



A Preliminary Study of Herpetofauna of Rakchham-Chhitkul Wildlife Sanctuary in Trans-Himalayan Baspa (Sangla) Valley, District Kinnaur, Himachal Pradesh, India.

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ABSTRACT: Biodiversity is the essence and manifestation of evolutionary history of life on earth. The exploration of Rakchham-Chhitkul Wildlife Sanctuary present in the Baspa (Sangla) valley situated in Trans-Himalayan landscape in a remote tribal district Kinnaur in Himachal Pradesh, India revealed the presence of six species of herpetofauna including one species of Amphibia belonging to family Bufonidae order Anura and five species of reptiles spread over four families Agamidae, Scincidae, Colubridae and Viperidae all belonging to order Squamata. The family Viperidae was found to be the dominant family with two genera.

Keywords: Biodiversity, Herpetofauna, Trans-himalaya, Viperidae

I. INTRODUCTION

Himalaya the youngest mountain systems in the world has been designated as a global biodiversity hotspot because it harbours certain unique and endemic taxa (Mittermier *et al.*, 2004). The Trans-Himalayan landscape is a high elevation land characterized by extreme cold, low precipitation and rugged terrain of mountains.

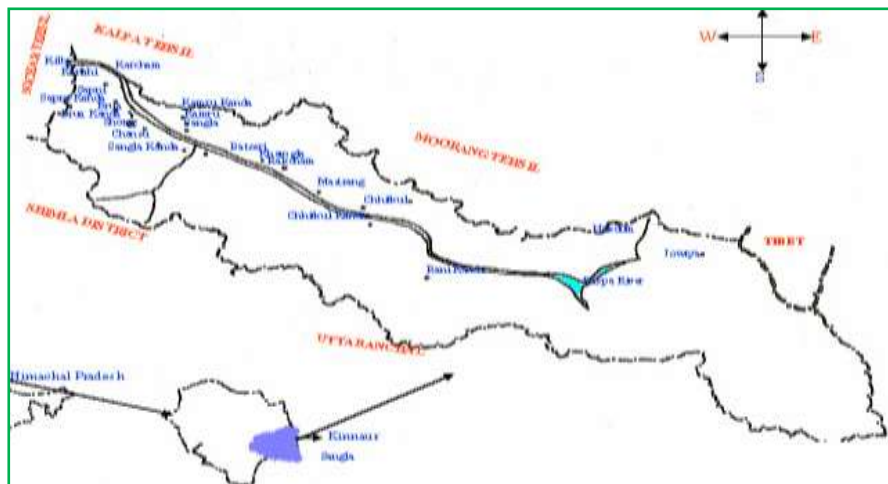
The term Herpetofauna can be used to refer to the assemblage of Amphibians and Reptiles in a given area. Placing Amphibians and Reptiles into one scientific discipline implies that these two groups are much similar but in fact they are quite different from each other. Amphibians have a thin moist glandular skin without scales, the skin is permeable to gas and water. Amphibians have a two phase life cycle unique among vertebrates: a larval form undergoes metamorphosis into an adult form. The larvae have gills for respiration. Their eggs are more susceptible to desiccation and must be laid in water or damp surrounding. Amphibians are thus dependent on availability of water.

By comparison, reptiles are truly terrestrial organisms. Their thick scaly skin is an effective water barrier. They breathe by lungs throughout their life and unlike amphibians; reptiles do not have gilled larval stage as the young emerge from eggs as miniature adults. As a rule, reptiles are oviparous (egg-laying), although certain species of squamates retain the eggs until hatching and a few are viviparous.

Herpetofauna forms an important component of our ecosystem by linking terrestrial ecosystem with aquatic ecosystem. Due to their ectothermic nature, they are more susceptible to seasonal variation than other vertebrates. They play an important role in the ecosystem as constituents of food chains, in controlling insect pests and also as ecological indicators owing to their high degree of sensitivity to the minute variation in the environment (Roy 2002; Daniels 2005). The worldwide described species of herpetofauna comprise of 8,734 reptiles and 6,515 amphibians (Chapman, 2009). Globally, 944 (21%) reptiles and 1,994 (41%) amphibians are threatened (IUCN Red List version 2015.4).

The reptiles in India are represented by 518 species which includes 3 species of crocodiles, 34 species of turtles and tortoises, 202 species of lizards and 279 species of snakes belonging to 28 families ((Aengals *et al.*, 2011). The amphibian in India are highly diverse with 342 species which includes 306 species of anura, 35 species of gymnophiona and 1 species of salamander (Dinesh *et al.* 2013). An updated checklist enlists 384 species of amphibians from India (Dinesh *et al.* 2015). The threatened faunal species include 53 species of reptiles and 75 species of amphibians.

Himachal Pradesh has only 1.7% of total geographical area of the country but contributes more than 11% of its reptiles with 55 species belonging to 40 genera and 14 families and 5% of amphibians with 17 species belonging to 4 families (Saikia and Sharma, 2009). Recently the status, distribution and conservation status of 17 species of amphibian and 55 species of reptiles from state have been documented (Sharma and Sidhu, 2016). The herpetofauna of Himachal Pradesh has engaged the attention of many distinguished investigators since long, who have conducted studies on diversity of amphibians and reptiles in different parts of the state (Annandale 1907, Boulenger 1920, Smith 1935 1943, Acharjee and Kriplani 1951, Waltner 1974, Dubois 1975, Tilak and Mehta 1983, Mehta 2000a and 2000 b, Mehta 2005, and Singh and Banyal 2013). However, the present study area of Rakchham-Chhitkul wildlife sanctuary has received very little attention of the investigators due to severe cold climate, and inaccessible habitat. Only a few studies have been conducted on diversity and ecology of larger vertebrates of this sanctuary area (Wynter-Blyth 1948, Narang 1989, Negi and Banyal 2015 a&b). The present study is the first of its kind and will act as baseline literature for further studies in this area.



Study Area

Present study has been conducted in Rakchham-Chhitkul Wildlife Sanctuary in Kinnaur having an area of about 304 Km² with geo-coordinates of latitude 31°14'22" N - 31°28'37"N and longitudes 78°17'31"E - 78°31'30"E in Himachal Pradesh, India (Fig. 1). The Baspa river originating near the Indo-Tibet border from Baspa Bamak and Arsomang glaciers travels 72 Km through the valley giving it not only the water but also its name, joins the river Sutlej at Karchham. The Baspa (Sangla) valley is characterized by rugged, precipitous peaks covered by perpetual snow cover (Deota et al., 2011). Great Himalayan range and Dhauladhar range, two of world's greatest mountain ranges represents these peaks on the right and left bank of river Baspa respectively. The altitude of Baspa valley ranges from 2,800 masl to 5,486 masl. The temperature varying from -15°C to 18°C, mean rainfall 463 mm and annual snowfall 1,130 mm. The forest type of this sanctuary includes Lower Western Himalayan Temperate Forest, Upper Western Himalayan Temperate Forest and Sub-Alpine Birch-Fir Forest. The sanctuary area is fed with numerous snow-fed perennial and seasonal streams. There is a great variation in climatic conditions in the valley as ecological characteristics changes very sharply in the mountains due to steep gradient.



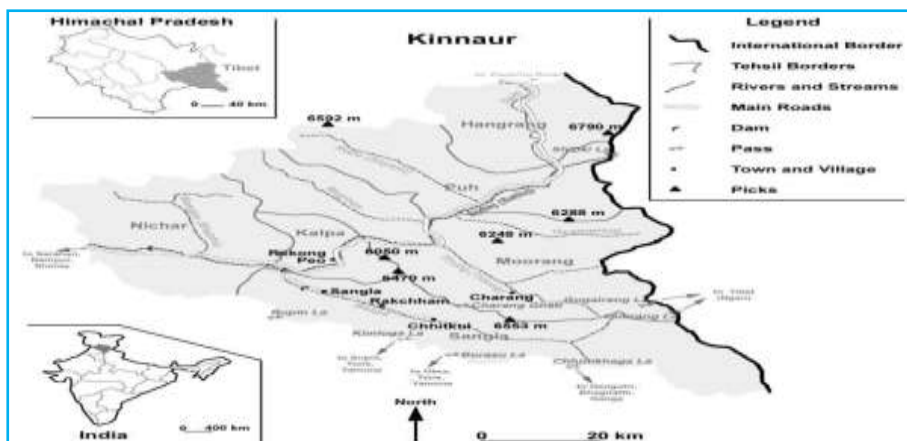


Fig.1: Map of Baspa valley, the study area in District Kinnaur, Himachal Pradesh, India (Source: mapsofindia.com and diagrammatic map of Baspa Valley).

II. METHODOLOGY

The present work is an attempt to study the diversity and abundance of herpetofauna of the study area. The study area was divided into three altitudinal zones viz., Zone-I: extending from Sangla to Kharogla (2700 to 3000 m) which is having forests of lower level fir like Tosh, Zone-II: from Rakchham to Mastarang (3050 to 3300 m) with the forests of Deodar and Blue pine and Zone-III: from Chhitkul to Dumti (3450 to 4200 m) having tracts of blue pine, birch & rhododendron forests, and alpine meadows. The survey was conducted during June 2012 to June 2014 at various locations situated at different altitudes. The Amphibians were sampled as per methods by Vasudevan *et al.*, (2001). They were sampled using a combination of adaptive cluster sampling, visual encounter surveys, audio surveys and opportunistic records. They were sampled by turning the leaf litters, rock and by prodding the cavities on the forest floor. Considering the topography and altitude of the study area visual encounter survey was used for sampling reptiles. Sampling was restricted largely to day time. This method involved searching for reptiles, examining all possible microhabitats such as boulders, fallen logs, holes in the cliffs etc. They were also sampled using methods described by Ishwar *et al.* (2001). Forest floor reptiles were sampled using adaptive cluster sampling which gives better estimates of the density of animals that show patchy distribution. In addition to general sampling, targeted forests and stream sampling were also done for recording the presence of reptiles. Apart from this some reptiles were observed especially on the large rocks sun basking during the early hours of day. These specimens were photographed with Nikon D-90 for identification. No specimens were killed or brought to laboratory during the present study. Identification was based on morphological characters. The species were identified by using Smith (1943), Daniel (2002), Das (2002), and Daniels (2005).

III. RESULTS & DISCUSSION

Present study revealed the presence of six species of herpetofauna consisting of one species of amphibian and five species of reptiles (Table 1). The single amphibian species recorded was Himalayan Toad (*Duttaphrynus himalayanus*) belonging to family Bufonidae. The five species of reptiles recorded belonged to four different families, all belonging to order Squamata. Species recorded were Kashmir/Hurdwar Lizard (*Laudakia dayana*) family Agamidae, Himalayan Ground Skink (*Asymblepharus himalayanus*) family Scincidae, Indian Rat Snake (*Ptyas mucosus*) family Colubridae, Himalayan Pit Viper (*Gloydius himalayanus*) and White-lipped Pit Viper (*Trimeresurus albolabris*) family Viperidae.

Table:1 Systematic list of herpetofauna observed in Rakchham-Chhitkul Wildlife Sanctuary, Baspa (Sangla) Valley, District Kinnaur, Himachal Pradesh (India).

S. No	Zoological Name	Common Name	Class	Order	Family
1	<i>Duttaphrynus himalayanus</i>	Himalayan Toad	Amphibia	Anura	Bufonidae
2	<i>Laudakia dayana</i>	Kashmir/Hurdwar Lizard	Reptilia	Squamata	Agamidae
3	<i>Asymblepharus himalayanus</i>	Himalayan Ground Skink	Reptilia	Squamata	Scincidae
4	<i>Ptyas mucosus</i>	Indian Rat Snak	Reptilia	Squamata	Colubridae
5	<i>Gloydius himalayanus</i>	Himalayan Pit Viper	Reptilia	Squamata	Viperidae
6	<i>Trimeresurus albolabris</i>	White-lipped Pit Viper	Reptilia	Squamata	Viperidae

It was found that Family Viperidae was the dominant family with two genera while all other families were represented by single genus each. The only amphibian recorded i.e. Himalayan Toad was recorded in zone I as a common species and summer visitor. It was recorded once from Boning saring area during the monsoon season. Among the reptiles the Hurdwar/Kashmir Lizard has been recorded in zone I & II. The study area harbours a good population of the species. Large numbers of individuals were observed especially on the large rocks sun basking during the early hours of the day. Their distribution shows a marked gradient with changing altitude in the study area with population diminishing from Sangla to Rakchham beyond which very few individual were observed that too chiefly during the months of summers. The Himalayan Ground Skink was recorded in all three altitudinal zones viz., I, II and III. During present study a number of specimens of this species were recorded from all over the sanctuary area. The Indian Rat Snake was recorded in zones I and II but mainly from the Dangdang Shee area near Khrogla in the sanctuary area. The Himalayan Pit Viper is the most common poisonous snake of the Himalayan region and is quite docile in nature. In winter, the snake hibernates. During present study this species has been recorded in zone II. The other viper White-lipped Pit Viper was recorded in zone I but is a rare species in the study area. A single specimen was recorded from the Chispin area near Sangla village, in the month of July.

The presence of Kashmir/Hurdwar Lizard is probably the first record from Himachal Pradesh, though, a different species under the genus *Laudakia* i.e. *L. tuberculata* (Agma Rock Lizard) has been reported from Khajjiar area in Chamba District of Himachal Pradesh by Singh and Banyal (2013). This lizard recorded as a common species in zones I & II of the present study area has somehow escaped the expert eyes of a number of field workers like Mehta (2000), Saikia and Sharma (2009) and Saikia *et al.* (2010) who have studied the herpetofauna of Himachal Pradesh in details. Presence of Indian Rat Snake recorded in the sanctuary area can be justified by the fact that this species has extensive geographical distribution in Asia, from Iran, Turkmenistan, Afghanistan, Pakistan, India, Sri Lanka, Nepal, Bangladesh, Myanmar, China, Thailand, Lao PDR, Cambodia, Viet Nam, Malaysia, Singapore to Indonesia (Manthey and Grossmann, 1997) and has also been reported from Himachal Pradesh by Mehta (2000) and Thakur and Mattu (2015). Moreover, a single specimen of White-lipped Pit Viper recorded from the Chispin area near Sangla village is widespread throughout Myanmar across southern China and southward to Java, and Indonesia and has been earlier reported by Saikia *et al.* (2007) from Himachal Pradesh, but believed to occurs from sea level to 1,200 m amsl (Stuart *et al.*, 2012), therefore, the presence of this species in present study area is certainly an extension in the upper distribution limit of this species.

The study area has of late witnessed various development activities. With its snow capped peaks, mountain streams, magnificent biodiversity and fascinating ethnic diversity the valley, over the years has developed as a favoured tourist destination leading to the arrival of large number of tourists every year. The unregulated growth of tourism industry can make an upbeat destination lose its scenic charm and tranquillity and adversely affect the wildlife and biodiversity of that area. These will have a synergistic effect on many extinction drivers, such as habitat fragmentation and degradation, diseases and climate change. The research in such protected areas can not only add to the body of human knowledge but also generate information useful for the efficient management of wildlife sanctuaries and forests. This study brought to light the diversity and distribution of herpetofauna of Rakchham-Chhitkul wildlife sanctuary providing vital information and a baseline data for the future research and conservation planning.

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