



The herpetofauna in Sarpang District, Bhutan

Although several checklists exist of herpetofauna in Bhutan, these are based on citizen science data or report the diversity of individual regions (Wangyal *et al.* 2020 and references therein) and published records are lacking for many areas. Like the country as a whole, there is no formal checklist or report for Sarpang District despite the fact that most of this district is encompassed within three protected areas namely Royal Manas National Park (RMNP), Jigme Singye Wangchuck National Park (JSWNP) and Phibsoo Wildlife Sanctuary (PWS).

The Zoological Society of India (ZSI) and the Naturhistorisches Museum Basel (NHMBA) made collections in 1969 and 1972 respectively. Bustard (1979) declared that the gharial (*Gavialis gangeticus*) had been extirpated from Manas River in Bhutan. Biswas (1976) described a new *Calotes* species endemic to Bhutan. Later, Bauer & Günther (1992), Das & Palden (2000), Wangyal (2011, 2012, 2014), Das *et al.* (2016), Koirala *et al.* (2016), Tshewang & Letro (2018), Dorji *et al.* (2019), Tenzin & Wangyal (2019), Chaida *et al.* (2020), Wangyal *et al.* (2020) reported herpetofauna from Bhutan. In the recent reptile guide by Wangyal & Das (2021) 102 species of snakes, 39 lizards, six species of testudines were recorded.

Sarpang District is in south central Bhutan and encompasses a total area of ~1,655km² (MWHS 2019) (Fig. 1). The elevation for Sarpang District ranges from 153 to 3,506 m a.s.l. (Tenzin *et al.* 2021) with annual precipitation of 3,500–5,500 mm. The district has diverse forest types: subtropical broadleaved forests, warm broadleaved forests, and cool broadleaved forests (Nepal & Dorji 2020, Tenzin *et al.* 2021). The District shares a border with the northeast Indian state of Assam towards the south and connects to Indian Manas National

Park (MNP) and RMNP towards the east. Sarpang District also has a part of PWS in the west which abuts Buxa Tiger Reserve (BTR) in the Indian state of West Bengal. This network of conservation areas forms one of the biggest tiger conservation landscapes in Asia (Tenzin *et al.* 2021). After reviewing previous literature on the herpetofauna of Sarpang, we listed only 34 reptile species for the district (Table 1). Sapkota *et al.* (2020) indicated that snakes are a source of fear and excitement whereby most Bhutanese researchers don't like to study them, which leads to limited records. In this study, the occurrence points of herpetofauna were plotted using ArcGIS. This shows that most of the herpetofauna were recorded from the proximity of the national highway systems and farm roads, with few recorded from distant or remote locations. The distribution of herpetofauna was analyzed based on gewogs (Administrative blocks). Among 12 gewogs within the district, the highest species richness was in Samtenling ($n=23$), and the least in Tareythang ($n=1$). This is because most of the past research and opportunistic observations were done in Samtenling (see Das & Palden 2000). The elevation range of these herpetofauna records was from 180–1610 m a.s.l.

11 species of amphibians (out of 12) found in Sarpang District (Table 2) are categorized as of Least Concern (LC) and one species was not assessed. Among the reptiles (out of 34), 21 species were categorized as LC, two were Critically Endangered (CR), and rest of the species were not assessed. Further, none of the herpetofauna species were listed in Schedule I of Forest and Nature Conservation Acts of Bhutan. This means that they can and are deliberately killed when people came across them. In addition, few of the globally threatened species such as gharial (*Gavialis gangeticus*), elongated tortoise (*Indotestuda elongate*), reticulated python (*Python reticulatus*), saltwater crocodile (*Crocodylus porosus*), and Burmese python (*Python bivittatus*) are listed under CITES Appendix I and II.

Table 1. Annotated checklist of reptiles of Sarpang District, Bhutan

No.	Common name	Scientific name and conservation status	Family	Distribution in Sarpang district	Sources
1	Yellow-speckled wolf snake	<i>Lycodon jara</i> (Shaw, 1802) ^{LC}	Colubridae	Gelephu town	Wangyal (2012)
2	Banded krait	<i>Bungarus fasciatus</i> (Schneider, 1801) ^{LC}	Elapidae	Road between Surey & Gelephu	Das & Palden (2000)
3	Bengal monitor lizard	<i>Varanus bengalensis</i> (Daudin, 1802) ^{NT}	Varanidae	Sistykhola bridge (Sengye), Umling	New Record
4	Bengalese kukri snake	<i>Oligodon dorsalis</i> (Gray & Hardwicke, 1835)	Colubridae	Serzhong	Das & Palden (2000)
5	Bronze grass skink	<i>Mabuya macularia</i> (Blyth, 1853)	Scincidae	Gelephu town	Das & Palden (2000)
6	Brooke's house gecko	<i>Hemidactylus brookii</i> (Gray, 1845) ^{VU}	Gekkonidae	Thapa Nursery (Samtenling)	New Record
7	Burmese rock python	<i>Python bivittatus</i> (Kuhl, 1820)	Pythonidae	Jigmeling, Gelephu	Wangyal (2012)
8	Cantor's black-headed snake	<i>Sibynophis sagittarius</i> (Cantor, 1839)	Colubridae	Road between Surey & Gelephu	Das & Palden (2000)
9	Checked Keelback	<i>Fowlea piscator</i> (Schneider 1799) ^{LC}	Colubridae	Grain distillery (Samtenling)	New Record
10	Common bronze back	<i>Dendrelaphis tristis</i> (Daudin, 1803) ^{LC}	Colubridae	Gelephu	Wangyal (2012)
11	Common house gecko	<i>Hemidactylus frenatus</i> (Schlegel, 1836) ^{LC}	Gekkonidae	Near AWP (Gelephu)	New Record
12	Common mock viper	<i>Pseudonaspastes pulverulentus</i> (F. Boie, 1827)	Colubridae	Serzhong	Das & Palden (2000)
13	Common slug snake	<i>Paras monicola</i> (Cantor, 1839) ^{LC}	Pareidae	Indo-Bhutan check post (Gelephu)	New Record
14	Eastern garden lizard	<i>Calotes versicolor</i> (Daudin, 1802) [*]	Agamidae	Gelephu town	Das & Palden (2000)
15	Elongated tortoise	<i>Indotestuda elongata</i> (Blyth, 1853) ^{CR}	Testudinoidea	Thapa Nursery (Samtenling)	New Record
16	Green pitviper sp.	<i>Trimeresurus</i> species ^{LC}	Viperidae	Raidara	New Record
17	Indian cobra	<i>Naja naja</i> (Linnaeus, 1758) ^{LC}	Elapidae	Gelephu town, Tamangoan (Jigmeling)	Das & Palden (2000)
18	Indian forest skink	<i>Sphenomorphus indicus</i> (Gray, 1853)	Scincidae	Serzhong	Das & Palden (2000)
19	Indo-Pacific gecko	<i>Hemidactylus garnotii</i> (Dumeril & Bibron, 1836) ^{LC}	Gekkonidae	Gelephu town	Das & Palden (2000)
20	Jerdon's forest lizard	<i>Calotes jerdoni</i> (Gunther, 1870) ^{LC}	Agamidae	Gelephu Fishery	New Record
21	Khasi Hills bent-toed gecko	<i>Cyrtodactylus khasiensis</i> (Jerdon, 1870) ^{LC}	Gekkonidae	Thapa Nursery (Samtenling)	New Record
22	Monocled cobra	<i>Naja kaouthia</i> (Lesson, 1831) ^{LC}	Elapidae	Raidara	New Record
23	Ornate flying snake	<i>Chrysopelea ornata</i> (Shaw, 1802)	Colubridae	Moukhola, Juprey	New Record
24	Radiated rat snake	<i>Coelognathus radiatus</i> (F. Boie, 1827) ^{LC}	Colubridae	Below airport (Gelephu)	New Record
25	Reticulated python	<i>Malayopython reticulatus</i> (Schneider, 1801) ^{LC}	Pythonidae	Gelephu, Jigmeling	New Record
26	Russell's viper	<i>Daboia russelii</i> (Shaw & Nodder, 1797) ^{LC}	Viperidae	Moukhola (Indo-Bhutan)	New Record
27	Striped grass skink	<i>Eutropis dissimilis</i> (Hallowell, 1857)	Scincidae	Moukhola	New Record
28	Variagated mountain lizard	<i>Japalura variegata</i> (Gray, 1853) ^{LC}	Agamidae	Batasey (Jigmecholing)	Bauer & Günther (1992)
29	White-lipped pit viper	<i>Trimeresurus albolabris</i> (Gray, 1842) ^{LC}	Viperidae	Lodarey (Gelephu)	Wangyal (2012)
30	Saltwater crocodile	<i>Crocodylus porosus</i> (Laurenti, 1768) ^{LC}	Crocodylidae	Chipchipey (Jigmeling)	Wangyal (2014)
31	Hharial	<i>Gavialis gangeticus</i> (Oppel, 1811) ^{CR}	Gavialidae	Chipchipey (Jigmeling)	Wangyal (2014)
32	Zaw's wolf snake	<i>Lycodon zawi</i> (Slowinski <i>et al.</i> , 2001) ^{LC}	Colubridae	Gaden (Umling)	New Record
33	King cobra	<i>Ophiophagus hannah</i> (Cantor, 1836) ^{VU}	Elapidae	Dangling (Umling), Singye	New Record
34	Common Trinket snake	<i>Coelognathus helena</i> (Daudin, 1803) ^{LC}	Colubridae	Dangling (Umling)	New Record

* probably *C. irawadi* Zug, Brown, Schulte, Vindum, 2006

Plate 32

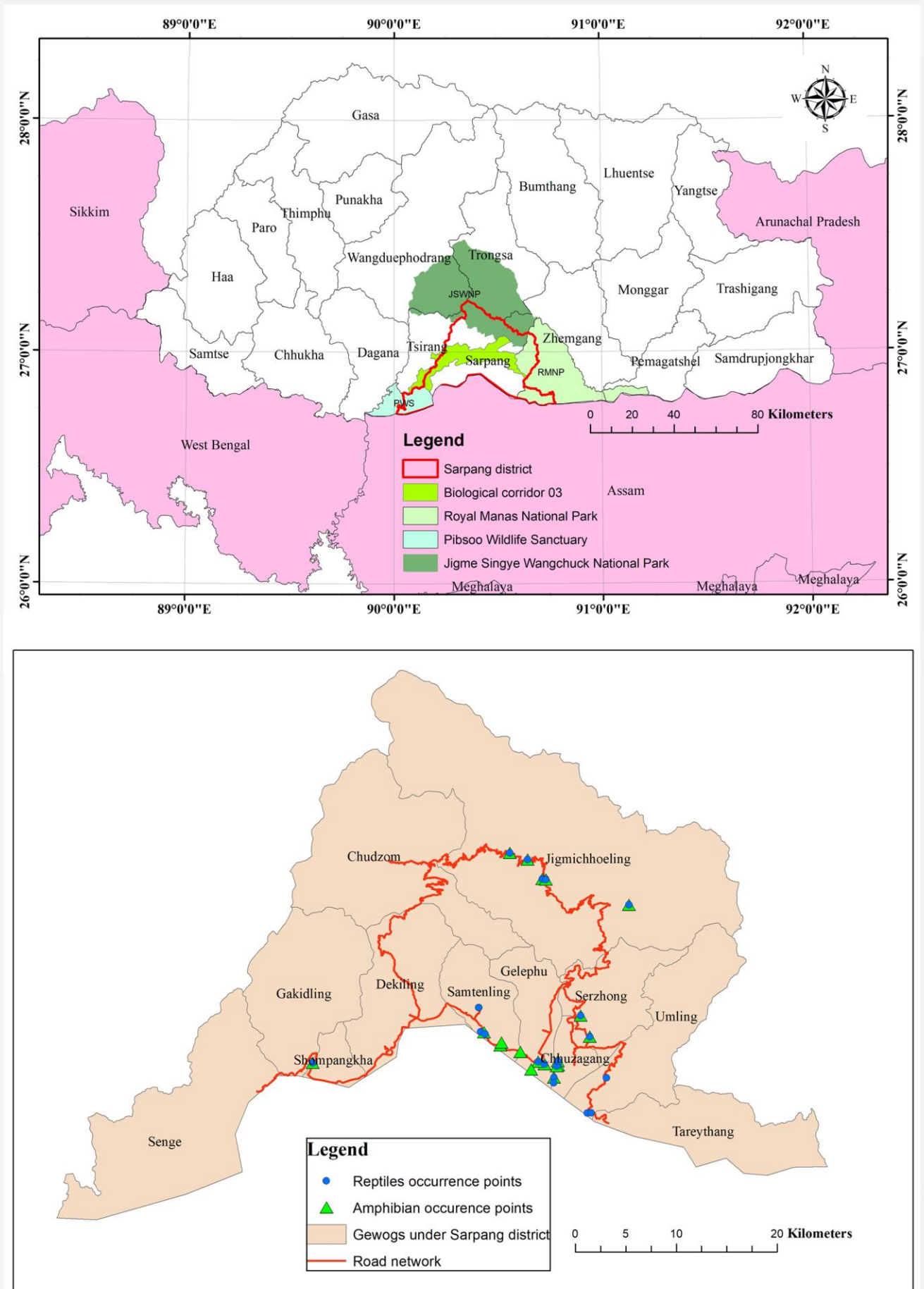


Figure 1. (Top): A map of Bhutan showing the Sarpang District (outlined in red); **(Bottom):** Sarpang District in greater detail (shaded), showing field locations of amphibians and reptiles.

Table 2. Annotated checklist of amphibians of Sarpang District, Bhutan

No.	Common name	Scientific name and conservation status	Family	Distribution in Sarpang district	Sources
1	Mountain horned frog	<i>Megophrys parva</i> (Boulenger, 1893) ^{LC}	Megophryidae	Serzhong	Das & Palden (2000)
2	Common Asian toad	<i>Duttaphrynus melanostictus</i> (Schneider, 1799) ^{LC}	Bufoidea	Moukhola, Gelephu town	Das & Palden (2000)
3	Marbled sucker frog	<i>Amolops marmoratus</i> (Blyth, 1855) ^{LC}	Ranidae	Serzhong	Das & Palden (2000)
4	Indian skipping frog	<i>Euphlyctis cyanophlyctis</i> (Schneider, 1799) ^{LC}	Ranidae	Sarpang	Das & Palden (2000)
5	Indian bull frog	<i>Hoplobatrachus tigerinus</i> (Daudin, 1803) ^{LC}	Ranidae	Sarpang	Das & Palden (2000)
6	Asian grass frog sp.	<i>Minivyrata</i> species ^{LC}	Ranidae	Moukhola	Das & Palden (2000)
7	Ranid frog sp.	<i>Hylarana</i> species ^{LC}	Ranidae	Moukhola	Das & Palden (2000)
8	Eastern spadefoot toad	<i>Leptobrachium bompu</i> (Sondhi & Ohler, 2011)	Magophryidae	Pakhola (Jigmecholing)	Tenzin & Wangyal (2019)
9	Himalayan bull frog	<i>Nanorana leibigii</i> (Gunther, 1860) ^{LC}	Dicroglossidae	Simkharka, Chapkhola (Jigmecholing)	Tenzin & Dhendup (2017)
10	Cascade frog group	<i>Amolops</i> species ^{LC}	Ranidae	Rongkhola (Jigmecholing)	New Record
11	Jerdon's bull frogs	<i>Hoplobatrachus crassus</i> (Jerdon, 1854) ^{LC}	Dicroglossidae	National Aquaculture Centre (Gelephu)	New Record
12	Assamese forest frog	<i>Sylvirana leptoglossa</i> (Cope, 1868) ^{LC}	Ranidae	Kholatar (Jigmecholing)	New Record

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