INVENTORY OF HERPETOFAUNAL DIVERSITY IN NAGARJUN FOREST OF SHIVAPURI NAGARJUN NATIONAL PARK
Final Report

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Companions for Amphibians and Reptiles of Nepal (CARON)

Kathmandu, Nepal

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Hard to list out all, numerous personnel from several places and organizations have contributed at several instances and are acknowledged wholeheartedly. The supports from our families and friends are placed at the height.

Companions for Amphibians and Reptiles of Nepal (CARON)
Kathmandu

Table of contents

1. Introduction

1.1 Background

The number of frogs, toads and salamanders is dropping in many areas of the world. The causes range from destruction of their local habitats to global depletion of the ozone layer (Blaustein & Wake 1995). Amphibian species worldwide appear to be suffering population level declines caused, at least in part, by the degradation and fragmentation of habitat and the intervening areas between habitat patches. Amphibians are frequently characterized as having limited dispersal abilities, strong site fidelity and spatially disjunct breeding habitat (Smith & Green 2005). Thus, syntopic species of amphibians and reptiles are correspondingly defenseless against the global threats of deforestation, draining of wetlands, and pollution from agricultural runoff (Gibbons et al. 2000). Amphibian populations have suffered widespread declines and extinctions in recent decades(Kiesecker et al. 2001). Limited dispersal ability may further increase the vulnerability of amphibians and reptiles to changes in climate. Slight changes in water level in breeding ponds can trigger reproductive failure and, in a single year, cause a severe drop in the population size of short-lived species; persistent changes can lead to extinctions of species (Arau jo et al. 2006).

Although the amphibian decline problem is a serious threat, reptiles appear to be in even greater danger of extinction worldwide (Gibbons et al. 2000). The assessments of amphibian (and reptile) diversity require exploration of previously unvisited areas, comprehensive surveys of poorly known areas, and revisiting of localities that have not been assessed in the last decade (Parra et al. 2007).

South Asia has a rich diversity of amphibian and reptilian fauna including several unique and endemic species (Shah & Tiwari 2004). It appears that only about 50% of the biodiversity of amphibians in South Asia has been discovered. However, there is increasing habitat loss and fragmentation, which are rapidly depleting amphibian populations. Very few species have been described from disturbed habitats, indicating a diminished species composition when compared with the original habitat (Molur 2008).

Fourteen species of herpetofauna are endemic to Nepal. Seventeen of the species of herpetofauna are nationally threatened, of which six species are globally threatened (ICIMOD & MOEST-GON 2007). As herpetofauna (amphibians and reptiles) is the poorly studied group in the country, their present status is also poorly known (CEPF 2005). A recent

publication “Amphibians and Reptiles of Nepal” edited by Schleich and Catstle (2002) provides an account of 50 amphibians and 123 reptiles. The herpetofauna in Nepal is relatively richer compared to other South Asian countries-well over 206 species and sub-species, including 59 amphibian species of which 15 are listed as globally threatened. Amphibian and reptiles of Nepal face severe threat of extinction. Major threats include rapid deforestation, soil and water pollution, land use changes, habitat loss and unsustainable extraction. From a conservation point of view, herpetofauna conservation efforts have been limited (Shah & Tiwari 2004). Nepal has a reduced species composition compared with the 2001 checklists (Molur 2008).

The study is related to the researches in the field of herpetology in Nepal to generate the current status of herps in the area and to sensitize the conservation efforts. Further, it is expected to fulfill the gap in herpetological studies from species and site conservation point of view in Nepal to; in an area currently inscribed in Protected Area (PA) system.

1.2 Study area

The study area, Nagarjuna forest, has been included recently in Shivapuri Nagarjuna National Park. The area lies to the western part of the national park. The study area extends from base of Nagarjun forest (around 1350 m msl) to top of Nagarjun hill (2100m msl). The study area comprises shrubs area, slight to moderately dense forests along with some springs making a combination of aquatic habitats at places. The good forest growths and springs make diverse habitat conditions for herpetofauna in Nagarjuna Forest. The slope landscape, caves and varied microclimatic conditions harbour diverse herpetofaunal species and populations. The study area is one of the important natural areas along the Kathmandu valley rim (Bhuju *et al* 2007).

Climatic Condition of Kathmandu (nearest): Temperature (max, min), Rainfall

Nagarjun forest is a typical Mahabharat hill and enjoys mostly sub-tropical type of climate and partly temperate climate (Chaudhary 1998), with rainy summer and dry winter. The southern side is sunny and is evidently much drier than the northern forested side. As the climatic data of the Nagarjun area is not available, the climatic data of nearest meteorological stations ie. Dhunibesi ($27^0$43” N and $85^0$11”E, and elevation at 1085m), Kakani ($27^0$48”N and $85^0$15”E, and elevation at 2064m) and Panipokhari, Maharajgunj ($27^0$44”N and $85^0$20”E, and elevation at 1335 m) were used for analysis.

The mean monthly temperatures of the area ranged from 3.05^{0}C (January) recorded at Panipokhari to 30.53^{0}C (July) at Dhunibesi. December, January, and February were coldest months while June, July and August were hottest months. Average relative humidity of the area ranged from 54.7 (April) at Dhunibesi to 94.2 9 (July) at Kakani. Similarly, the average monthly rainfall ranged from 5.15 mm (December) at Kakani to 548.73mm (July) at panipokhari. July and August were most precipitous months.

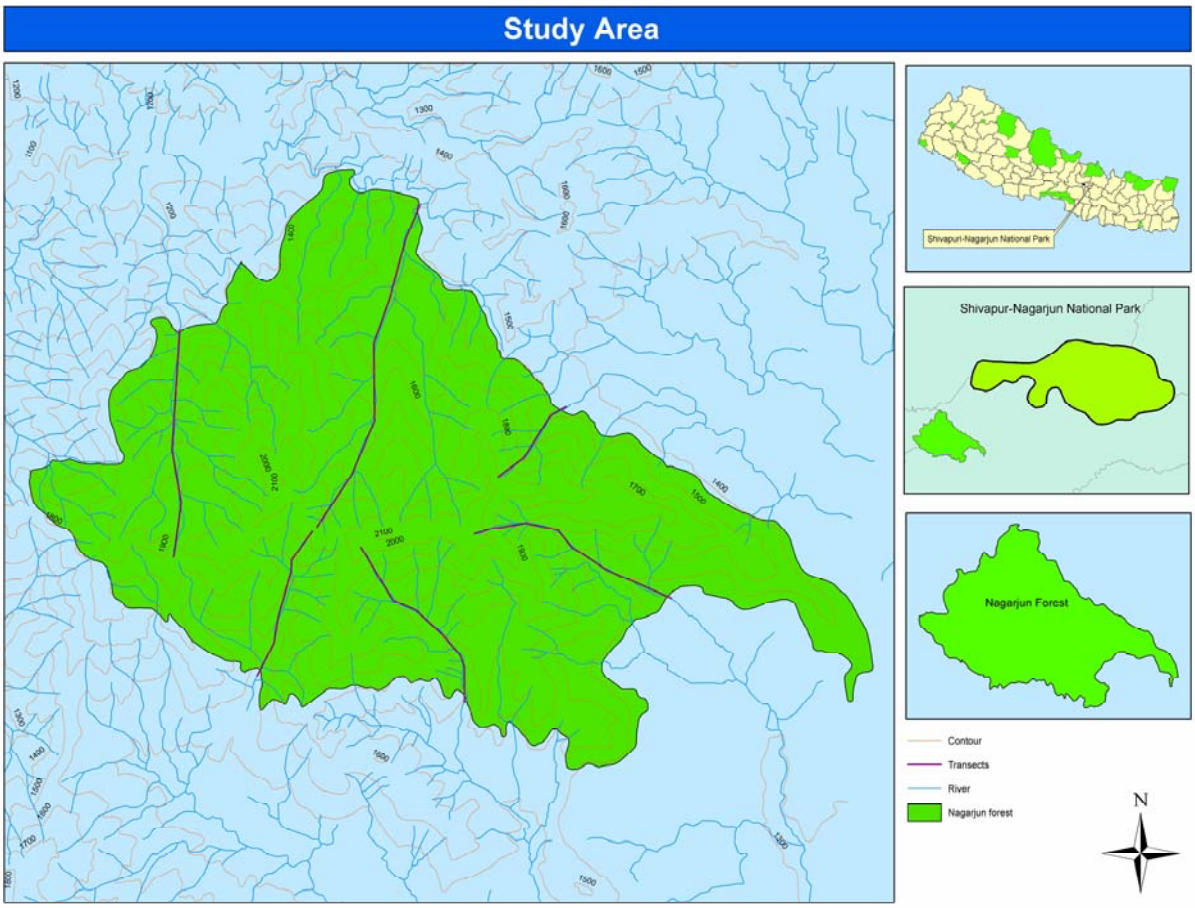

Fig 1: The study area

1.3 Rationale

Three species of reptiles are protected under the National Parks and Wildlife Conservation Act, 1973 (Bhuju *et al* 2007), but none of the amphibian species is protected. Bhuju *et al* (2007) stated in Nepal Biodiversity Resource Profile that current checklists of ShNP include 3 herpeto species. But, this is sought to be the gap in study of herpetofauna in the park. This gap has created a situation of 'No names, no conservation' for herpetofauna since no systematic exploration works are ongoing or seem. The park has different habitat conditions due to geographical and microclimatic variations. The current project is expected to explore

the herpetofauna of Nagarjuna Forest part of Shivapuri Nagarjuna National Park, to add the species to current list of herpetofauna. Additionally, the habitat situation and species association analyses are expected to add a new dimension in herpetological research in Nepal.

2. Research objectives:

- To explore the herpetofaunal diversity in Nagarjuna Forest of Shivapuri Nagarjun National Park
- To identify the species composition and assemblage of herpetofauna in Nagarjun forest
- To explain spatial patterns of distributions of the herpetofauna in Nagarjun Forest

3. Expected outcomes:

To date, taxonomical and systematic study of herpetofauna in Nepal is lacking. It is sought to identify the patterns of sample richness, relative abundance, and species composition across major habitat type characteristic of the study area. The project is expected to explore the amphibian and reptile species and produce the detail inventory using scientific approaches to help government and conservation organizations develop herpetofaunal monitoring protocol based on the information obtained through the analysis of habitat conditions and threats. The principal hypothesis of the project is whether varying habitat situation and anthropogenic impacts have influence in species composition and diversity of herpetofauna. The study is envisaged to impart conservation concern to authorities and organizations regarding herpetofauna while preparing the conservation programs and include this group as priority group in such programs. One of the important aspects of the project is to add the species in herpetofauna list of Shivapuri National Park (ShNP) since the study site is recently inscribed in to Shivapur-Nagarjun National Park

4. Methodology:

4.1 Field methods

The field methods involved the approaches for the basic exploration of the herpetofauna in the Nagarjuna Forest area. Random Transect method was adopted order to sampling in the area for intensive study (fig.). Transects were set based on the application using (Arc GIS 9.2). Diurnal transect walks were carried to locate the amphibians and reptiles; hand picking (using equipments for handling the reptiles and amphibians) in all the sites. The species

caught during survey were be identified on the spot using field guide of Shah and Tiwari (2004) and released *in-situ*. Opportunistic surveys were also carried out in other parts from sample transect lines based on (Gardner & Fitzherbert 2007).

The field surveys were carried in June-July and August-September. In each transect (along the forest trails and streams) four persons walked covering the distance of 10 m on both sides. The species encounter location was recorded by using GPS.

The local residents were contacted and information was obtained through the interviews and color photographs. The color photographs of the potential amphibian and reptiles were shown to local residents and asked to explain the features. Whenever more than one individual in more than two instances could explain the features the species were noted and later consulted with the herpetologists to confirm the occurrences.

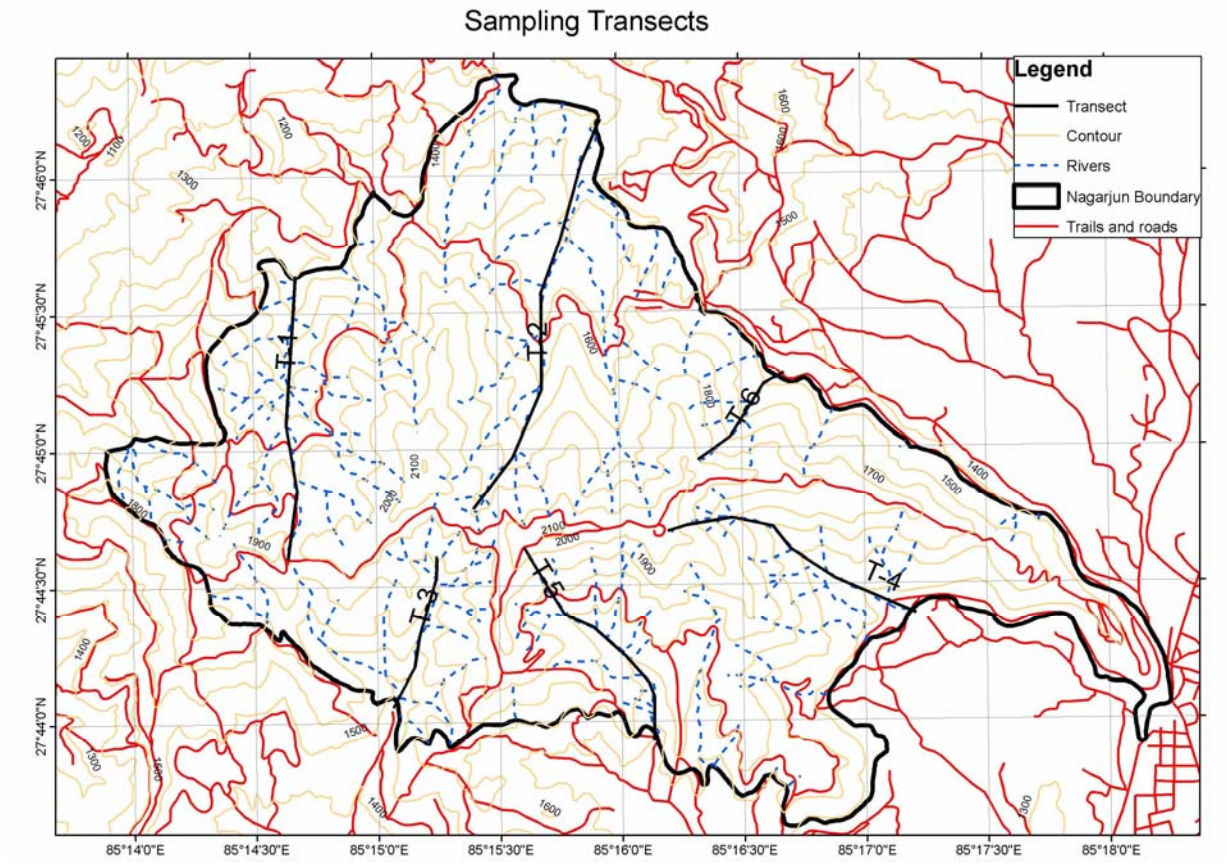

Fig 2: Map showing sampling transects

2. Activities

Forest Survey

Forest surveys for herps have been carried for 20 days covering 5 watersheds of total seven watersheds in Nagarjuna Forest. The followed methodology is as described in the proposal. Walk along transects searching the herps. The procedures involved are walking along transect in a fixed time covering a fixed distance. The logs were overturned, searched on the trunk of trees, overturning of stones along the water way, searching in the hollows of trees, rocks etc. While walking, the herps were located by visual encounter.

3. Results

3.1 Species inventory

3.1.1 Field Records

Through fieldworks of the Nagarjuna forests altogether 11 species (134 individuals) of herpetofauna (three amphibians and eight reptiles) were recorded. *Naja kaouthia* was encountered only once. The other species with less encounter (<10) were *Bufo melanostictus*, *Trachischium leave*, *Mabuya carinata*, *Amphiesma platyceps* and *Japalura variegate*. Five species namely, *Japalura variegate*, *Trachischium tenuiceps*, *Asymblepharus sikimmensis*, *Calotes versicolor versicolor*, *Megophrys parva* and *Limnonectes syhadrensis* were observed commonly i.e. >10 individuals. *Megophrys parva* was the most commonly observed species among all (and amphibians) whereas *Calotes versicolor versicolor* was the most common among reptiles.

Table: Species encountered in Nagarjun during the forest survey

SN	Species	Family	No. of Individual
1	*Naja kaouthia* Lesson, 1831	Elapidae	1
2	*Bufo melanostictus* Schneider, 1799	Bufonidae	3
3	*Trachischium leave* Peracca, 1904	Colubridae	3
4	*Mabuya carinata* (Schneider, 1801)	Scincidae	5
5	*Amphiesma platyceps* (Blyth, 1854)	Colubridae	7
6	*Limnonectes syhadrensis* (Annandale, 1919)	Ranidae	13
7	*Trachischium tenuiceps* (Blyth, 1854)	Colubridae	14
8	*Asymblepharus sikimmensis* (Blyth, 1853)	Scincidae	22
9	*Calotes versicolor versicolor* (Daudin, 1802)	Agamidae	27
10	*Megophrys parva* (Boulenger, 1893)	Megophrydae	35
11	*Japalura variegata* Gray, 1853	Agamidae	4
	Total Individuals		134

Some of the species records were made through the local information *viz.* local resident information and expert communication. The following seven species (2 amphibians and 5 reptiles) records were made through the secondary sources.

Table: Species information from secondary sources

SN	Species	Common Name	Source
1	*Ophiophagus hannah*	King Cobra	NHM*
2	*Varanus bengalensis*	Common Monitor	Local Residents
3	*Mabuya carinata*	Common Indian Skink	Local Residents
4	*Paa leigibii*	Liebig's Paa Frog	Local Residents
5	*Trimeresurus albolabris*	White Lipped Pit Viper	Local Residents
6	*Buffo stomaticus*	Marbled Toad	Local Residents
7	*Ptyas mucosa mucosa*	Asiatic Rat Snake	Local Residents

* Source: *Natural History Museum, Kathmandu*

3.2 Distribution of Herpetofauna

Using the GPS points of the site observations of the herpwtofauna the distribution of herps was mapped in Arc GIS 9.2.

3.3 Habitat and species composition

Disturbance

Nagarjuna forest is away from grazing problems. However other human activities were not uncommon. Road networks linking villages to Kathmandu were major disturbance factors. Accidental killings of herps along the road were observed. And annual clearings of road edges were also noticed. The forest is protected but clearings of forest floor by security (Nepal Army) also disturbed the habitat of herps. It was also observed that illegal entry of hikers/trekkers/picnickers inside the forest also disturbed the herps. Illegal fishing (net) in the streams was also seen as a disturbance factors to the herptofauna. The local practices of fuelwood and fodder collection were frequent in the area; particularly near the settlements.

Distance with water bodies

Surveys were carried out in and around water bodies (streams). However none of the species encountered during the entire field survey were found in the water bodies. All the species of snakes (Elapidae and Colubridae) and frogs (Bufonidae, Megophrydae, Ranidae) observed during the survey were within a distance of 50m from water bodies. On the other hand the species of Agamidae (Lizards) and Scincidae (Skinks) were encountered independent of the distance of water bodies.

4. Conclusions

The herpetofaunal inventory in Nagarjun forest adopting the opportunistic sampling and transect sampling method has been conducted. This study has reported 11 species of reptile and amphibians from the Nagarjun Forest area. Including the secondary reporting of occurrence of other 7 more species, this area has 18 species of herpetofaunal species.

Since the area has been recently inscribed in Shivapuri – Nagarjun National Park, it has high potential of conservation of herpetofauna and other wildlife species.

Since the area has been used by the locals for their livelihood i.e. fuel wood, fodder collection and grazing purposes, (particularly northwest site). The impacts should be minimized so that the area established for the purpose of conservation can be managed in harmony with the local communities.

Since this study was carried out for short period for inventory purpose, it was out scope to estimate complete species occurrence and populations. Thus detail study of herpetofaunal species based on the threats including population and habitat should be carried out.

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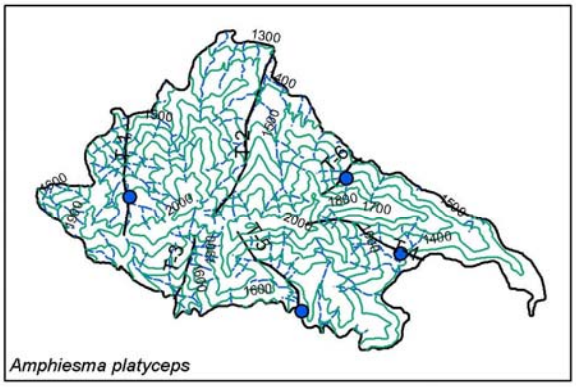
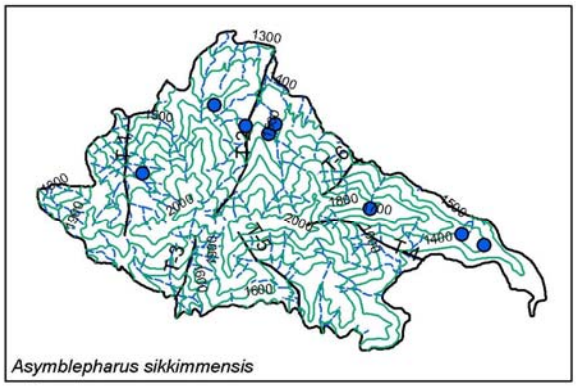
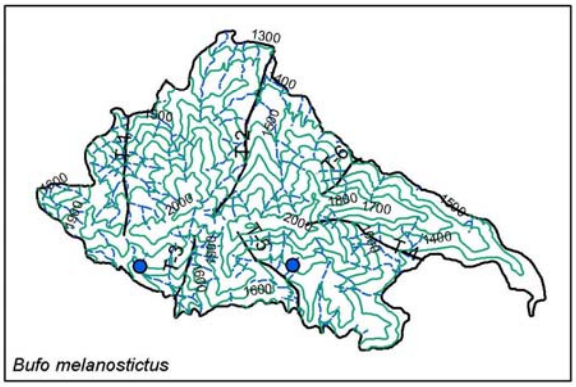
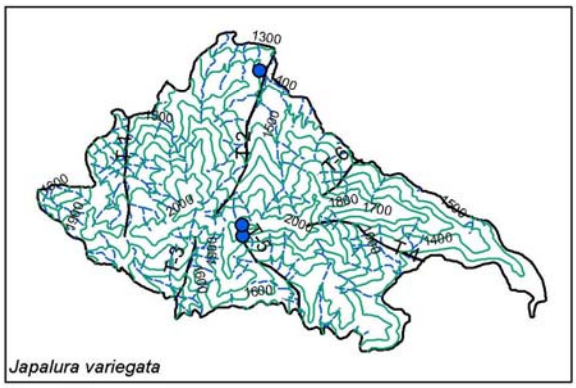
ANNEX I:

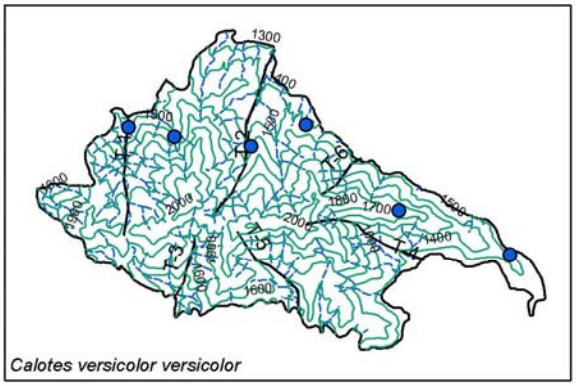
Species Distribution Maps

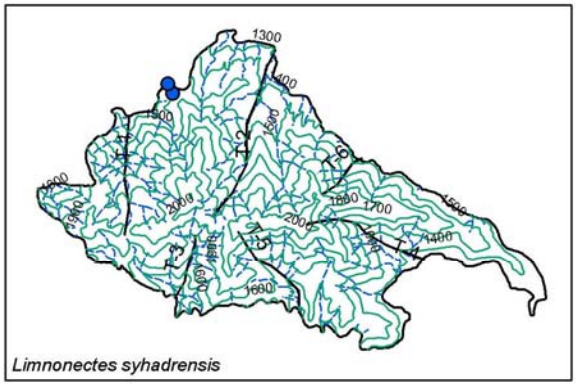


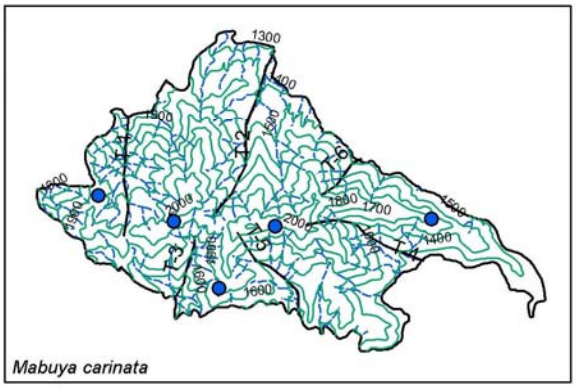


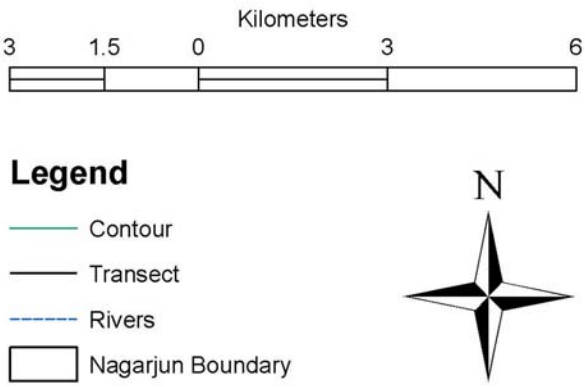




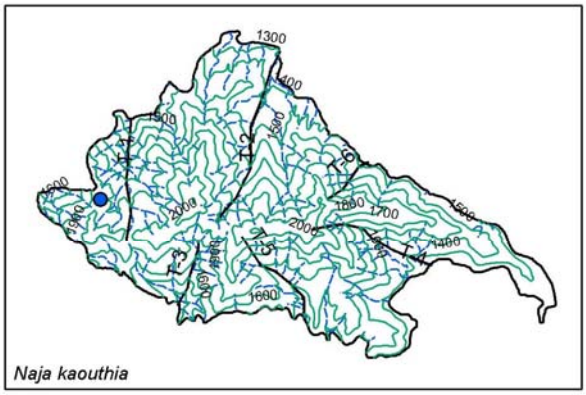


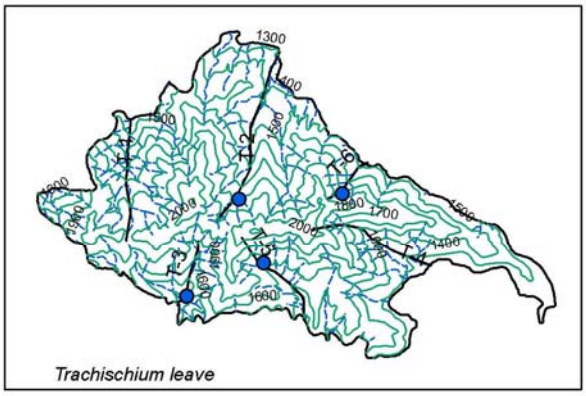


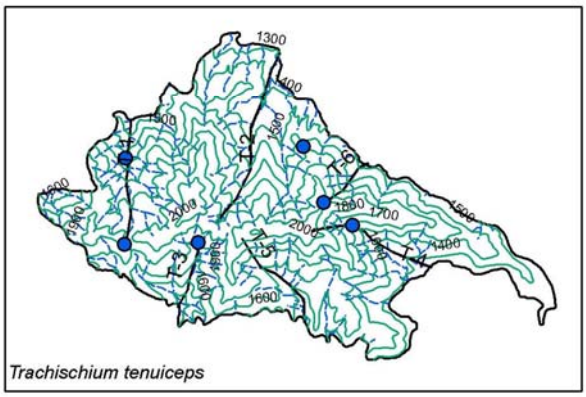


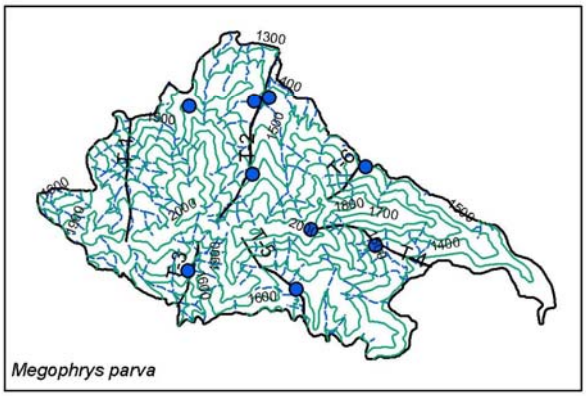


Species Distribution Maps









Kilometers

3 1.5 0 3 6

Legend

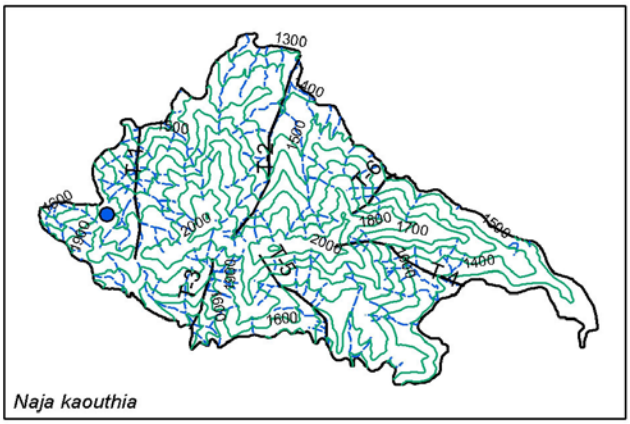
- Contour
- Transect
- Rivers
- Nagarjun Boundary

N

ANNEX II: SPECIES PROFILE

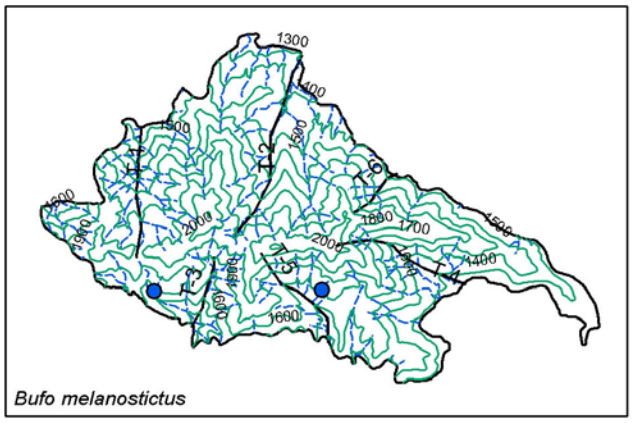
Naja kouthia Lesson, 1831

Family:	Elapidae
Common Name:	Monocled cobra, Monocellate cobra
Nepali Name:	Paniyadarad, Goman, Tilakdom, Dom, Dumini
Size:	Maximum 1500.0mm (male) and 1560.0mm (felame)
Life Span:	Captive >12 yrs
Identification:	Head not very distinct from neck; eye moderate, pupil round, nostril between an anterior and a posterior nasal; head shields normal except the loreal which is absent. Scales smooth, 25-31 scales on neck, 19-21, usually 21, on the body; 17 or 15 in front of the vent. Ventrals 164-196; subcaudals 43-58, usually paired. Olivaceous or brownish to black above, with or without a orange-coloured, O-shaped or monocellae mark upon the hood; a black spot on the lower surface of the hood on either side, and one or two broad black cross-bars on the belly behind it. The rest of the belly is either same colour as the back but slightly yellowish.
Food habit:	Carnivorous, mainly fish, frogs, toads and rodents
Habitat:	Agricultural areas, scrubland, secondary forests and settlements close to water bodies. The species is known to enter houses.
Reproduction:	Oviparous, mating between January and July
Incubation Period:	50-58 days
Clutch Size:	8-32 eggs
Activity Pattern:	Diurnal and crespuscular
Distribution:	Nepal, India, China, Bhutan, Bangladesh, Thailand, Indo China and Myanmar
Altitude Range:	<100-3200m in Nepal
Status:	Occasional
Venom:	Neurotoxic, deadly poisonous
Remarks:	A highly aggressive species, prefers water areas



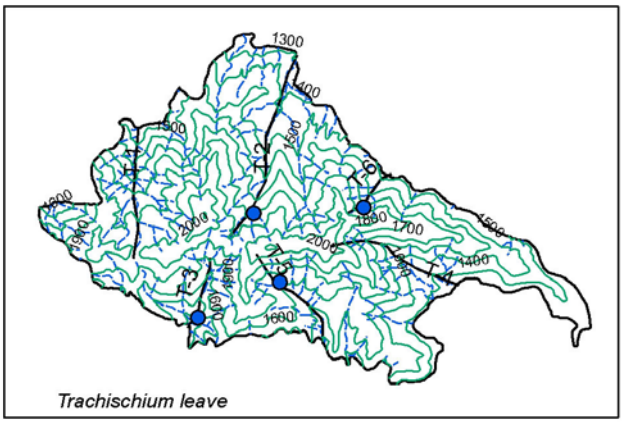
***Bufo melanostictus* Schneider, 1799**

Family:	Bufonidae
Common Name:	Black spined toad/ Common Asian toad
Nepali Name:	Khasre bhyaguto, Dhundaribyang, Khatkhyarri meghoba
Size:	Snout-vent length- 57mm in males and 64 mm in females, maximum size reported in Nepal 140 mm (Mitchell and Zug, 1986)
Identification:	Head with more or less elevated bony ridges, viz. a canthal, a preorbital, a supraorbital, a postorbital, and a short orbito-tympanic; snout short, blunt; interorbital space much broader than the upper eyelid; tympanum very distinct at least two third the width of the eye. First finger extending generally beyond the second; toes at least half webbed, with simple subarticular tubercles. The blind limb being carried forwards along the body, the tarso-metatarsal articulation reaches the tympanum or the eye. Upper surface with more or less prominent, generally spiny warts; parotoids very prominent, kidney shaped or elliptic, more or less elongate. Yellowish or brownish above, the spines of the warts and the ridges of the head generally black; beneath immaculate or more or less spotted.
Food habit:	Carnivorous, mostly insects
Habitat:	Can be found everywhere, within clearings, settlements, agricultural lands, forests, riverine forests, etc below 2200 m. (below 2250 m in Nepal)
Reproduction:	Oviparous, March to July
Activity Pattern:	Nocturnal
Distribution:	Nepal, India, Bangladesh, Bhutan, Pakistan, Sri Lanka, Myanmar, Thailand, China and the western Indo-Australian archipelago
Status:	Fairly common
Remarks:	Most common toad of Nepal



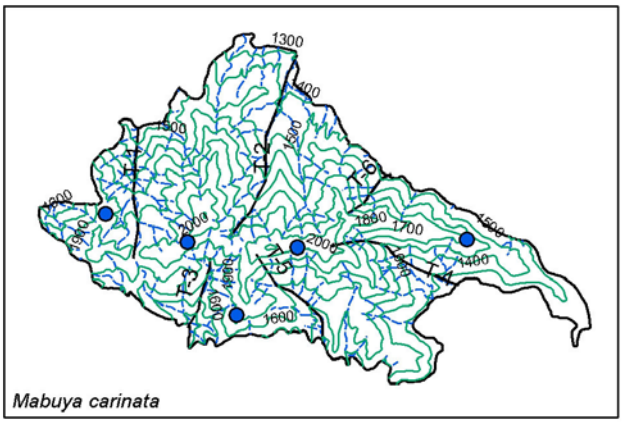
***Trachischium leave* Peracca, 1904**

Family:	Colubridae
Common Name:	Olive oriental slender snake
Nepali Name:	Sarpa, Chapare sarpa, Mate sarpa, Khumle sanp
Size:	SVL in juvenile male 131.0 mm, tail 25.0 mm and female 273.0 mm, tail 41.0 mm (specimens from Annapurna Himalaya area).
Identification:	Head not distinct from body; eye small, pupil round; body cylindrical, dorsal smooth except for weakly keeled 2nd sacral row in juvenile male; dorsal without apical pits; apical areas distinctly lighter than rest of scale; ventral rounded. Prefrontals 2, preocular and post ocular single; nasals divided. Scales in 13 rows at mid-body; ventral 143-152; subcaudals 30-39, divided; anal divided. Dorsal surface uniformly olive brown (pale brown in alcohol), with metallic sheen. Ventral surface including tail dark orange (whitish in alcohol).
Food habit:	Carnivorous, worms and insects.
Habitat:	Agricultural lands, moist mixed oak forests and around settlements. The individuals were found hidden beneath large rocks.
Reproduction:	NDA
Incubation Period:	NDA
Clutch Size:	NDA
Sexual Diamorphism:	Males are smaller than females and with keeled scales at the sides of the vent. Females probably with larger number of ventrals.
Activity Pattern:	Nocturnal
Distribution:	Nepal and India
Altitude Range:	>2000 m (Nepal)
Status:	Scarce
Remarks:	According to Tillack and Shah (2002) this species is rarest among the 5 species of its genus.



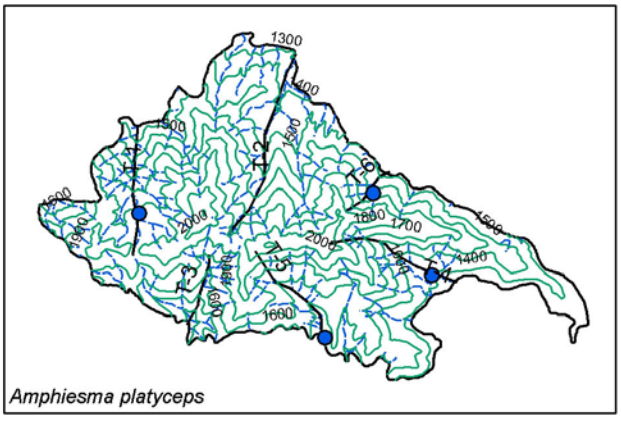
***Mabuya carinata* (Schneider, 1801)**

Family:	Scincidae
Common Name:	Brahminy skink, Common Indian skink
Nepali Name:	Bhanemungro, Chikani girgit
Size:	Snout to vent – 125.0; tail – 165.0 mm
Identification:	Supranasals separated from or just touching one another; lower eyelid scaly; temporal scales keeled; ear-opening subcircular, smaller than a lateral scale, with short pointed lobules anteriorly. Dorsal and lateral scales with 3-5 distinct keels, the three median keels are always strongly marked; from 30-34 scales round the middle of the body. Digits moderately long with smooth or obtusely keeled lamellae, 14-18 beneath the 4th toe; the hind limb reaches the wrist or elbow. Brown or olive or bronzy above, uniform or with dark brown or black spots, or longitudinal streaks along the lateral margins of the scales; sides darker brown or chestnut, with or without light spots; a light dorso-lateral line starting from aboce the eye and continued to the base of the tail always more or less distinct; a second white line starting from the upper lip and passing along the side of the flank to the groin present or absent; lower parts whitish or yellow. Flanks of the male scarlet in the breeding season and the belly yellow.
Food habit:	Carnivorous, mainly insects
Habitat:	Lives on the edges of forests, within and outside of cultivated lands and settlements throughout its distribution.
Reproduction:	Oviparous
Clutch Size:	About 23 eggs
Sexual Diamorphism:	Males have thickened tails at the base, scarlet flanks and yellow ventral surface during breeding season.
Activity Pattern:	Diurnal
Distribution:	Nepal, India, Bangladesh, Maldives and Sri Lanka
Altitude Range:	<100-1372 m (Nepal)
Status:	Very common
Remarks:	Very common in its distributional ranges. It is the largest skink of the country.



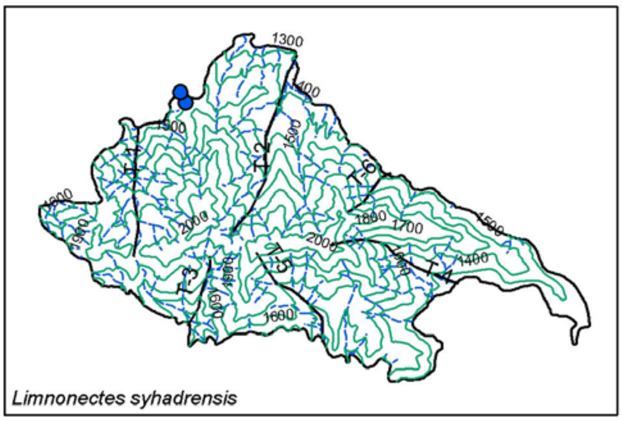
***Amphiesma platyceps* (Blyth, 1854)**

Family:	Colubridae
Common Name:	Mountain keelback, Asiatic Keelback, Eastern Keelback
Nepali Name:	Sarpa, Chankhe Sarpa, Ratosarpa
Size:	Total length – Male 880.0, tail 225.0; female 735.0; tail 165.0 mm
Identification:	One preocular; temporals 1 + 1, rarely 2 + 2; 8 supralabials, 3rd, 4th and 5th touching the eye. Body slender; scales in 19 rows, more or less distinctly keeled, those of the outer rows often smooth. Ventrals 174-217; subcaudals 86-107. Body colouration variable, olive brown above, with small black spots; lip white or yellow, belly yellowish, with or without blackish dots, bordered outside with bright red; lower surface of tail frequently mottled with black.
Food habit:	Carnivorous, mainly frogs
Habitat:	Usually in the close vicinity of water bodies, cultivated areas and edge of forests.
Reproduction:	Oviparous
Incubation Period:	NDA
Clutch Size:	NDA
Activity Pattern:	Day and night
Distribution:	Nepal, India and China
Altitude Range:	1040-3657 m (in Nepal)
Status:	Fairly common
Venom:	As a rear-ranged snake, it is weakly venomous, but not fatal to humans.
Remarks:	Fairly common throughout its distribution in mid-mountainous regions.



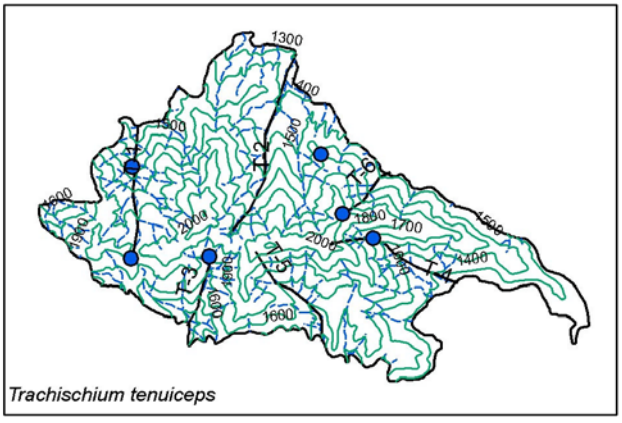
Limnonectes syhadrensis (Annandale, 1919)

Family:	Ranidae
Common Name:	Syhadra frog
Nepali Name:	Tyang tyang paha, Bhyaguto, Ahale bhyaguto
Size:	Average SVL of males is 28.5 mm and that of females is 33.7 mm (Dubois, 1975)
Identification:	Head slightly longer than wide; snout rounded to slightly pointed; canthus rostralis obtuse; loreal region oblique; tympanum distinct; interorbital space much narrower than the upper eyelid. First finger extending beyond the second; subarticular tubercles of fingers and toes well developed; toes usually half webbed; inner metatarsal tubercle oval or elliptical; outer metatarsal tubercle present; tivio-tarsal articulation reaching between the eye and the nostril. Skn dorsally with more or less prominent warts, with short longitudinal folds on the back. Dorsally grey to brown or live, sometimes with reddish patches on the back; a narrow to broad yellowish vertebral line often present; lips with dark vertical bars; limbs with completer or incomplete dark cross bars; sides of thighs yellow, marbled with black. Ventrally white or yellowish white. Males with vocal sacs, forming loose folds on the throat, which are brown or blackish.
Food habit:	Carnivorous, mostly insects.
Habitat:	Rice fields, ponds and channels of tropical and sub-tropical zones.
Reproduction:	Oviparous, start with the advent of the monsoon.
Sexual Diamorphism:	Females are larger than males, males have darker throat.
Activity Pattern:	Seen active day and night.
Distribution:	Nepal, Pakistan and India.
Altitude Range:	Below 1980 m (Nepal).
Status:	Fairly common.
Remarks:	Nanhoe and Ouboter (1987) regarded this species synonym of Limnonectes limnocharis. Except the calls of males and minor differences in the size of the body regions, these two species are similar.



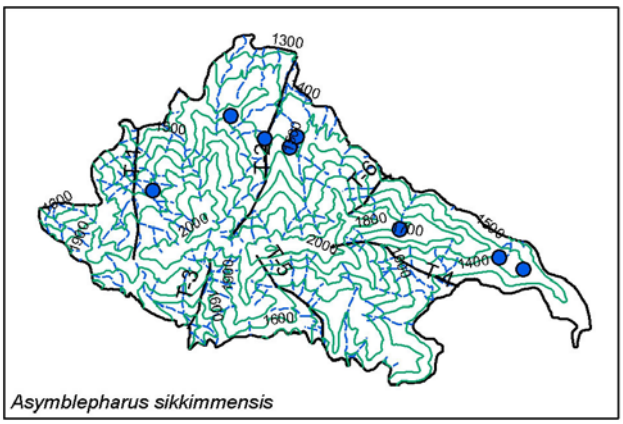
***Trachischium tenuiceps* (Blyth, 1854)**

Family:	Colubridae
Common Name:	Orange-bellied worm snake, Orange-bellied oriental slender snake
Nepali Name:	Sarpa, Chapare sarpa, Mate sarpa, Khumle sanp
Size:	Total length – fmale 370.0, tail 50.0 mm.
Identification:	Rostral as broad as high; internasals much shorter than prefrontals; loreal as long as high; 2 prefrontals; 2 postoculars, rarely united; temporals 1 + 1; anterior genial little longer than the posterior. Scales in 13 rows, keeled in the male on the sides of the vent. Ventrals 125-140; subcaudals 28-42. Dark brown to blackish above, yellow or orange below; tail mottled below with brown and with a brown mesial line.
Food habit:	Carnivorous, worms and insects
Habitat:	Moist oak forest, agricultural lands and around settlements, usually under rocks and logs.
Reproduction:	Oviparous
Incubation Period:	NA
Clutch Size:	3-6 eggs
Sexual Diamorphism:	Males are smaller than females and with keeled scales at the sides of the vent.
Activity Pattern:	Nocturnal
Distribution:	Nepal, India, Bangladesh and China
Altitude Range:	1400-2440m
Status:	Common
Remarks:	So far reported only from central and eastern Nepal



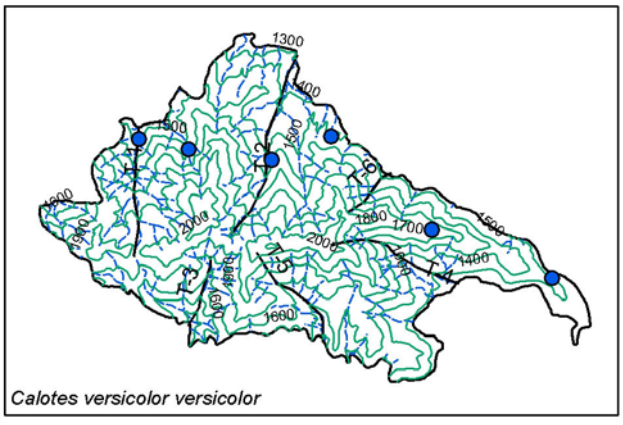
***Asymblepharus sikimmensis* (Blyth, 1853)**

Family:	Scincidae
Common Name:	Sikkim skink, Sikkimese ground skink, Bronzy-brown skink
Nepali Name:	Bhanemungro, Chikani girgit
Size:	SVL in males 49.0 mm and females 50.0mm.
Identification:	Transparent window in lower eyelid medium-sized. Ciliars not thickned. Frontal touching the first 2 supraoculars. Only the 5th supralabial situated under the eye. Ear round and very small, with distinct projecting lobules. Some pairs of enlarged nuchals. Only 21-29 scales around mid-body. Dorsum bronze-brown, usually with some irregularly arranged dark brown to black spots. A distinct dark brown lateral band, sometimes bordered by a gold coloured dorso-lateral line. Ventral parts white to grrenish white, yellow or grayish. In spring the chin, the lower flanks and the subcaudal region become orange.
Food habit:	Carnivorous, mostly insects.
Habitat:	Moist forests, agricultural lands and settlements.
Reproduction:	Oviparous, spring and summer.
Incubation Period:	NDA
Clutch Size:	4-6 eggs
Activity Pattern:	Diurnal and occasionally nocturnal
Distribution:	Nepal, India, Bangladesh and China.
Altitude Range:	<100-3200 m.
Status:	Very common
Remarks:	Most common and widely distributed scincid lizard of Nepal.



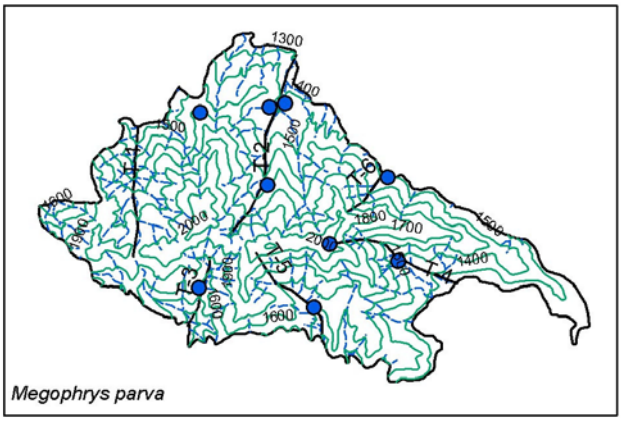
***Calotes versicolor versicolor* (Daudin, 1802)**

Family:	Agamidae
Common Name:	Common garden lizard, Bloodsucker, Variable agama
Nepali Name:	Chheparo, Chhepado, Girgitan, Girgit, Kanthutara
Size:	Total length – male 140 mm, tail 350 mm.
Identification:	Forehead concave; cheeks swollen in the adult male; upper head scales unequal, smooth or feebly keeled; two well separated spines on each side of the back of the head above the ear; 9-11 upper and as many lower labials. Body compressed, dorsal scales rather large, more or less distinctly keeled; 35-52 scales round the middle of the body. No gular pouch, except in the male during the breeding season. Tail rounded or feebly compressed, covered with subequal, keeled scales. Light brown or grayish above, uniform or with more or less distinct dark brown transverse spots or bars upon the back and sides; or variegated with dark brown; dark streaks radiating from the eye. Dirty whitish below, often streaks with dark brown or black.
Food habit:	Carnivorous, mostly insects.
Habitat:	Usually seen inhabiting a variety of terrestrial habitats below 2000 m.
Reproduction:	Oviparous, nesting from March to May.
Incubation Period:	42-45 days.
Clutch Size:	4-12 eggs.
Sexual Diamorphism:	Males longer and with thickened tail base and swollen cheeks.
Activity Pattern:	Diurnal
Distribution:	Nepal, India, Afghanistan, Pakistan, Sri Lanka, China and Indonesia.
Altitude Range:	<100-3200 m (Nepal).
Status:	Very Common
Remarks:	Most common lizard of Nepal.



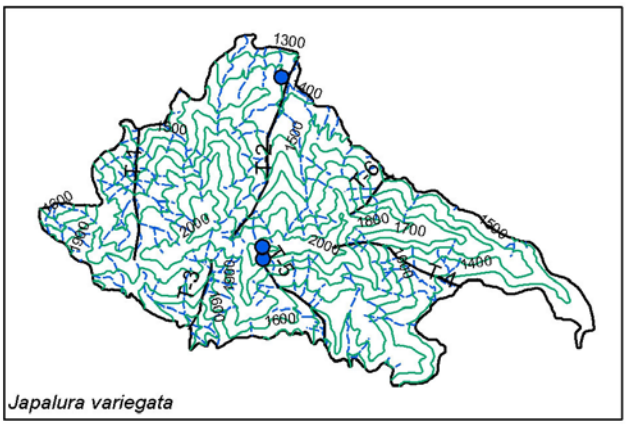
***Megophrys parva* (Boulenger, 1893)**

Family:	Megophryidae
Common Name:	Myanmar pelobatid toad, Burmese spadefoot toad
Nepali Name:	Dyang Paha, Bhyaguto
Size:	Snout vent length – Maximum 40mm for a male and 54 mm for female
Identification:	Head broad, depressed, rather short; snout rounded, distinctly projecting beyond the mouth; canthus rostralis sharp; loreal region slightly concave; upper eyelid with sharp edge; tympanum rather small; a supratympanic fold from posterior edge of the orbits towards the armpit. Toes with a rudiment of webbing; tips of fingers and toes slightly swollen; subarticular and metatarsal tubercles indistinct. Skin smooth. Olive-brown above; a triangular dark spot between the eyes; generally one or two other markings on the back; the lateral part of the head sometimes black.
Food habit:	Carnivorous, mainly insects
Habitat:	Mostly living at the edge of water sources, subtropical and oak forest
Reproduction:	Oviparous, June-August
Sexual Diamorphism:	Males have nuptial pads on their first two fingers and red colour on the inner sides of the lower legs
Activity Pattern:	Nocturnal, but males can be heard calling frequently by day
Distribution:	Nepal, India, Bangladesh, China, Myanmar and Thailand
Altitude Range:	970-2440 (Nepal)
Status:	Fairly common
Remarks:	The meat of this frog is used as medicine



***Japalura variegata* Gray, 1853**

Family:	Agamidae
Common Name:	Variegated mountain lizard, Variegated mountain forest agama, Variegated japalure
Nepali Name:	Chheparo, Hariyo Chheparo
Size:	Snout to vent 110; tail 205 mm
Identification:	Upper head scales sharply keeled; back of the head with scattered conical tubercles; tympanum covered with small scales. Body compressed; dorsal scales small, unequal, keeled, intermixed with larger more strongly keeled ones, all the scales with their points directed backwards and upwards except the lowermost; ventral scales as large as or larger than the largest dorsals, strongly keeled. A small gular pouch; a slight fold in front of the shoulder; nuchal crest low; dorsal crest a serrated ridge. Limbs well developed; fourth toe much longer than third; the hind limb reaches to the eye or beyond. Tail above covered with keeled scales intermixed with larger ones, below with uniform strongly keeled one. Olive-brown or green above, with lighter and darker markings; usually a series of light chevron-shaped stripes along the back corresponding to the large scales, a white stripe along the side of the neck; upper lip white; top of head sometimes with light and dark cross bars; tail with light and dark annuli; lower part greenish white; gular pouch usually with large dark blue spot.
Food habit:	Carnivorous, mostly insects
Habitat:	Moist forests, agricultural lands and open shrublands in temperate zone
Reproduction:	Oviparous
Sexual Diamorphism:	Nuchal and dorsal crest scales of males are laterally compressed, while they are flat in females
Clutch Size:	10-20 eggs
Activity Pattern:	Diurnal
Distribution:	Eastern Himalayas of Nepal and India
Altitude Range:	1400-2200 m
Status:	Fairly Common
Remarks:	Previous report only from eastern Nepal, **New record for the Central Nepal**



ANNEX III SPECIES ENCOUNTER POINTS

Species	Latitude	Longitude	Transect/ Sample
Calotes versicolor versicolor	27.7593056	85.2699167	Opportunistic Sample
Asymblepharus sikkimmensis	27.7581111	85.2645000	Opportunistic Sample
Asymblepharus sikkimmensis	27.7592222	85.2612222	2
Asymblepharus sikkimmensis	27.7622410	85.2566722	Opportunistic Sample
Limnonectes syhadrensis	27.7638056	85.2507778	Opportunistic Sample
Asymblepharus sikkimmensis	27.7595000	85.2653889	Opportunistic Sample
Megophrys parva	27.7623889	85.2527778	Opportunistic Sample
Trachischium tenuiceps	27.7568333	85.2687222	Opportunistic Sample
Calotes versicolor versicolor	27.7561791	85.2620760	2
Calotes versicolor versicolor	27.7589905	85.2445675	1
Calotes versicolor versicolor	27.7576021	85.2510789	Opportunistic Sample
Limnonectes syhadrensis	27.7651944	85.2500556	Opportunistic Sample
Trachischium leave	27.7356093	85.2524057	3
Megophrys parva	27.7393367	85.2525436	3
Mabuya carinata	27.7359766	85.2574791	Opportunistic Sample
Amphiesma platyceps	27.7325546	85.2692524	5
Trachischium leave	27.7402860	85.2631657	5
Japalura variegata	27.7435352	85.2607522	5
Japalura variegata	27.7450623	85.2606717	Opportunistic Sample
Amphiesma platyceps	27.7407537	85.2834156	4
Megophrys parva	27.7428454	85.2788814	4
Trachischium tenuiceps	27.7457979	85.2755825	4
Megophrys parva	27.7450657	85.2698386	4
Mabuya carinata	27.7448436	85.2655222	Opportunistic Sample
Calotes versicolor versicolor	27.7406078	85.2990506	Opportunistic Sample
Asymblepharus sikkimmensis	27.7420831	85.2951957	Opportunistic Sample
Asymblepharus sikkimmensis	27.7435950	85.2920763	Opportunistic Sample
Mabuya carinata	27.7459028	85.2877898	Opportunistic Sample
Calotes versicolor versicolor	27.7469490	85.2831451	Opportunistic Sample
Asymblepharus sikkimmensis	27.7473369	85.2789338	Opportunistic Sample

Megophrys parva	27.7538488	85.2774411	6
Amphiesma platyceps	27.7516847	85.2756511	6
Trachischium leave	27.7501285	85.2741622	6
Trachischium tenuiceps	27.7489314	85.2715502	6
Japalura variegata	27.7673689	85.2631351	2
Megophrys parva	27.7630630	85.2618597	2
Megophrys parva	27.7636547	85.2639257	2
Megophrys parva	27.7528604	85.2615950	2
Trachischium leave	27.7493452	85.2596916	2
Mabuya carinata	27.7454989	85.2510197	Opportunistic Sample
Amphiesma platyceps	27.7489577	85.2446864	1
Asymblepharus sikkimmensis	27.7524308	85.2464417	Opportunistic Sample
Mabuya carinata	27.7492590	85.2402778	Opportunistic Sample
Trachischium tenuiceps	27.7552023	85.2437769	1
Megophrys parva	27.7367324	85.2677015	5
Bufo melanostictus	27.7389370	85.2461948	Opportunistic Sample
Trachischium tenuiceps	27.7431392	85.2436097	1
Trachischium tenuiceps	27.7434026	85.2539118	3
Naja kaouthia	27.7492590	85.2402778	Opportunistic Sample
Bufo melanostictus	27.7391552	85.2680164	Opportunistic Sample
Bufo melanostictus	27.7389370	85.2461948	Opportunistic Sample