ARTICLES

Biawak, 3(4), pp. 100-105

Conservation Status of *Varanus flavescens* in Chitwan, Nepal

JANAK RAJ KHATIWADA and BIPIN CHANDRA GHIMIRE

Himalayan Research and Conservation Nepal
GPO Box 8975 EPC 5997, Kathmandu, Nepal
E-mail: nepalhimalaya@gmail.com

Abstract: In Nepal, the biology and conservation status of *Varanus flavescens* is poorly known. Hence we undertook direct visual and indirect (questionnaire) surveys to assess the presence of monitor lizards across four areas of Chitwan to aid in assessing their conservation status. The species was reported present in all four surveyed areas. Mostly, the species was directly observed associated with agricultural land. Illegal hunting for meat and skin, habitat degradation and disturbance, particularly in patchy forests adjoining the agricultural land, appear to be the most significant threats to *V. flavescens* in the areas surveyed. In order to ensure the long-term survival of the species, it is essential to develop an adequate conservation strategy and have effective law enforcement to stop poaching.

Introduction

Varanus flavescens is poorly studied in Nepal and generally across its range in south Asia. Its distribution includes the south Asian countries of Nepal, India, Pakistan and Bangladesh (Shah and Tiwari, 2004). It is categorized as lower risk/least concern on the IUCN Red List (IUCN, 2009) but all south Asian populations are listed in CITES Appendix I. Similarly, it is legally protected by the government of Nepal under Schedule I (Section 10) of the National Parks and Conservation Act (1973). It prefers swamps around bodies of water, but is also found in forests and cultivated lands (Shah and Tiwari, 2004). *Varanus flavescens* has been reported from the entire lowlands of Nepal; however, its current conservation status is still unknown. Herpetofaunal studies have reported a total of 143 species of amphibians and reptiles from Nepal (Shah and Tiwari, 2004; Schleich and Kätsle, 2002). The lowland Terai is hot and humid and is extremely rich in its herpetofaunal assemblage. So far, there has been a lack of baseline data for *V. flavescens*. In addition, increased poaching of monitor lizards for their valuable skin is suspected of being a significant threat to the species. They are also used directly and indirectly as food and medicines in various parts of Nepal (Shah, 1997). *Varanus flavescens* and *V. bengalensis bengalensis* are the only two monitor lizards found in Nepal, and both species have been previously recorded from the Chitwan. This paper attempts to provide the conservation status and distribution of *V. flavescens*, and identify the threats to its existence in the area. The intent of our study is to provide preliminary information to assist planning for potential conservation interventions for this species in lowland Terai Nepal.

Study Site

The study (Fig. 1) was carried out in the Chitwan district of Nepal across four different localities (Bachhauli Village Development Committee (hereafter VDC), ward no. 7, 8 and 9; Kumroj VDC: 1, 2, and 3; Ratnanagar Municipality ward no. 4 and 5; and Bharatpur Municipality ward no. 8 and 9). These areas lie in the buffer zone of Chitwan National Park. Chitwan lies in the inner Doon Valley in the central Terai of Nepal, between the Siwalik Hills in the south and the

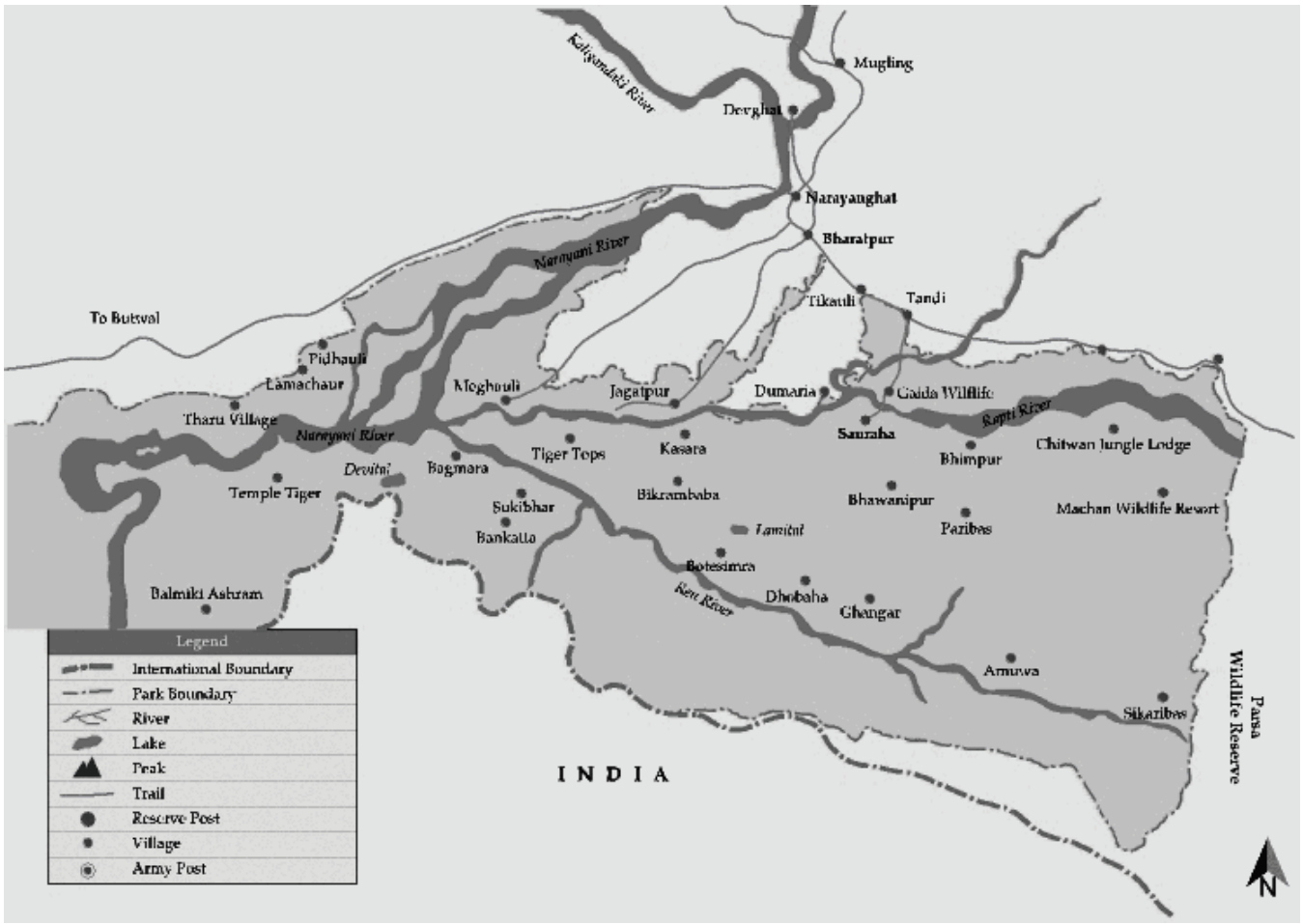

Fig. 1. Map of Chitwan showing Chitwan National Park (not to scale).

Mahabharat Hills to the north. The climate of the area is subtropical, mainly dominated by the southeast monsoon. The rainfall averages 2400 mm per year and about 90% of rainfall concentrates within four months of monsoon season (June-September). The monsoon rain causes dramatic flooding and changes in the character and course of rivers, and has a major seasonal effect on ecosystem dynamics. November to mid February is marked as the cool season where temperatures can drop to 9 °C. The hot season occurs from mid-February to May, where temperatures can reach 36 °C (Dinerstein, 2003). Residents in the study area were from different ethnicities and origins; however, the predominant ethnic group was the Tharus who typically live in close proximity to the forests of the Terai (Baral and Heinen, 2007).

Methods

The study was conducted from June to September 2008 during three field sessions: 13-23 June; 20-30 August; and 21-29 September. Observations of *V. flavescens* were conducted using the Visual Encounter Survey Method (Campbell and Christman, 1982; Corn and Bury, 1990; Crump and Scott, 1994; Heyer et al., 1994) through vigorous searching in different habitat types including forest, grassland, human settlements, wetlands, and agricultural lands; all areas suspected of supporting monitors. Whenever a *V. flavescens* was sighted, the time of observation, number of individuals, size class (juveniles ≤ 1 m total body length; adult > 1 m total body length) and habitat type with GPS coordinates were noted. Household surveys were carried out in the area to assess the conservation status of the species and to find out attitudes of local people towards *V. flavescens*. A total of 60 randomly selected respondents from four different areas within the study area were interviewed using structured questionnaires. A total of 20 respondents were interviewed from Bachhauli VDC, 15 from Kumroj VDC, 12 from Ratnanagar Municipality, and 13 from Bharatpur Municipality, respectively.

Results

Status and Distribution of Varanus flavescens

The survey covered four different study sites across the buffer zone area of Chitwan National Park. *Varanus flavescens* was present in all areas surveyed. The highest number of sightings occurred in the Jhuwani area of Bachhauli VDC ward numbers 7 and 9, with five individuals observed (Table 1). Most were observed in agricultural land which is close to the Dhure Khola (river). Similarly, Kumroj village is located adjacent to Chitwan National Park and Kumroj Community forest, which lies between two rivers, Dhumre Khola and Icharni Khola, and also provided suitable habitat for the species. Four individuals were sighted from the Kumroj area. Single individuals were observed in the study sites of Ratnanagar and Bharatpur Municipality. Most of the *V. flavescens* were recorded from the forest and agricultural land near water sources.

Conservation Attitude

From the questionnaire survey findings, among 54 respondents out of 64 randomly selected households, a high proportion of respondents (90.9%) affirmed the occurrence of *V. flavescens* in the area. However, 4% were unaware of its presence and 5.1% responded that it was absent in the study area. As per the responses, two species of monitor lizard are found in the area, *Sun Gohoro* and *Bhaise Gohoro* in local dialect. *Sun Gohoro* refers to *V. flavescens*, with a light brown dorsum with a reddish hue, and a fairly distinct pattern of alternating transverse bars of reddish brown to dirty yellow on the back and tail (Fig. 2). *Bhaise Gohoro* refers to *V. b. bengalensis*, with a brown to olive dorsum usually marked with blackish spots; the spots are most numerous upon the throat (Fig. 3).

All respondents from Bachhauli and Kumroj confirmed sightings of *V. flavescens* in their area. *Varanus flavescens* sightings were recorded from different habitats within the study sites. Forty seven percent of respondents had noticed the species in cropland, followed by 29% in forest, 14% in wetland, and 10% from grassland. Seven percent of respondents had observed juvenile *V. flavescens*, signifying a breeding population in the area. Local people held favorable attitudes towards *V. flavescens* conservation with 73% of respondents indicating positive intent towards *V. flavescens* conservation, while 23% answered 'no' and

Table 1. Details of *Varanus flavescens* observations at Chitwan, 2008.

Block	Area	Location	Altitude (m)	Sightings (N)	Monitor Size Class		Main Habitat type
					Adult	Juvenile	
Bachhauli	Jhuwani	27º35'04.6"N 84º31'51.1"E	160	2	1	1	Agricultural land
	Nayabasti	27º35'04.7"N 84º31'51.2"E	172	1	1	0	Grassland
	Simaltandi	27º34'45.1"N 84º31'31.1"E	172	2	1	1	Agricultural land
Kumroj	Harnari	27º34'27.7"N 84º31'19.2"E	173	2	1	1	Forest/agricultural land
	Bairiya	27º34'26.9"N 84º31'49.4"E	182	2	2	0	Agricultural land
Ratnanagar	Chitrasari	27º35'45.0"N 84º20'19.6"E	182	1	1	0	Agricultural land
	Tikauli	27º37'45.7"N 84º28'42.6"E	214	1	1	0	Forest
Bharatpur	Gauriganj	27º36'49.5"N 84º25'20.2"E	175	1	1	0	Agricultural land
	Beesh Hajari Lake	27º37'05.5"N 84º26'15.7"E	209	1	1	0	Forest

Fig. 2. *Varanus flavescens* from Jhuwani, Chitwan.

4% answered 'no opinion'.

Seventy percent of respondents generally believed that observations of *V. flavescens* were decreasing in the area. The other 24% claimed the population to be stable, but 6% believed the population is increasing.

Discussion

Information on the current conservation status of *V. flavescens* in Chitwan was obtained through multiple field surveys and via interviews with local people. Interviewees were representative of multiple ethnic groups and castes, with the Tharu people being the dominant community among the areas. Tharu communities are found closer to the forest and are primarily dependent on the natural resources. The Bachhauli and Kumroj areas contain the largest populations of Tharus, where farming and fishing are the major activities of these people. These areas have four bodies of water adjacent to the village: Dhure Khola, Icharni Khola, Budi Rapti and Rapti Khola. Most of the *V. flavescens* were sighted in forests and croplands near these bodies of water. *Varanus flavescens* is also very common in rice fields. It prefers swamps, but is also found in forests and cultivated lands (Shah and Tiwari,

Fig. 3. *V. bengalensis bengalensis* from Gyalchok, Gorkha, Nepal. 715 m elev.

Figs. 4 and 5. An adult *V. flavescens* killed by local people.

2004).

Overall, our survey results possibly suggest that sightings of *V. flavescens* have been decreasing. Several threats to *V. flavescens* were noted in our surveys including poaching and nuisance killing (Figs. 4 and 5). Poaching has been undertaken to enable consumption of meat for purported medicinal value. Respondents believed that eating the meat of monitor lizards increased human health and acts as a deterrent or possible cure for tuberculosis, leprosy, asthma, and piles (Shah and Tiwari, 2004). The skin of *V. flavescens* is also used to make different local products including drums and belts. Nuisance killing is known to occur, in part due to the burrows dug by *V. flavescens,* which inadvertently damage man-made water channels used for irrigating crops. Furthermore, local people regard *V. flavescens* as highly poisonous, resulting in retribution killings.

Conservation Recommendations

Human population growth in Chitwan will continue to put pressure on wild animals including *V. flavescens*. Much of the habitat for all animals is located outside the protected areas of Nepal. Hence, local community-based approaches for conservation are advocated. We envisage that a multi-stakeholder approach among the Department of National Park and Wildlife Conservation, non-governmental organizations (NGOs), research institutes, and local communities would benefit this lizard alongside other species in these areas of Nepal. Poaching for skin and meat, habitat degradation, and heavy use of pesticides could be reasons for declining populations, though determining the exact causes of declining populations will require more intensive study.

Acknowledgements – We would like to thank the Oregon Zoo Foundation and Columbus Zoo and Aquarium for providing financial support for this study. We are very much grateful to Himalayan Research and Conservation Nepal for the continuous support throughout the study period. We are thankful to Prakash Dhungana and Deepak Shah for their assistance in the field.

References

Baral, H.S. and C. Inskipp. 2005. Important Bird Areas in Nepal: Key Sites for Conservation. Bird Conservation Nepal and Birdlife International. Kathmandu and Cambridge.

Baral, N. and J.T. Heinen. 2007. Resources use, conservation attitudes, management intervention and park-people relations in the Western Terai landscape of Nepal. Environmental Conservation 34(1): 64-72.

Campbell, H.W. and S.P. Christman. 1982. Field techniques for herpetofaunal community analysis. Pp. 193-200. In Scott, N.J. (ed.), Herpetological Communities, USDI Fish and Wildlife Service, Wildlife Research Report 13, Washington D.C. 239 pp.

Corn, P.S. and R.B. Bury. 1990. Sampling Methods for Terrestrial Amphibians and Reptiles. USDA Forest Service, General and Technical Report PNW-GTR-256. 34 pp.

Crump, M.L. and N.J. Scott. 1994. Visual Encounter Surveys. Pp. 84-92. In Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster (eds.). Measuring and Monitoring Biological Diversity. Standard Methods for Amphibians. Smithsonian Institution Press, Washington D.C.

Dinerstein, E. 2003. The Return of the Unicorns, the Natural History and Conservation of the Greater One-horned Rhinoceros. Columbia University Press, New York. 316 pp.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster (eds.). 1994. Measuring and Monitoring Biological Diversity. Standard Methods for Amphibians. Smithsonian Institution Press, Washington D.C. 364 pp.

IUCN 2009. IUCN Red List of Threatened Species. Version 2009.1. http://www.iucnredlist.org. Last accessed 12 June 2009.

Schleich, H.H. and W. Kästle (eds.). 2002. Amphibians and Reptiles of Nepal. ARG. Ganther Verlag KG, Ruggel. 1295 pp.

Shah, K.B. 1997. Amphibians and Reptiles Use as Food and Medicines in Nepal. A project report submitted to Tribhuvan University, Natural History Museum, Kathmandu, Nepal. 31 pp.

Shah, K.B. and S. Tiwari. 2004. Herpetofauna of Nepal: A Conservation Companion. IUCN- the World Conservation Union, Nepal. VIII+ 237 pp.

Received: 13 June 2009; Accepted: 22 November 2009