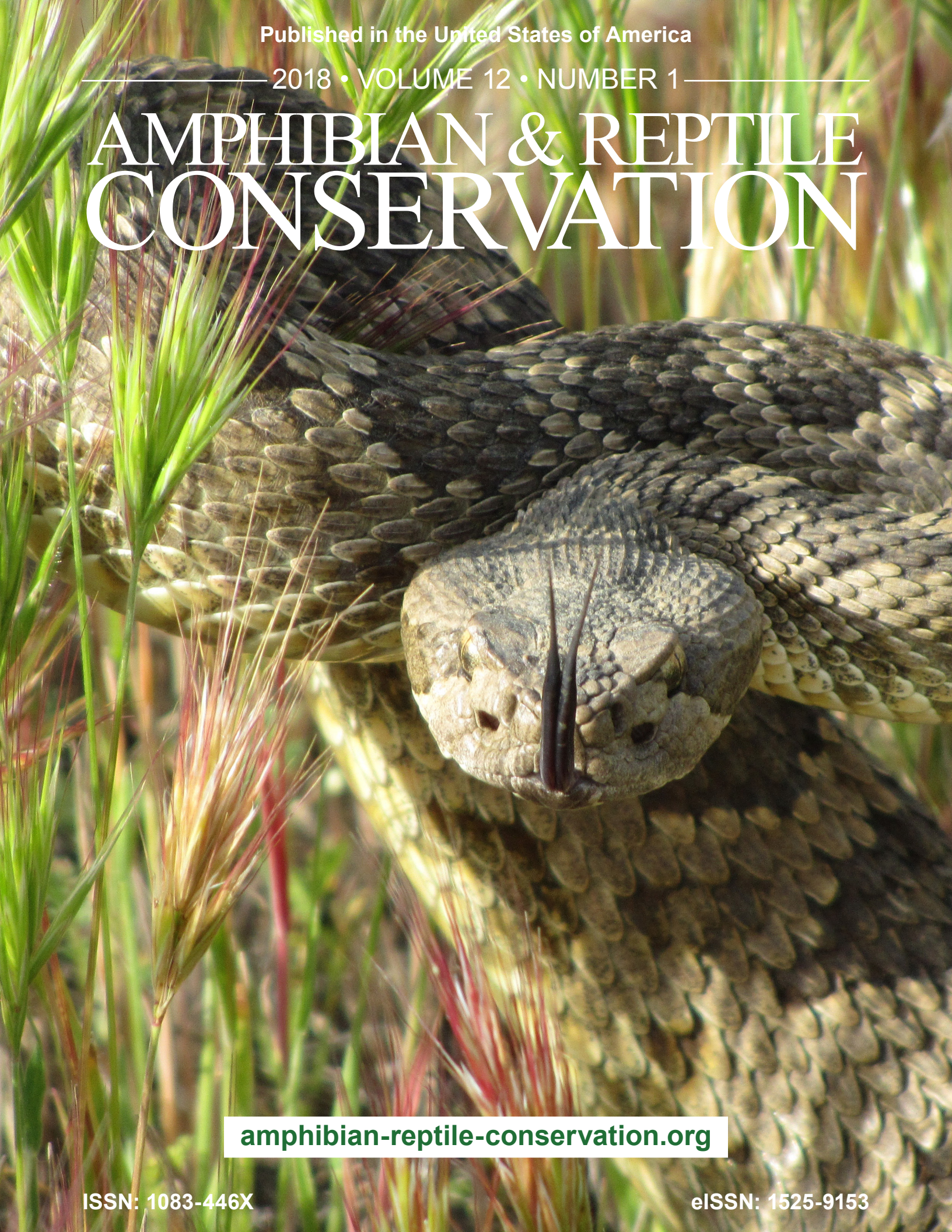
Published in the United States of America

2018 • VOLUME 12 • NUMBER 1

AMPHIBIAN & REPTILE CONSERVATION



amphibian-reptile-conservation.org

ISSN: 1083-446X

eISSN: 1525-9153

Official journal website:
amphibian-reptile-conservation.org

Amphibian & Reptile Conservation
12(1) [General Section]: 35–48 (e155).

Amphibians and reptiles of Parsa National Park, Nepal

[1]Santosh Bhattarai, [1,2]Chiranjibi Prasad Pokheral, [1]Babu Ram Lamichhane, [3]Uba Raj Regmi, [3]Ashok Kumar Ram, and [4]Naresh Subedi

[1]National Trust for Nature Conservation - Biodiversity Conservation Center, Ratnanagar-6, Sauraha, Chitwan-44204, NEPAL [2]National Trust for Nature Conservation-Central Zoo, Jawalakhel, Lalitpur, NEPAL [3]Department of National Parks and Wildlife Conservation, Parsa National Park, NEPAL [4]National Trust for Nature Conservation-Khumaltar, Lalitpur, NEPAL

***Abstract.*—We report the results of a herpetofaunal inventory between July, 2014 and March, 2017 of Parsa National Park that detected 51 herpetofaunal species. Three amphibians (*Microhyla nilphamariensis*, *Sphaerotheca breviceps*, and *Uperodon taprobanicus*), two Gecko species (*Hemidactylus flaviviridis* and *H. frenatus*), one Agamid (*Sitana fusca*), two Skinks (*Eutropis carinata* and *Sphenomorphus maculatus*), 13 snakes (*Ahaetulla nasuta*, *Bungarus lividus*, *Coelognathus helena*, *Coelognathus radiatus*, *Chrysopelea ornata*, *Dendrelaphis tristis*, *Lycodon aulicus*, *Lycodon jara*, *Oligodon arnensis*, *Psammodynastes pulverulentus*, *Ptyas mucosa*, *Rhabdophis subminiatus*, and *Trimeresurus albolabris*), and one crocodile (*Crocodylus palustris*) are new records to Parsa National Park. This paper aims to highlight the understanding of amphibians and reptiles of Parsa National Park and will be a reference for herpetofaunal management in the park.**

Keywords. Herpetofauna, biodiversity, conservation, protected area, Terai-Arc Landscape, new records

Citation: Bhattarai S, Pokheral CP, Lamichhane BR, Regmi UR, Ram AK, Subedi N. 2018. Amphibians and reptiles of Parsa National Park, Nepal. *Amphibian & Reptile Conservation* 12(1) [General Section]: 35–48 (e155).

Copyright: © 2018 Bhattarai et al. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits unrestricted use for non-commercial and education purposes only, in any medium, provided the original author and the official and authorized publication sources are recognized and properly credited. The official and authorized publication credit sources, which will be duly enforced, are as follows: official journal title *Amphibian & Reptile Conservation*; official journal website <*amphibian-reptile-conservation.org*>.

Received: 23 January 2018; **Accepted:** 20 February 2018; **Published:** 17 July 2018

Introduction

Globally, amphibians and reptiles are among the least studied vertebrate taxa (Fazey et al. 2005). The amphibians and reptiles of Nepal have a wide range of both vertical and horizontal distribution. However, the field of herpetology has always received less priority than other vertebrates (Bhattarai et al. 2017). Among herpetofaunal species, only the gharial (*Gavialis gangeticus*) subjected to long term monitoring and conservation efforts (Acharya et al. 2017). Information on species richness and distribution of amphibians and reptiles in management plans of many Protected Areas of Nepal including Parsa National Park (PNP) are poorly documented. Past studies by Schleich and Kästle (2002) and Shah and Tiwari (2004) recorded 37 species from the PNP and lack detailed locality information. Since then, several taxonomic revisions of the species have been done. In addition to this, Kästle et al. (2013) listed eight species of herpetofauna which underestimates the species richness of the PNP. Here, we provide the comprehensive checklist on species richness with natural history data to highlight understanding of the amphibian and reptile fauna of Parsa National Park.

Study Area

Parsa National Park (PNP), the youngest National Park in the country, was established in 1984 as Wildlife Reserve and upgraded to National Park in 2017. It is geographically located within 27°15' to 27°33'N, 84°41' to 84°58'E. The unique sub-tropical dry ecosystem was established to protect habitat mainly for the resident population of wild Asian elephant (*Elephas maximus*). However, it also provides a habitat for migratory wildlife species and a dispersal site for spill-over population of Chitwan National Park to which it is connected at its western boundary and Valmaki Tiger Reserve of India to the South. Examples are the Asian one-horned Rhinoceros (*Rhinoceros unicornis*), Royal Bengal tiger (*Panthera tigris*) and Gaur (*Bos gaurus*). Understanding the potential to conserve many charismatic species, the Government of Nepal extended the area of the PNP in 2015 and the current area is 627 km^2 (Fig. 1). Besides its biodiversity conservation value, the PNP is also serving the vital needs of the large human population living south of the park by conserving water sources in the Siwalik hill and has reduced the soil erosion in the hill. The PNP includes mainly sub-tropical forests of the Siwalik and

Correspondence. [1] *santosh.bhattarai@hotmail.com* (Corresponding author)

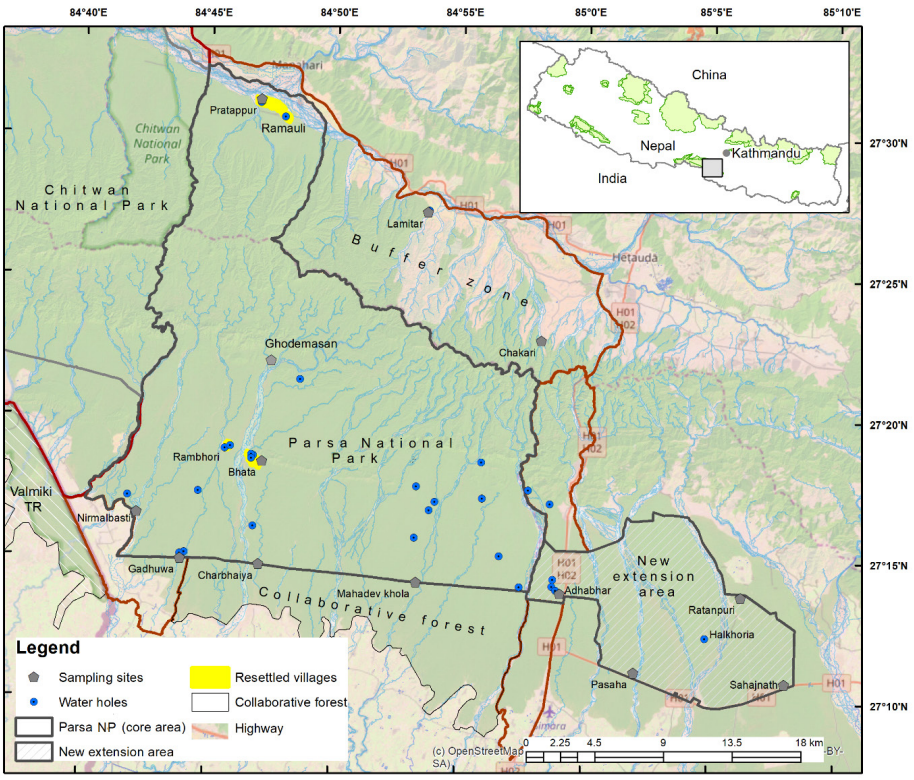


Fig. 1. Study location, Parsa National Park.

Bhabar physiographic regions of Parsa, Makwanpur and Bara districts. The vegetation is mainly dominated by Sal (*Shorea robusta*) forest, and riverbeds and flood plains are covered by *Saccharum spontaneum* and *Imperata cylindrica* (Chhetri 2003). Although the PNP is connected with Chitwan National Park (Nepal) and Valmiki Tiger Reserve (India), very little information on species richness and diversity is available (Lamichhane et al. 2017). We concentrated our search effort near permanent water bodies and artificially created ponds inside the park. Field investigations were conducted at Rambhori-Bhata, Halkhoria Daha, Amlekhganj-Hattisar, Adhabhar, Ghodemasan, Mahadev Khola, Gaduwa-line, and Nirmalbasti, Ramauli-Pratappur.

Field Methods

We conducted surveys in both the dry and wet seasons. We used the visual encounter survey protocol (Heyer et al. 1994) and active searches from 10–20 July, 2014, 15–27 March, 2015, 18–21 June, 2015, 04–10 February, 2016, 17–25 July, 2016, and 03–09 March, 2017. We covered all major sites within the park. Our search effort focused on recording the diverse herpetological community as efficiently as possible. On each expedition, we spent three hours of intensive search combined with opportunistic records. During the survey, on detection of an animal, we recorded the location, date, time, and microhabitat. We did not use dogs or chemicals or any auditory cues for species detection. However, we included opportunistic records of various herpetofauna encountered elsewhere within the PNP in our results. Photographs of detected animals were taken whenever possible and used as visual evidence for verifying species identifications. We used keys described in Smith (1935), Schleich and Kästle (2002), and Shah and Tiwari (2004) for identification. We followed Frost (2017) for nomenclature of amphibians and Uetz et al. (2017) for reptiles.

Results

We recorded 12 species of amphibians in eight genera and four families of anurans (Table 1), and 39 species of reptiles which consisted of five species of skinks, three species of Geckonids, two species of Agamids, two species of monitor lizards, 25 snake species, and one tortoise and crocodile each (Table 1). We recorded 22 additional species in the area which accounted for 51 species of the herpetofauna in the PNP. These additional species consist of three species of anurans, two species of gecko, two species of skinks, 13 snake species, and one crocodile species.

Species Accounts

AMPHIBIANS

Bufonidae (Gray 1825)

Duttaphrynus melanostictus (Schneider 1799): Recorded from Amlekhganj-Hattisar, Adhabhar, Rambhori-Bhata, Halkhoria Daha, Nirmalbasti, and Ramauli-Pratapur. This was commonly seen in and around human settlements during monsoon. Road-killed individuals of this

Table 1. Amphibians and Reptiles of Parsa National Park, Nepal. An asterisk (*) denotes new records to the area.

S.N.	Species	IUCN Status
AMPHIBIANS		
Bufonidae Gray, 1825		
1.	*Duttaphrynus melanostictus* (Schneider 1799)	LC
2.	*D. stomaticus* (Lütken 1864)	LC
Dicroglossidae Anderson, 1871		
3.	*Euphlyctis cyanophlyctis* (Schneider 1799)	LC
4.	*Fejarvarya syhadrensis* (Annandale 1919)	LC
5.	*Fejarvarya teraiensis* (Dubois 1984)	LC
6.	*Hoplobatrachus crassus* (Jerdon 1853)	LC
7.	*Hoplobatrachus tigerinus* (Daudin 1802)	LC
8.	**Sphaerotheca breviceps* (Schneider 1799)	LC
Microhylidae Gunther, 1858		
9.	**Microhyla* cf. *nilphamariensis* (Howlader, Nair, Gopalan, and Merila 2015)	LC
10.	*Uperodon globulosus* (Günther 1864)	LC
11.	**Uperodon taprobanicus* (Parker 1934)	LC
Rhacophoridae Hoffman, 1932 (1858)		
12.	*Polypedates maculatus* (Gray 1830)	LC
REPTILES		
Gekkonidae Gray, 1825		
13.	*Hemidactylus* cf. *brookii* Gray, 1845	NA
14.	**Hemidactylus flaviviridis* Rüppell, 1835	LC
15.	**Hemidactylus frenatus* Dúmeril and Bibron, 1836	LC
Agamidae Gray, 1827		
16.	*Calotes versicolor* (Daudin 1802)	NA
17.	**Sitana fusca* Schleich and Kästle, 1998	NA
Scincidae Gray, 1825		
18.	**Eutropis carinata* (Schneider 1801)	LC
19.	*Eutropis dissimilis* (Hallowell 1857)	NA
20.	*Eutropis macularia* (Blyth 1853)	NA
21.	*Lygosoma punctata* (Gmelin 1799)	NA
22.	**Sphenomorphus maculatus* (Blyth 1853)	NA
Varanidae Merrem, 1820		
23.	*Varanus bengalensis* (Daudin 1802)	LC
24.	*Varanus flavescens* (Hardwicke and Gray 1827)	NA
Typhlopidae Merrem, 1820		
25.	*Indotyphlops braminus* (Daudin 1803)	NA
Boidae Gray, 1825		
26.	*Eryx conicus* (Schneider 1801)	NA
Pythonidae Fitzinger, 1826		
27.	*Python bivittatus* Kuhl, 1820	VU
Colubridae Oppel, 1811		
28.	**Ahaetulla nasuta* (Bonnaterre 1790)	NA
29.	*Boiga trigonata* (Schneider 1802)	LC
30.	**Coelognathus helenam* (Daudin 1803)	NA
31.	**Coelognathus radiatus* (Boie 1827)	LC
32.	**Chrysopelea ornata* (Shaw 1802)	NA
33.	**Dendrelaphis tristis* (Daudin 1803)	NA

Table 1. Amphibians and Reptiles of Parsa National Park, Nepal. An asterisk (*) denotes new records to the area.

S.N.	Species	IUCN Status
Colubridae Oppel, 1811		
34.	**Lycodon aulicus* (Linnaeus 1758)	NA
35.	**Lycodon jara* (Shaw 1802)	LC
36.	**Oligodon arnensis* (Shaw 1802)	NA
37.	**Psammodynastes pulverulentus* (Boie 1827)	NA
38.	**Ptyas mucosa* (Linnaeus 1758)	NA
39.	*Sibynophis sagittarius* (Cantor 1839)	NA
Elapidae F. Boie, 1827		
40.	*Bungarus caeruleus* (Schneider 1801)	NA
41.	*Bungarus fasciatus* (Schneider 1801)	LC
42.	**Bungarus lividus* Cantor, 1839	NA
43.	*Naja naja* (Linnaeus 1758)	NA
44.	*Ophiophagus hannah* (Cantor 1836)	VU
Natricidae Bonaparte, 1838		
45.	*Amphiesma stolatum* (Linnaeus 1758)	NA
46.	*Xenochropis piscator* (Schneider 1799)	NA
47.	**Rhabdophis subminiatus* (Schlegel 1837)	NA
Viperidae Oppel, 1811		
48.	*Daboia russelii* (Shaw and Nodder 1797)	LC
49.	**Trimeresurus albolabris* Gray, 1842	NA
Testudinidae Batsch, 1788		
50.	*Indotestudo elongata* (Blyth 1854)	EN
Crocodylidae Cuvier, 1806		
51.	**Crocodylus palustris* Lesson, 1831	VU

species were frequently observed in the east-west national highway between Amlekhgunj and Adhabhar segment. This is the most common bufonid in Terai, Nepal (Fig. 2).



Fig. 2. *Duttaphrynus melanostictus*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Duttaphrynus stomaticus (Lütken 1864): This was frequently encountered at NTNC-Parsa Conservation Program Office complex, Hattisar, Amlekhganj, Adhabhar, Ramauli-Pratappur, Bhata, and Nirmalbasti (Fig. 3). The individuals can be distinguished from *D. melanostictus* by absence of canthal black ridge and smaller tympanum.



Fig. 3. *Duttaphrynus stomaticus*. *Photograph by Santosh Bhattarai.*

Dicroglossidae (Anderson 1871)

Euphlyctis cyanophlyctis (Schneider 1799): The most common frog of Terai Nepal within and outside protected areas commonly encountered in water pools (Fig. 4).



Fig. 4. *Euphlyctis cyanophlyctis*. *Photograph by Santosh Bhattarai.*

Fejarvarya syhadrensis (Annandale 1919): The individuals we recorded had no mid dorsal line with reddish orange patches which is characteristic of this species (Schleich and Kästle 2002). We recorded this species along marshy lands in the ponds inside the park.

Fejervarya teraiensis (Dubois 1984): The calling males were recorded at puddles in Amlekhgunj, Adhabar, and Bhata. The individuals had a cream colored mid dorsal line with dorsolateral fold. According to Schleich and Kästle (2002), this species is well distributed in the entire Terai from 71 to 400 m.

Hoplobatrachus crassus (Jerdon 1853): We found an individual of this species at an army post in Gaduwaline inside the park. Shah and Tiwari (2004) also recorded this species from Parsa.

Hoplobatrachus tigerinus (Daudin 1802): This is the largest frog of Terai region. Yellow colored breeding males were frequently observed in puddles during monsoon (Fig. 5).



Fig. 5. *Hoplobatrachus tigerinus*. *Photograph by Santosh Bhattarai.*

Sphaerotheca breviceps (Schneider 1799): Almost toad-like, stocky with distinct supratympanal fold. We found some specimens in Halkhoria Daha and Amlekhgunj-Hattisar area during June and July and calling males were also observed. This is the first record to Parsa National Park.



Fig. 6. *Sphaerotheca breviceps*. *Photograph by Santosh Bhattarai.*

Microhylidae (Günther 1843, 1858)

Microhyla cf. *nilphamariensis* (Howlader, Nair, Gopalan, and Merila 2015): The type locality of this frog is Koya Golahut, Saidpur, Nilphamari, Bangladesh. Recently, Khatiwada et al. (2017) recorded it from central and eastern Nepal and proposed the Chitwan population to be *M. nilphamarariensis* based on molecular and call records. We believe the Parsa population to be *M. nilphamariensis* (Fig. 7). However, only detailed molecular study will resolve its taxonomy.



Fig. 7. *Microhyla* cf. *nilphamariensis*. *Photograph by Santosh Bhattarai.*

Uperodon globulosus (Günther 1864): This bulky globular frog is frequently seen during monsoon, when calling males were seen during the night in Bhata area. Shah and Tiwari (2004) also reported the occurrence of this species from Parsa National Park (Fig. 8).



Fig. 8. *Uperodon globulosus*. *Photograph by Santosh Bhattarai.*

Uperodon taprobanicus (Parker 1934): This frog is grayish black, and individuals have reddish-orange dorsolateral irregular bands. Individuals with a mid-dorsal line from snout to vent and with mid-dorsal line were recorded (Fig. 9). Males have folded black vocal sacs and were observed in amplexus. According to Schleich and Kästle (2002), this species is distributed from central to eastern Nepal between 100 and 300 m elevation. Bhattarai et al. (2017a) also recorded this species from Beeshazar and associated lakes, a Ramsar site.



Fig. 9. *Uperodon taprobanicus*. *Photograph by Santosh Bhattarai.*

Rhacophoridae (Hoffman 1932)

Polypedates maculatus (Gray 1830): Calling males were frequently observed at NTNC-Parsa Conservation Program office complex during the monsoon. This species was frequently observed on the office window and in the bathroom (Fig. 10).



Fig. 10. *Polypedates maculatus*. *Photograph by Santosh Bhattarai.*

REPTILES

Gekkonidae (Gray 1825)

Hemidactylus cf. *brookii* (Gray 1845): Individuals with strongly keeled dorsal tubercles and tails with spines were recorded. Schleich and Kästle (2002) recorded *H. brookii* on buildings in Chitwan National Park. However, we recorded them in dead logs inside the park in Parsa National Park (Fig. 11). This species is regarded as a species complex and has been proposed for detailed molecular studies to solve taxonomy of Nepalese populations (Rösler and Glaw 2010; Kathriner et al. 2014).



Fig. 11. *Hemidactylus brookii*. *Photograph by Santosh Bhattarai.*

Hemidactylus flaviviridis (Rüppell 1835): This is a common house gecko in the study area. Frequently seen at houses, park guard posts and army posts, and the temple inside the park, as well as villages nearby the park. This is the first record from the Parsa National Park.

Hemidactylus frenatus (Dúmeril and Bibron 1836): We reported two individuals of this species, photographed at Bhata-Hattisar and Gaduwa. This is the first record of this species from Parsa National Park.

Agamidae (Gray 1827)

Calotes versicolor (Daudin 1802): This is the most common diurnal agamid distributed from below 100 m to 3,200 m in Nepal (Schleich and Kästle 2002). The species was frequently observed in and out of the park boundary (Fig. 12).



Fig. 12. *Calotes versicolor*. *Photograph by Santosh Bhattarai*.

Sitana fusca (Schleich and Kästle 1998): This species was described from Bardibas, Mahottari district, Nepal ca. 100 km east of Parsa National Park. This is the first record of *Sitana* from Parsa National Park. This species was frequently observed at NTNC-Parsa Conservation Program office complex, Bhedaha Khola, and Darau Khola. In June 2016, a gravid female was observed nesting in the office complex, and two hatchlings of same species were encountered in August 2016 (Fig. 13).



Fig. 13. Nesting female of *Sitana fusca*. *Photograph by Santosh Bhattarai.*

Scincidae (Gray 1825)

Eutropis carinata (Schneider 1801): Commonly observed inside the park basking in open grassland and on rocky substrates. Observed at Kamini Daha, Bhata, Mahadev Khola, Halkhoria Daha, Ghode Masan, Ramauli-Pratappur, Sikaribasb Bhedaha Khola, and Darau Khola. This is one of the most commonly observed skinks in Nepal. However, earlier researchers did not report it from Parsa National Park (Fig. 14).



Fig. 14. *Eutropis carinata*. *Photograph by Kapil Pokharel/ NTNC-BCC.*

Eutropis dissimilis (Hallowell 1857): Recorded from Amlekhgunj-Hattisar, Sikaribaas basking during winter. This species is rarely seen compared to its congenerics in Parsa National Park (Fig. 15).



Fig. 15. *Eutropis dissimillis*. *Photograph by Kapil Pokharel/ NTNC-BCC.*

Eutropis macularia (Blyth 1853): Observed from Kamini Daha, Amlekhgunj-Hattisar, Bhata, Nirmalbasti, Ramauli Pratappur, Mahadev Khola, and Ghode Masan (Fig. 16).



Fig. 16. *Eutropis macularia*. *Photograph by Binod Darai/ NTNC-BCC.*

Lygosoma punctata (Gmelin 1799): Observed from Bhata, Adhabhar, Sikaribaas, and Shitalpur (Fig. 17).



Fig. 17. *Lygosoma punctata*. *Photograph by Binod Darai/ NTNC-BCC.*

Sphenomorphus maculatus (Blyth 1853): This species was frequently observed in the foothills of Siwaliks inside the park and found basking on the rocks of dry river beds (Fig. 18). This is the first record for Parsa National Park.



Fig. 18. *Sphenomorphus maculatus*. *Photograph by Santosh Bhattarai.*

Varanidae (Merrem 1820)

Varanus bengalensis (Daudin 1802): Individuals were observed at Kamini Daha, Masine area, Bhata, Adhabhar-PNP office, Bhedaha Khola, Shitalpur, and Ramauli-Pratapur. They were frequently observed at human habitations at Amlekhgunj, and one adult was rescued from the Nepal Oil Corporation's office complex. The species is frequently seen in holes of the Sal (*Shorea robusta*) trees lying on the ground and on standing trees (Fig. 19).



Fig. 19. *Varanus bengalensis*. *Photograph by Kapil Pokharel/ NTNC-BCC.*

Varanus flavescens (Hardwicke and Gray 1827): This species was frequently encountered in the buffer zone around the PNP and in agricultural lands outside the park boundary. It is a legally protected varanid of Nepal which has been accorded the highest degree of protection in Schedule-I under the National Parks and Wildlife Conservation Act, 1973. The species is facing severe threat due to illegal hunting for its flesh and skin. The skin of varanids is used for making musical instruments by local communities.

Typhlopidae (Merrem 1820)

Indotyphlops braminus (Daudin, 1803): The species was observed from Kamini Daha living inside leaf litter.

Boidae (Gray 1825)

Eryx conicus (Schneider 1801): This species was encountered at Amlekhgunj-Hattisar (Fig. 20).



Fig. 20. *Eryx conicus*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Pythonidae (Fitzinger 1826)

Python bivittatus (Kuhl 1820): The python is the largest snake species in Nepal and it is distributed from Nepalese Terai up to 2,800 m elevation in Nepal (Bhattarai et al. 2017). In the PNP, the species was observed from Bhata, Amlekhgunj-Hattisar, Halkhoria Daha, and Ramauli Pratapur (Fig. 21). The PNP has dry sub-tropical habitat and gets incidental fire. One injured python was found with wounds inside the park at Kamini Daha.



Fig. 21. *Python bivittatus*. *Photograph by Om P. Chaudhary/ NTNC-BCC.*

Colubridae (Oppel 1811)

Ahaetulla nasuta (Bonnaterre 1790): An individual of this species was observed at Mahadev Khola basking on grasses and flew to the bush when approached. Another individual was observed at Shitalpur on a *Mallotus philippensis* tree approximately 3.5 m from ground level. We report this species for the first time from the park.

Boiga trigonata (Schneider 1802): Many killed specimens were found in the buffer villages and highway between Amlekhgunj and Pathlaiya section of the National Park (Fig. 22).

Coelognathus helena (Daudin 1803): Observed from Amlekhgunj-Hattisar, Adhabhar-PNP office complex, and Ramauli Pratapur. This is the first record from Parsa National Park.

Coelognathus radiatus (Boie 1827): Dead specimens were found near human habitation, and an individual was recorded at Kamini Daha. In May and June, the species is frequently observed in buffer villages of the park, and people kill the snakes when they encounter them.



Fig. 22. *Boiga trigonata*. *Photograph by Kapil Pokharel/ NTNC-BCC.*

Chrysopelea ornata (Shaw 1802): A juvenile individual was observed at Shikaribas Khola, and a dead specimen was found at Amlekhgunj-Hattisar (Fig. 23). This is the first record from Parsa National Park.



Fig. 23. *Chrysopelea ornata*. *Photograph by Kapil Pokharel/ NTNC-BCC.*

Dendrelaphis tristis (Daudin 1803): The basking individuals were encountered at Amlekhgunj-Hattisar, Bhata-Hattisar, and Ghodemasan (Fig. 24). This is the first record from Parsa National Park.



Fig. 24. *Dendrelaphis tristis*. *Photograph by Om P. Chaudhary/ NTNC-BCC.*

Lycodon aulicus (Linnaeus 1758): Observed at NTNC-Parsa Conservation Program Office complex, and dead individuals were found at Amlekhgunj-Hattisar. A basking individual was frequently observed in a crevice of a cemented water tank (Fig. 25). This is the first record from Parsa National Park.



Fig. 25. *Lycodon aulicus*. *Photograph by Santosh Bhattarai.*

Lycodon jara (Shaw 1802): Observed at Amlekhgunj-Hattisar. According to Schleich and Kästle (2002), it is a rarely found species from Terai Nepal. However, there are published reports of it in bordering states of India as well. This is the first record from Parsa National Park (Fig. 26).



Fig. 26. *Lycodon jara*. *Photograph by Santosh Bhattarai.*

Oligodon arnensis (Shaw 1802): Observed from Amlekhgunj-Hattisar and NTNC-Parsa Conservation Office Complex (Fig. 27). This species is also frequently observed in Chitwan National Park.



Fig. 27. *Oligodon arnensis*. P*hotograph by Kapil Pokharel/ NTNC-BCC.*

Psammodynastes pulverulentus (Boie 1827): According to Schleich and Kästle (2002), the records of the species were from Butwal, western Nepal, and Khotang, Udaypur, and Ilam from eastern Nepal. Recently, Bhattarai et al. (2017) reported it from Ratomate-Harda Khola, Chitwan National Park. Later the species was also observed at Triveni area of Chitwan National Park. In the PNP, the species was observed at Ghodemasan area, being the first record from the PNP (Fig. 28).

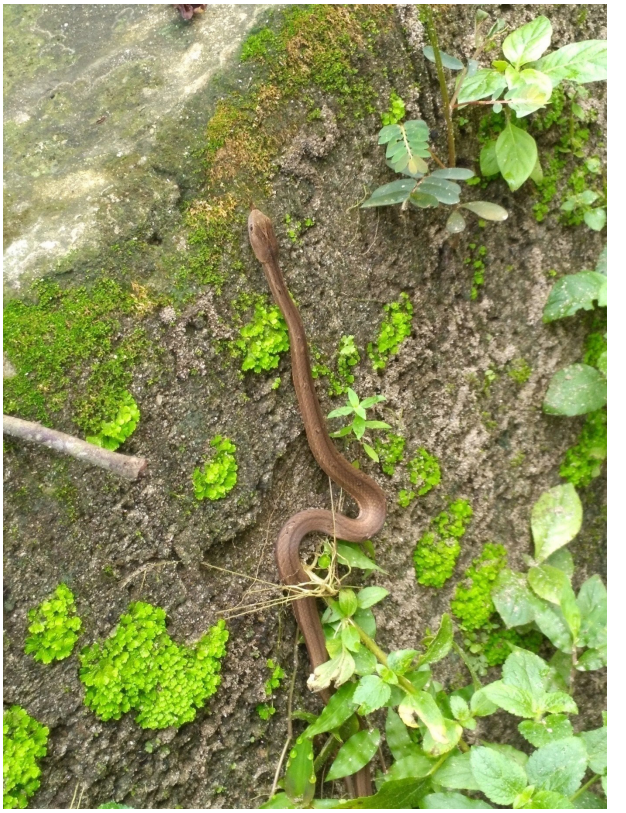


Fig. 28. *Psammodynastes pulverulentus*. *Photograph by Tirtha Lama/NTNC-BCC*, photograph taken at Triveni, Chitwan National Park.

Ptyas mucosa (Linnaeus 1758): Animals in combat were observed on 7 June, 2016. A road-killed specimen in the segment between Amlekhgunj and Adhabhar was recorded. Individuals were frequently observed at NTNC-Parsa Conservation Office complex (Fig. 29). This report is the first record for Parsa National Park.



Fig. 29. *Ptyas mucosa*. *Photograph by Santosh Bhattarai.*

Sibynophis sagittarius (Cantor 1839): A specimen was found at Ghodemasan area basking on a riverbed (Fig. 30).



Fig. 30. *Sibynophis sagittarius*. *Photograph by Kapil Pokharel.*

Elapidae (F. Boie 1827)

Bungarus caeruleus (Schneider 1801): Specimens observed at Amlekhgunj-Hattisar. Killed specimens were found near human habitation (Fig. 31).



Fig. 31. *Bungarus caeruleus*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Bungarus fasciatus (Schneider 1801): One individual was found crawling inside Amlekhgunj-Hattisar in July 2016.

Bungarus lividus (Cantor 1839): An individual was observed at Bhata-Hattisar on forest trail towards Bhata-temple. The second individual was found killed in Amlekhgunj. This is the first record from Parsa National Park.

Naja naja (Linnaeus 1758): An individual was found basking in the riverbed of Bhedah Khola. Two individuals were found killed at human habitation at Amlekhgunj (Fig. 32).



Fig. 32. *Naja naja*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Ophiophagus hannah (Cantor 1836): A dead specimen was recorded at Amlekhgunj-Hattisar. Another individual was observed at Shitalpur camp in November 2016. (Fig. 33).



Fig. 33. *Ophiophagus hannah*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Natricidae (Bonaparte 1838)

Amphiesma stolatum (Linnaeus 1758): Frequently observed at Amlekhgunj-Hattisar, Bhata-Hattisar, and Adhabhar-PNP office complex. An individual was observed feeding on *Duttaphrynus melanostictus* at NTNC-Parsa Conservation Office complex. Road kills observed in the segment between Amlekhgunj and Adhabhar (Fig. 34).



Fig. 34. *Amphiesma stolatum*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Xenochrophis piscator (Schneider 1799): The species was frequently observed in human habitation and a specimen was seen in the Bhata wetland (Fig. 35).



Fig. 35. *Xenochropis piscator*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Rhabdophis subminiatus (Schlegel 1837): Record of this species was previously not reported from the PNP. Schleich and Kästle (2002) reported it from the Chitwan National Park. The specimen was recorded at Ghodemasan area basking on a rock (Fig. 36) in November 2016.



Fig. 36. *Rhabdophis subminiatus*. *Photograph by Dip Prasad Chaudhary/NTNC-BCC.*

Viperidae (Oppel 1811)

Daboia russelii (Shaw and Nodder 1797): A single individual was observed from Bhata on the way to Rambhori grassland. The individual was basking near a gabion wall (Fig. 37).

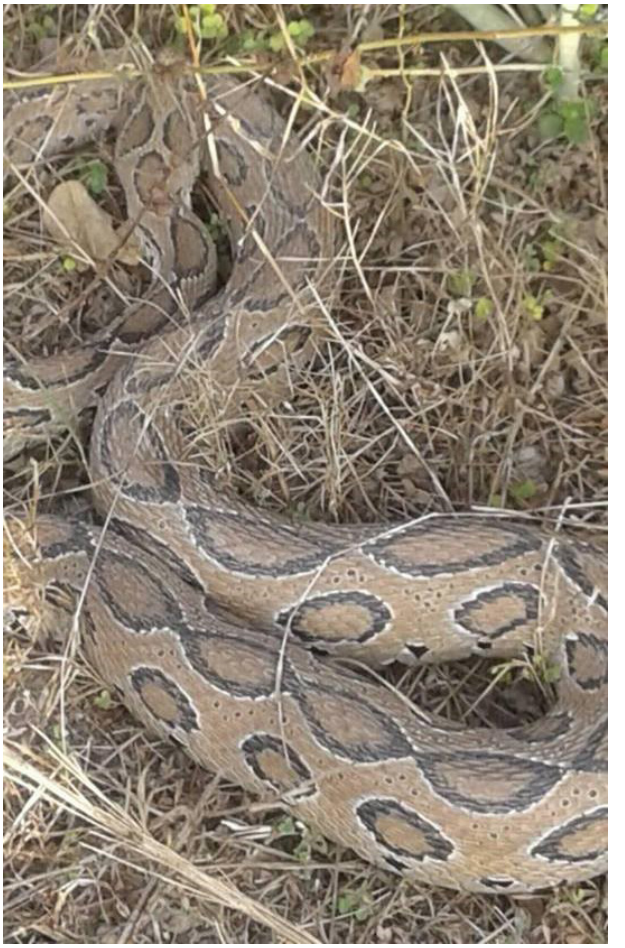


Fig. 37. *Daboia russelii*. *Photograph by Santosh Bhattarai*.

Trimeresurus albolabris (Gray 1842): Two individuals were observed at Kamini Daha in March 2014 and June 2015. The third individual was observed from Ramauli-Pratapur in December 2016 (Fig. 38).



Fig. 38. *Trimeresurus albolabris*. *Photograph by Kapil Pokharel/NTNC-BCC.*

Testudinidae (Batsch 1788)

Indotestudo elongata (Blyth 1854): An individual was observed at Ghodemasan. Two rescued individuals were kept at Amlekhgunj-Hattisar. Later, they were released inside the park. Local people, especially business people, like to keep turtles and tortoises in captivity believing they are a sign of good luck for their business (Fig. 39).



Fig. 39. *Indotestudo elongata*. *Photograph by Santosh Bhattarai.*

Crocodylidae (Cuvier 1806)

Crocodylus palustris (Lesson 1831): An individual was kept in an enclosure in Amlekhjung-Hattisar. Later, it was released in a wetland inside the park at Bhata.

Discussion

Our short expeditions resulted in 22 new species records for the PNP, including three species of frog, two geckos, one Agamid, two skink species, 13 snake species, and one crocodile. The details of new species recorded for the PNP are in Table 1.

The record of *Traschischium tenuiceps* by Kästle et al. (2013) from the PNP needs to be verified as the elevational range of the species in Nepal is 1,500–2,400 m (Schleich and Kästle 2002). We presume that the species was mistakenly reported from the PNP.

Our survey mainly focused on daytime searches due to logistics. It is highly likely that many other amphibians and reptiles remain to be added to the list, especially fossorial and arboreal species. During our survey we failed to document *Eryx johnii* (Russell 1801) as this species is frequently observed in nearby areas.

Among the species we recorded, *Varanus flavescens* and *Python* sp. are legally protected species in Nepal. The pythons are the only legally protected snake species of Nepal which has been accorded the highest degree of protection under the National Parks and Wildlife Conservation Act, 1973. The Act has included the python in the Schedule-I as *Python molurus*. In 2009 *Python bivittatus* was elevated to specific status, and the occurrence of *Python molurus* in Nepal is doubtful (Bhattarai 2014). Therefore, we suggest *P. bivittatus* be listed in the Act instead of *P. molurus*.

The IUCN has evaluated the tortoise *Indotestudo elongata* as an endangered species. Similarly, *Crocodylus palustris*, *Ophiophagus hannah*, and *Python bivittatus* have been categorized as vulnerable species. The rampant killing of snake species in the buffer zone of the PNP is an observed threat. Buffer communities perceive all snakes to be venomous despite the fact that only 17% of Nepalese snakes are venomous (Bhattarai et al. 2017; Sharma et al. 2013).

The national east-west highway bisects the park in the Amlekhganj-Pathlaiya section where many wild species are frequently observed trampled by the vehicular movement. The regular monitoring of this section will reveal the extent of wildlife loss due to vehicles.

The PNP shares its western boundary with Chitwan National Park, and the Siwalik hill in the North might have unique species as this park has comparatively drier habitats. We believe detailed inventory will further increase the species richness and diversity of the park.

Acknowledgements.—Amphibians and reptiles were recorded during field implementation of two projects: 1. Community Based Human-Elephant Conflict Management in Chitwan-Parsa Complex (*Grant no# F15AP00340*), 2. Mitigating Human-Tiger Conflict engaging local community in Parsa National Park (*Grant no# F15AP00781*). We would like to thank US Fish and Wildlife Service for these two funds to NTNC-BCC. We extend our gratitude to Department of National Parks and Wildlife Conservation, Chitwan and Parsa National Parks for endorsing these projects. We thank Kapil Pokharel, Harka Man Lama, Om Prakash Chaudhary, Ashish Gurung, Dip Prasad Chaudhary, Binod Darai, Ramesh Darai, Tirtha Lama, and team NTNC-BCC for their assistance in the field. We also acknowledge ZSL Nepal office for funding support to carryout camera trap survey in Parsa National Park. We would also like to thank Mark O'Shea and Peter Uetz for their comments on the draft manuscript. We would also acknowledge Abhijit Das and two other reviewers for their comments on the manuscript.

Literature Cited

Acharya KP, Khadka BK, Jnawali SR, Malla S, Bhattarai S, Wikramanayake E, Kohl M. 2017. Conservation and population recovery of Gharials (*Gavialis gangeticus*) in Nepal. *Herpetologica* 73(2): 129–135.

Bhattarai S, Gurung A, Chalise L, Pokheral CP. 2017. Geographic Distribution: *Psammodynastes pulverulentus* (Mock Viper). *Herpetological Review* 48(1): 129.

Bhattarai S, Pokheral CP, Lamicchane BR. 2017. Death-feigning behavior in Burmese Python *Python bivittatus* Kuhl, 1820 in Chitwan National Park. *Russian Journal of Herpetology* 24(4): 323–326.

Bhattarai S, Pokheral CP, Lamichhane BR, Subedi N.

Herpetofauna of a Ramsar Site: Beeshazar and Associated Lakes, Chitwan National Park Nepal. *IRCF Reptiles & Amphibians* 24(1): 17–29.

Bhattarai S, Thapa KB, Chalise L, Gurung A, Pokheral CP, Subedi N, Thapa TB, Shah KB. 2017. On the distribution of the Himalayan Stripe-necked Snake *Liopeltis rappi* (Günther, 1860) (Serpentes: Colubridae) in Nepal. *Amphibian & Reptile Conservation* 11(1) [General Section]: 88–92 (e139).

Bhattarai S. 2014. Population of *Python bivittatus* in Bardia National Park, Nepal. M.Sc. Dissertation Report, Department of Wildlife Science, University of Kota, Rajasthan, India. 64 p.

Chetri M. 2003. Food habits of gaur *Bos gaurus gaurus* Smith, 1827 and livestock (cows and buffaloes) in Parsa Wildlife Reserve, Central Nepal. *Himalayan Journal of Sciences* 1(1): 31–36.

Fazey I, Fischer J, Lindenmayer DB. 2005. What do conservation biologists publish? *Biological Conservation* 124: 63–73.

Frost DR. 2017. Amphibian Species of the World: An Online Reference. Version 6.0. American Museum of Natural History, New York, New York, USA. Available: http://research.amnh.org/vz/herpetology/amphibia/ [Accessed: 25 November 2017].

Heyer WR, Donnelly MA, McDiarmid RW, Hayek LC, Foster MS. 1994. *Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians*. Smithsonian Institution Press. Washington, DC, USA. 364 p.

Kästle W, Rai K, Schleich HH. 2013. *Field Guide to Amphibians and Reptiles of Nepal*. ARCO-Nepal e.V. Munich, Germany. 625 p.

Kathriner A, O'Shea M, Kaiser H. 2014. Re-examination of *Hemidactylus tenkatei* van Lidth de Jeude, 1895: Populations from Timor provide insight into the taxonomy of the *H. brookii* Gray, 1845 complex (Squamata: Gekkonidae). *Zootaxa* 3887(5): 583–599.

Khatiwada JR, Guo CH, Wang SH, Thapa A, Wang B, Jiang J. 2017. A new species of *Microhyla* (Anura: Microhylidae) from Eastern Nepal. *Zootaxa* 4254(2): 221–239.

Lamichhane BR, Pokheral CP, Poudel S, Adhikari D, Giri SR, Bhattarai S, Bhatta TR, Pickles R, Amin R, Acharya KP, Dhakal M, Regmi UR, Ram AK, Subedi N. 2017. Rapid recovery of tigers *Panthera tigris* in Parsa Wildlife Reserve, Nepal. *Oryx* 52(1): 16–24. doi:10.1017/S0030605317000886.

Rösler H, Glaw F. 2010. Morphological variation and taxonomy of *Hemidactylus brookii* Gray, 1845, *Hemidactylus angulatus* Hallowell, 1854, and similar taxa (Squamata, Sauria, Gekkonidae). *Spixiana* 33: 139–160.

Schleich HH, Kästle W. 2002. *Amphibians and Reptiles of Nepal*. Koenigstein: Koeltz Scientific Books, Germany. 1,200 p.

Shah KB, Tiwari S. 2004. *Herpetofauna of Nepal: A Conservation Companion – Kathmandu*. IUCN Nepal, Kathmandu, Nepal. 237 p.

Sharma SK, Pandey DP, Shah KB, Tillack F, Chappuis F, Thapa CL, Elirol E, Kuch U. 2013. *Venomous Snakes of Nepal: A Photographic Guide*. B.P. Koirala Institute of Health Sciences, Dharan, Nepal. 86 p.

Smith, MA. 1935. *The Fauna of British India, Including Ceylon and Burma. Reptilia and Amphibia*, *Volume 2: Sauria*. Taylor and Francis, London, England. 440 p.

Uetz P, Freed P, Hošek J, editors. 2017. The Reptile Database. Available: htpp://www.reptile-database.org [Accessed: 17 December 2017].



Santosh Bhattarai currently works as Conservation Officer at National Trust for Nature Conservation- Biodiversity Conservation Center (NTNC-BCC), Sauraha, Chitwan, Nepal. He is particularly interested to understand evolutionary and ecological drivers of amphibians and reptiles by which species diversify and accumulate through time and space.



Chiranjibi Prasad Pokheral currently works as Program Manager at National Trust for Nature Conservation-Central Zoo, Lalitpur, Nepal. He completed his Ph.D. in 2012 and has more than two decades of experience in species conservation and management in Nepal. He is focused on tiger conservation in Nepal.



Babu Ram Lamichhane currently works as Research Officer at NTNC-BCC. He is interested in Human-Carnivore interactions and is pursuing his doctoral study in the same topic.



Uba Raj Regmi works at Department of National Parks and Wildlife Conservation. He has more than 25 years of experience of managing Protected Areas in Nepal. He currently works as Chief Conservation Officer at Langtang National Park, Nepal.



Ashok Kumar Ram works at Department of National Parks and Wildlife Conservation. Currently, he is working as Assistant Conservation Officer at Parsa National Park. He is focused on Human-Elephant conflict management issues.



Naresh Subedi completed his Ph.D. in 2012 and is currently based at NTNC-central office, Kathamandu, and works in the capacity of Conservation Program Manager. His earlier studies focsed on impact of invasive species on native wild animals and their conservation measures.