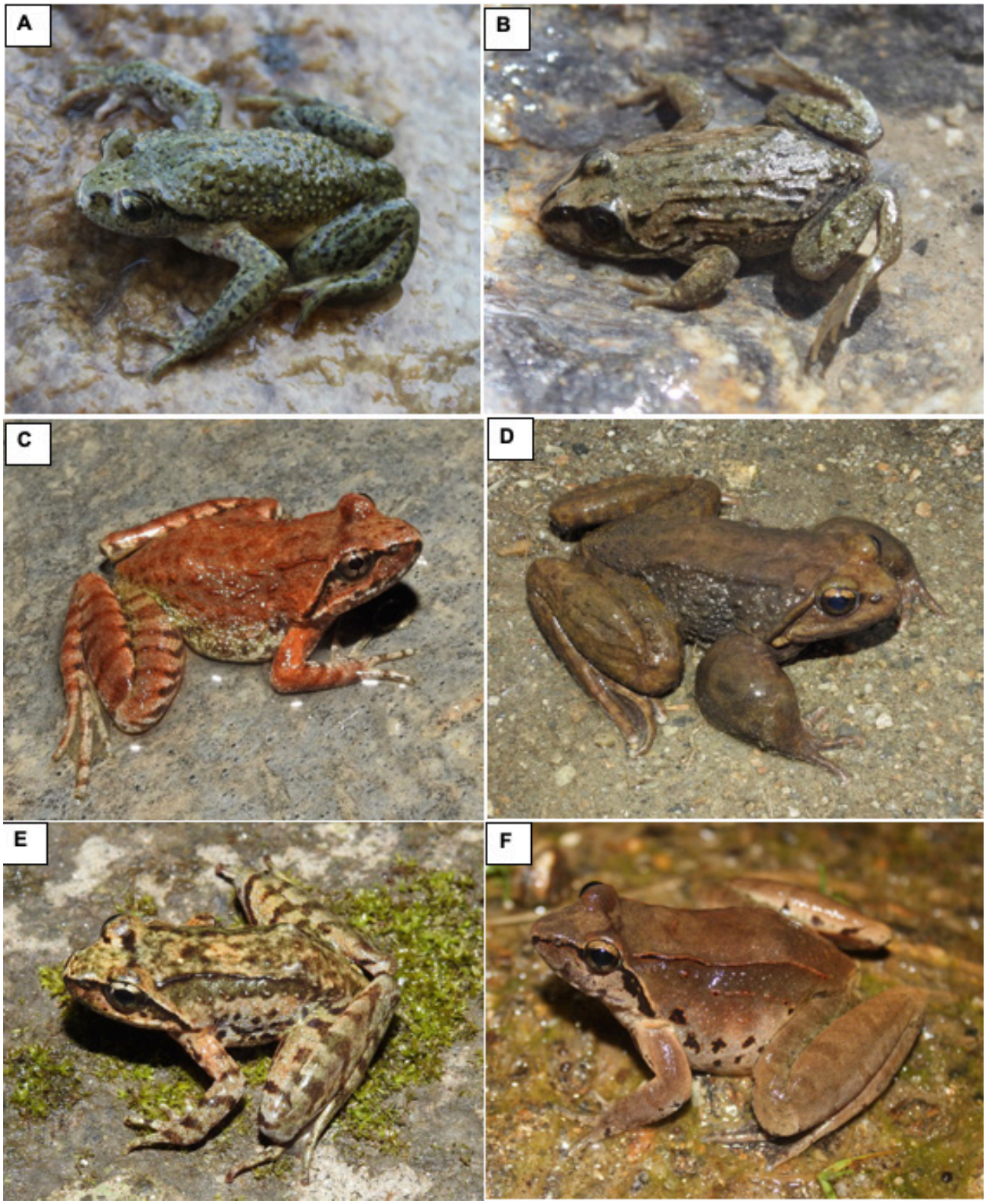

Image 2. Some amphibian species from CHAL: A—Boulenger's High Altitude Toad *Scutiger boulengeri* | B—High Himalaya Paa Frog *Nanorana* cf. *parkeri* | C—Mustang Frog *Nanorana rostandi* | D—Liebig's Paa Frog *Nanorana leibigii* | E—Blandford's Paa Frog *Nanorana blandfordii* | F—Langtang Frog *Nanorana polunini*. © Santosh Bhattarai.

Image 2. Some amphibian species from CHAL: G—Assam Cascade Frog *Amolops formosus* | H—Mounatin Cascade Frog *Amolops monticola* | I—Mahabharat Cascade Frog *Amolops mahabharatensis* | J—Nepal Cricket Frog *Minervarya nepalensis* | K—Sikkim Frog *Ombrana sikimensis* | L—Chitwan Frog *Hylarana chitwanensis*. © Santosh Bhattarai.

amphibians such as high Himalayan frogs of the genus *Nanorana*, lazy-toads of the genus *Scutiger*, and reptiles such as Toad-headed Agama *Phrynocephalus theobaldi* and Nepali Pit-viper *Gloydius nepalensis*.

DISCUSSION

This study provides a much-needed update regarding the current understanding of the richness of herpetofauna in the CHAL, with records of 35 amphibian and 105 reptile species. The high diversity of herpetofauna in the CHAL is likely due to its geographical position, which facilitates faunal and floral exchange between the species assemblages of the eastern and western Himalaya (KMTNC 1998; NTNC 2020; Bhattarai et al. 2025b).

Field surveys yielded a notable record of the Mountain Cascade Frog *Amolops monticola* from the Annapurna Conservation Area (Image 2H). Baral & Kadariya (2025) also reported the occurrence of *A. monticola* from the Annapurna Conservation Area. These specimens, observed from CHAL, exhibit morphological differences compared to true *A. monticola,* and are from locations approximately 455 km from the type locality in Darjeeling, India. Therefore, we recommend further integrative taxonomic studies to confirm the species identity as several cryptic species within the *monticola* group have been described in recent years. Patel et al. (2021) redefined the distribution of *A. monticola* to the lower Himalayan range of Darjeeling and south Sikkim, India; accordingly, the most recent IUCN assessment lists

Table 2. Type localities of herpetofauna within the Chitwan-Annapurna Landscape. The asterisk (*) indicates species described from outside of the PAs.

Taxa	Family	Common name	Scientific name	Type locality	Elevation (m)
Amphibians					
Frog	Dicroglossidae	Nepal Cricket Frog	*Minervarya nepalensis* (Dubois, 1975)	*Godavari (= Godawari), Central Nepal	1,560
Frog	Dicroglossidae	Langtang Frog	*Nanorana polunini* (Smith, 1951)	Langtang Village	3,353
Frog	Dicroglossidae	Mustang Frog	*Nanorana rostandi* (Dubois, 1974)	Lac Kutsab Terna Tal (= Dhumba Tal/ Lake), Jomsom, Mustang	2,900
Frog	Dicroglossidae	Maskey's Burrowing Frog	*Sphaerotheca maskeyi* (Schleich & Anders, 1998)	Chitwan National Park	300
Frog	Ranidae	Mahabharat Torrent Frog	*Amolops mahabharatensis* Khatiwada, Shu, Wang, Zhao, Xie & Jiang, 2020	*Hattibang, Chitwan	775
Frog	Ranidae	Chitwan Frog	*Hylarana chitwanensis* (Das, 1998)	Chitwan National Park	300
Frog	Rhacophridae	Narayanghat Whipping Frog	*Polypedates zed* (Dubois, 1987)	*Narayanghat, Chitwan	310
Reptiles					
Gecko	Gekkonidae	Annapurna Bent-toed Gecko	*Cyrtodactylus annapurnaensis* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	Lwang, Annapurna Conservation Area	1,450
Gecko	Gekkonidae	Chitwan Bent-toed Gecko	*Cyrtodactylus chitwanensis* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	*Bandipur, Tanahun	1,050
Gecko	Gekkonidae	Karan's Bent-toed Gecko	*Cyrtodactylus karanshahi* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Tillack, Olson, Hogan & Wright, 2025	Philim, Manaslu Conservation Area	1,590
Gecko	Gekkonidae	Makwanpurgadhi Bent-toed Gecko	*Cyrtodactylus makwanpurgadhiensis* Bhattarai, Gautam, Neupane, Khandekar, Thackeray, Agarwal, Olson, Hogan & Wright, 2025	*Makwanpurgadhi, Makwanpur, Bagmati Province	1,050
Skink	Scincidae	Mahabharat Skink	*Ablepharus mahabharatus* (Eremchenko, Shah & Pankilov, 1998)	*Bhaise-Daman, Makwanpur	950
Skink	Scincidae	Nepal skink	*Ablepharus nepalensis* (Eremchenko & Helfenberger, 1998)	*Suikhet-Naudanda, Kaski	1,500
Skink	Scincidae	Large Ground Skink	*Ablepharus capitaneus* (Ouboter, 1986)	*Dhampus, Annapurna region	1,850
Snake	Viperidae	Nepal Pit Viper	*Trimerusurus sepentrionalis* Krammer, 1977	*Hyangchya (=Hemja), Kaski	1,500
Snake	Viperidae	Nepali Pit Viper	*Gloydius nepalensis* Jablonski, Tillack, Mahlow-Tillack, Petzold, Wilzo, Das, Idrees, Baniya, Masroor, Hofmann, 2026	Kalopani, Mustang	2,500

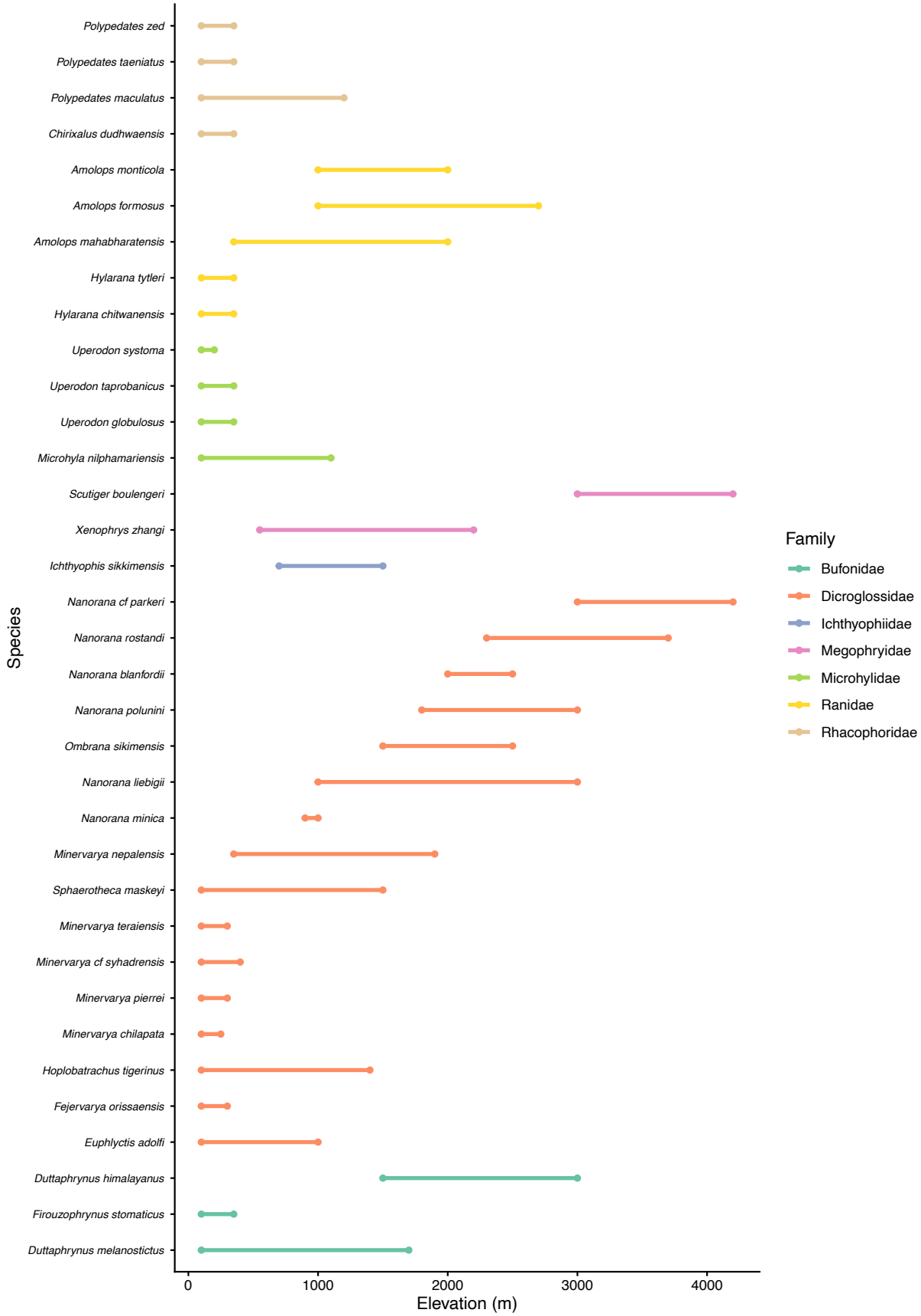

Figure 2. Elevational distribution of amphibians in the CHAL region (elevation in m).

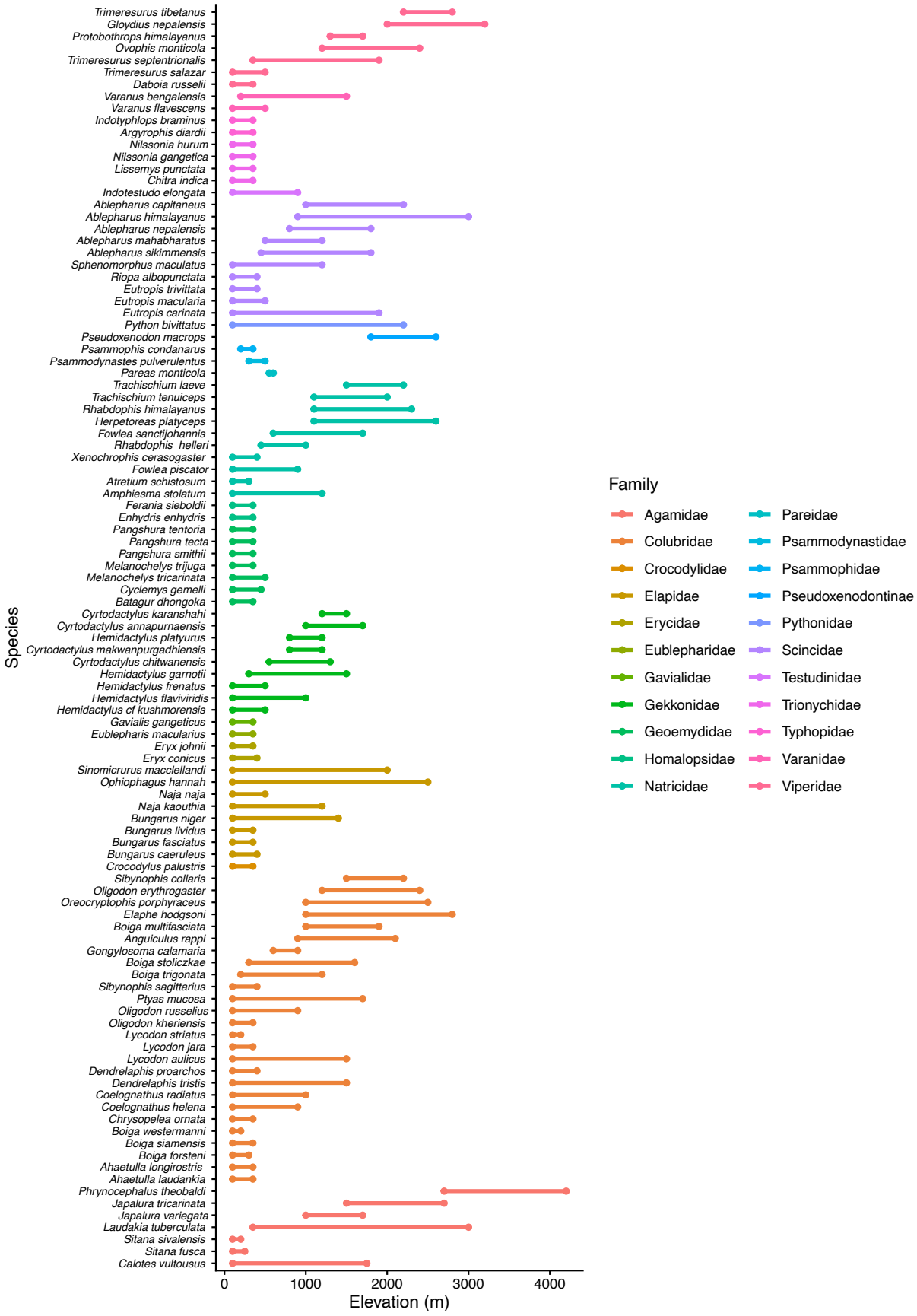

Figure 2 cont.. Elevational distribution of reptiles in the CHAL region (elevation in m).

Image 3. Some representative lizards from Chitwan-Annapurna Landscape: A—Toad-headed Agama *Phrynocephalus theobaldi* | B—Gravid female of Tricarinate Forest Agama *Japalura tricarinata* | C—Large Ground Skink *Ablepharus capitanius* | D—Mahabharat Skink *Ablepharus* mahabharatus | E—Chitwan Bent-toed Gecko *Cyrtodactylus chitwanensis* | F—ACAP Bent-toed Gecko *Cyrtodactylus annapurnaensis*. © Santosh Bhattarai.

Image 4. Some snake species from Chitwan Annapurna Landscape: A—Nepali Pit Viper *Gloydius nepalensis* | B—Mountain Pit Viper *Ovophis monticola* killed by villagers in Kaule, Chitwan | C—Nepal Pit Viper *Trimerusurus sepentrionalis* | D—Himalayan Habu Pit Viper *Protobothrops himalayanus* | E—False Cobra *Pseudoxenodon macrops* | F—Common Slug Snake *Pareas* cf. *monticola*. © Santosh Bhattarai.

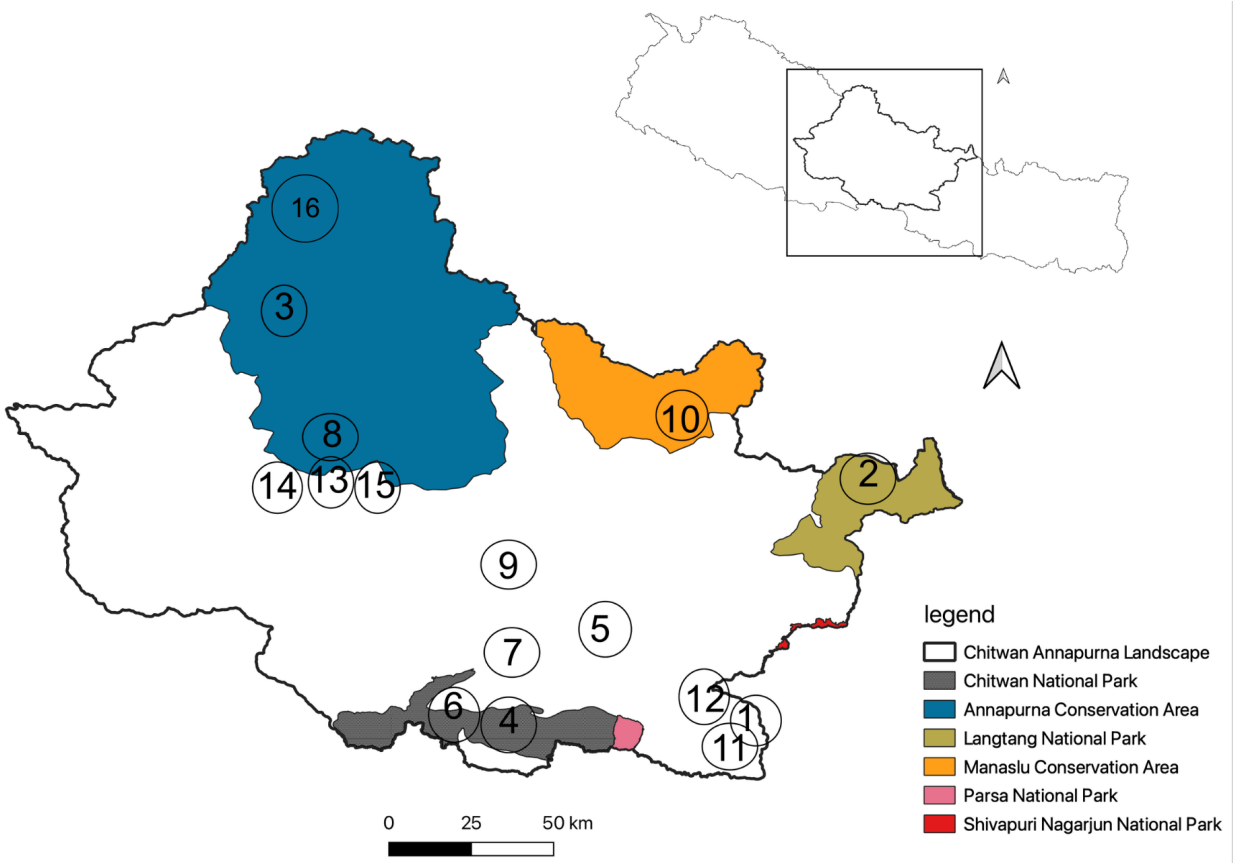

Figure 3. Type localities of amphibians and reptiles within and outside of protected areas in CHAL. The numbers in the circle refers to the species: 1—*Minervarya nepalensis* | 2—*Nanorana polunini* | 3—*Nanorana rostandi* | 4—*Sphaerotheca maskeyi* | 5—*Amolops mahabharatensis* | 6—*Hylarana chitwanensis* | 7—*Polypedates zed* | 8—*Cyrtodactylus annapurnaensis* | 9—*Cyrtodactylus chitwanensis* | 10—*Cyrtodactylus karanshahi* | 11—*Cyrtodactylus makwanpurgadhiensis* | 12—*Ablepharus mahabharatus* | 13—*Ablepharus nepalensis* | 14—*Ablepharus capitaneus* | 15—*Trimerusurus sepentrionalis* | | 16—*Gloydius nepalensis*.

its occurrence as "presence uncertain" in Nepal (IUCN SSC Amphibian Specialist Group 2023).

Rai et al. (2021) reported the Common Slug Snake *Pareas monticola* from Ilam as a new country record for Nepal. Our field surveys extend the known range of this species approximately 450 km west to the northern hills of Chitwan near Shaktikhor, representing the westernmost record of *P. monticola* within Nepal (Image 4F).

CHAL as a notable Type Locality Hotspot for Herpetofauna

The CHAL represents the type locality for 16 species of herpetofauna (Table 2). These type localities, distributed across a range of biogeographic zones from the lowlands to the high Himalaya, highlight the landscape's ecological heterogeneity and its role as a faunal and floral exchange for species which originate from both the western and eastern Himalaya (KMTNC 1998; NTNC 2020; Bhattarai et al. 2025b). Additionally, several of these type localities occur outside the protected area network (Table 2, Figure 3) and are increasingly affected by anthropogenic pressures and climate change (Pandit 2013; Paudel et al. 2018; Kattel 2022; Hofmann et al. 2024). Populations from type localities provide critical reference material for taxonomic comparisons with congeners and for resolving species boundaries. Conserving these sites is therefore essential not only for safeguarding original populations but also for advancing our understanding of large-scale biodiversity patterns and their underlying evolutionary and ecological processes (Agarwal et al. 2014; Hofmann et al. 2024).

Conservation Gaps

The CHAL spans several of Nepal's biogeographic regions from the lowland (Terai) to the high plateau of the trans-Himalaya region. Most conservation and research activities in Nepal are focused either in the lowland protected areas, where large, charismatic species such as tiger and rhinoceros occur, or in the

parts of the trans-Himalayan region which support snow leopard populations (Rawat et al. 2020; Bist et al. 2021). The lower Himalayas, especially the Siwalik Mountain range, are under-surveyed (Bhattarai et al. 2020, 2025b; Gautam et al. 2022). This geologically fragile and unstable mountain ecosystem has high biodiversity significance and deserves a stronger conservation focus (Lamichhane et al. 2021; Subedi et al. 2021).

The overarching document for wildlife and biodiversity conservation in Nepal is the National Parks and Wildlife Conservation Act (1973). Schedule-I of this Act identifies high priority species for conservation. Only three reptiles, namely Burmese Python *Python bivittatus*, Gharial *Gavialis gangeticus*, and Golden Monitor Lizard *Varanus flavescens* are listed. No amphibian species is included in the schedule. There are no species-specific national conservation strategies for any herpetofauna except for Gharial (Bhattarai et al. 2018; DNPWC 2018).

Our records show that there are several critically endangered, and several more endangered reptile and amphibian species present in the CHAL. These species would benefit from consideration in future conservation policy and planning.

Legally, Nepal's environmental impact assessment (EIA) system requires a biodiversity assessment prior to any large development project. Again, amphibians and reptiles are overlooked in many EIA documents. As amphibians and reptiles are very sensitive to local environmental changes, the omission of these species from EIAs risks the extirpation of populations of amphibians and reptiles known from Nepal and may also result in the extinction of some species before they are formally described or documented in Nepal.

Conservation and Research Priorities

Our results show that most herpetofauna species documented in the CHAL are recorded from protected areas, with a further bias towards those PAs which are most accessible. This is most likely due to the concentration of research activity in such areas. More remote protected areas such as Manaslu Conservation Area should be prioritized for future research and conservation activities, since there are clear gains to be made in such places. For example, a recent short herpetological survey in Manaslu Conservation Area led to the description of a new gecko species *Cyrtodactylus karanshahi* (Bhattarai et al. 2025a). Nepal shares common species between India and China, but after the advent and application of molecular techniques in neighbouring countries the taxonomy of several species and groups has undergone substantial changes. Taxonomic studies which integrate morphology, ecology, biogeography, and molecular techniques should be encouraged in Nepal to allow for a better understanding of species distributions and endemicity. Notably, reports of species such as *Ablepharus* sp., *Japalura* sp., *Polypedates* sp., and *Trimeresurus* sp. present in the CHAL, flags a requirement for a dedicated research effort including molecular techniques to explore evolutionary histories (Wang et al. 2019; Khatiwada et al. 2021; Vogel et al. 2022; Vences et al. 2024; Bragin et al. 2025; Malhotra et al. 2025) and taxonomic ambiguities.

CONCLUSIONS

This study highlights the remarkable diversity of amphibians and reptiles in the Chitwan–Annapurna Landscape including 140 species emphasizing the landscape's significance for herpetofauna conservation in the country. The species richness is highest within protected areas, particularly those that are more accessible, underscoring a strong research bias and suggesting that herpetofauna diversity in remote areas remains underestimated. Our findings demonstrate that targeted surveys in underexplored areas can yield substantial conservation gains, including the discovery of new species. Integrative taxonomic approaches combining morphological, ecological, biogeographical, and molecular data are urgently needed to resolve taxonomic uncertainties and improve understanding of species distributions and endemicity. Expanding research beyond well-studied protected areas will be essential for effective, landscape-scale conservation planning in the Chitwan–Annapurna Landscape.

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