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Cover Illustration: Turtle by Keerthi Krutha

Status of Ganges Soft-shell Turtle *Nilssonia gangetica* amidst Deplorable Scenarios In Urban Wetlands of Central Gujarat State, India

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Turtles and tortoises are represented by 341 species worldwide (Utez 2014). There are 29 species of testudines known from political India (2003) and 11 species of turtles (Table 1) are reported from Gujarat State (Vyas 2001; Munjpuria 2014).

All turtles are legally protected and are also revered as 'Kurma Dev' in Hindu religion. 'Kurma' (=turtle) is believed to be an incarnation of Lord Vishnu and is worshipped. Some names of the Hindu sects are also derived from turtle ancestors. In India, a couple of religious shrines also house turtles as deities in temple/community ponds. Some examples from Gujarat State are Maa Khodiyar (Shihor, Bhavnagar), Dwarkadhish Temple (Dakor, Kheda), Maa Ashapura temple (Rajpipla), Siddhnath and Sarsiya (Vadodara). These temple ponds retain small populations of freshwater turtles which are fed regularly by the devotees. Many Vaishnava Haveli also maintain a small population of Indian Star Tortoises *Geochelone elegans* (Vyas 2014).

Turtles are facing many serious threats. Direct threats such as poaching, egg collection and epidemic diseases affect this group acutely; whereas indirect threats such as water pollution, loss, alteration and destruction of habitat affect the fauna in the long run. However, human intervention has also had its pros and cons, either by promoting conservation of turtles or by denigrative intrusion into their realm. Much like urban scenarios elsewhere, the fast developing urban districts of Gujarat State have been affected too.

Species information

The Ganges Soft-shell Turtle (GST) *Nilssonia gangetica* is distinguished by the low-humped, round-oval shape green or olive colored carapace (grows up to 94cm), with or without black reticulation - without ocelli in adults but often well

Image 1. A view of Ratan Talav: One of the oldest water bodies in Bharuch City

Table 1. List of testudines recorded in Gujarat State, India

	Common English Name	Scientific Name	Distribution (Gujarat)
	Family Bataguridae		
1	Indian Black Turtle	*Melanochelys trijuga*	South Gujarat (South of Tapi river)
2	Indian Roofed Turtle	*Pangshura tectum*	North & Central Gujarat
3	Indian Tent Turtle	*Pangshura tentoria*	River Tapi
	Family Cheloniidae		
4	Green Sea Turtle	*Chelonia mydas*	Coastal waters of Gujarat
5	Hawksbill Sea Turtle	*Eretmochelys imbricata*	Coastal waters of Gujarat
6	Olive Ridley Sea Turtle	*Lepidochelys olivacea*	Coastal waters of Gujarat
	Family Dermochelyidae		
7	Leatherback Sea Turtle	*Dermochelys coriacea*	Gulf of Kutch
	Family Testudinidae		
8	Indian Star Tortoise	*Geochelone elegans*	Entire Gujarat, except South of Narmada River
	Family Trionychidae		
9	Indian Softshell Turtle	*Nilssonia gangetica*	Entire Gujarat, except Kutch
10	Indian Flapshell Turtle	*Lissemys punctata*	Entire Gujarat
11	Red-eared Slider	*Trachemys scripta elegans*	Malan river, Nr. Mahuva town

Image 2. Two large Ganges Soft-shell Turtles feeding on puffed rice, bread crumbs, pakora etc.

Image 4. A beautiful wetland on the edges of Harni Gam Talavin the outskirts of Vadodara city.

developed in hatchlings and juveniles (Das 1995). The carapace is smooth in texture in large adults, and has several longitudinal rows of tubercles present in juveniles. The plastron is light yellow or pinkish-white in color. Head color is dark green with three to five oblique black streaks and a black bar running from eye to nape, these head markings are broken and are entirely lost in older animals.

GST inhabits stagnant and running water sources, including large rivers, streams, irrigation canals, lakes, ponds and man-made water tanks. The species is widely distributed in the wetlands of Pakistan, Bangladesh, Nepal and northern India (Das 1995). This species is recorded from the entire state of Gujarat, except for Kutch (Vyas 1998). Healthy breeding populations are noted in all the major rivers, including river systems of Banas, Sabarmati, Mahi, Vishwamitri-Dhadhar, Narmada and Tapi (Vyas 1989).

This species is legally protected under Schedule I of the Indian Wildlife Protection Act, 1972 and is categorized as 'Vulnerable' in the IUCN Red list.

Materials and Methods

In the recent past, author visited few urban water bodies of central Gujarat in three cities. Author carried out a rapid assessment from November 2013 to November 2014, in these water bodies (Table 2) to comprehend the current and approaching scenarios of wetlands and turtle fauna, especially the threats and status of GST. Secondary information was gathered from locals dwelling in the vicinity of these water bodies, urban town planners and local forest officials.

The GST presence can be easily noted in any water body, as the animal often appears on the

Image 3. A panoramic view of Siddhnath Tank: one of oldest Gaikwadi water tanks in Vadodara City.

Courtesy: Google Earth

Image 5. Aerial view of Harni Gam Talav and the contrasting zones divided by a road.

surface to beathe, peeking with its large head and lowly elevated carapace. Thus, the status was estimated (approximately) by counting the number of animals visible on the water surface for breathing within a short period (30-40 mins) with the help of binoculars (8 x 40). Each water body was visited repetitively every alternate month and the status of the turtles was considered with respect to sightings; high (15-10 GSTs sighted within the water body), average (10-5) and low (<5).

In the last decade, it was noticed that many urban water bodies were facing shrinkage due to various government agencies who were either dumping soil and debris (non-biodegradable waste and garbage) or encroaching into wetlands under the garb of development suggested by planners (non-environmental efforts disguised as projects of rejuvenation and sanctification or river front development). Ultimately, such practice has impacted native aquatic flora and fauna adversely and chronically. This calls for an assessment of these wetlands, to detect the present status of turtle fauna.

Observations

1. Ashapura Talav is a small sacred water

Table 2. The summery list of water bodies and details from central Gujarat, India in the study

Name of City, District	No	Wetland	Geo-coordinate	Size*	No. of species	Status of Nig
Rajpipala, Narmada	1	Ashapura Talaw	21°52'29.78"N: 73°30'23.85"E	0.5	Nig, Lip	Low
Bharuch City, Bharuch	2	Ratan Talaw	21°41'53.26"N: 72°59'31.00"E	1.30	Nig, Lip	High
Vadodara City, Vadodara	3	Siddhanath	22°17'42.12"N: 73°12'8.73"E	0.20	No turtle	Nil
	4	Harni Talaw	22°20'18.47"N: 73°13'9.59"E	1.65	Nig, Lip, Pat	Low
	5	Gotri	22°18'50.63"N: 73° 8'5.83"E	1.30	Nig, Lip	Low
	6	Sarsiya	22°18'24.16"N: 73°12'49.68"E	1.10	Nig, Lip	Low
	7	Kishan wadi	22°18'26.12"N: 73°13'39.79"E	0.20	Nig, Lip	Low, removed
	8	Raje	22°18'1.67"N: 73°13'1.21"E	0.80	Nig, Lip	Low
	9	Chhani	22°21'55.45"N: 73°10'10.84"E	1.70	Nig, Lip	High
Padara, Vadodara	10	Chhipa, Padara	22°14'11.87"N: 73° 5'12.41"E	0.85	Nig, Lip	Low?
Dakor, Ananad	11	Gomati, Dakor	22°45'20.14"N: 73° 8'50.19"E	4.15	Nig, Lip, Trc, Pat	Low
	12					

*size approximately from present Google earth map 2014; Nig = *Nilssonia gangetica*; Lip = *Lissemys punctata*; Pat = *Pangshura tectum*; Trc = *Trachemys scripta elegans*

Image 6. The present condition of Sarsiya Talav: merely functioning as a garbage dumping ground.

Image 7. Pictorial view of Chhani Gam Talav; wetland supporting high diversity of avian and aquatic reptilian species.

tank in Rajpipla, containing a little population of *Nilssonia gangetica* and *Lissemys punctata*. In 2008, water was drained out from the tank for the restoration purposes, when a few adult GST and *L. punctata* were removed from the wetland. During the study, three individuals were observed along with a small population of *L. punctata*. The northern and eastern part of the water tank has a moderate slope and considerable vegetation, thus providing favourable conditions for nesting. This pond is moderately polluted, with a layer of floating thermocol, polythene bags, plastic cans and invasive plants (*Eichhornia*) on the surface of water.

2. Ratan Talav (Image 1) is a large water reservoir on northern banks of Narmada River at Bharuch City. From October 2010 to September 2011, over two dozen GSTs died within a short span of one year. About half of these dead turtles, were examined to determine the cause of death. The results did not yield any concrete reasons for the fatal sickness, except for high contamination of *Escherichia coli*

Image 8. A pictorial view of Chhipa Talav at Padra town and basking Mugger Crocodile.

diagnosed during post-mortem. Hence, the actual cause of sickness and reason of death remains to be a mystery. Sadly, in the summer of 2012, half a dozen turtles were lost due to similar symptoms. Some underlying cause for their deaths still seem to be prevalent in this population of turtles.

During the visits, immense discharge of sewage was noticed in the wetland, as a result, the water quality of the wetland is highly degraded and toxic. Also, quantities of puffed rice, bread crumbs, biscuits and fried 'Pakora' were observed floating

Image 9. An adult female of the Red-eared Turtle (*T. s. elegans*) being an invasive alien species of turtle, at Gomati Talav, Dakor.

on the surface of water along with other non-biodegradable solid waste. This waste is usually littered into the water body by the devotees from the adjoining temple premises of Ramaji Temple. Over the years, it became a ritual for the pilgrims to throw food along with the packets into the tank for feeding turtle. Eight to 10 large-sized GSTs were foraging and vigorously feeding upon these food items (Image 2). The periphery of the reservoir is congested and encroached by locals of extremely economically backward communities and squatters. Additionally, there are uninhabited plots allotted to the under privileged for 'EWS' row housing, with scattered patches of green cover. Almost the entire vicinity of the water body is environmentally degraded, except for the northern brink, which is relatively undisturbed and greener due to the nearby graveyard. This serves as a flourishing condition for the GST population, providing them nesting grounds.

3. Siddhnath Temple tank is one of oldest water bodies of Vadodara City, with concrete banks. (Image 3). In the years 2008-2009, the local authority ordered for the water body to be thoroughly drained and cleaned, for the purpose of restoration and beautification. Few turtles, including three large adult GSTs were caught/ rescued by the local NGOs and released into a nearby water body. Following this action, the tank has not been refilled with water till date. Instead of cleaning the water body, one can see sewage

being dumped into it.

4. Harni Wetland is large notable water body situated on the north-eastern edge of Vadodara City. The wetland still remains un-encroached and enriched with biodiversity due to the surrounding agricultural fields and naturally flourishing aquatic vegetation, on its north-eastern periphery (Image 4). It is a home to 131 local and migratory bird species (Padate & Sapna 1996). Along with these, a small population of GSTs also survive in accord with a comparatively larger population of *L. punctata*. Unfortunately, this wetland was divided into two zones, whereby the southwestern and northwestern edges of the wetland along with southern and northern edge of the water body were included for infrastructural development by the Town Planning Authority, without any consideration of a buffer zone to mitigate direct damage to the ecology of the wetland (Image 5).

5. Gotri Gam Talav is one of the largest water reservoirs in the city, situated on the western edge of the city, congested and encroached with dense slums and squatters. A small populace of both the species inhabits the wetlands. The water body is moderately polluted by sewage released from the environs, slums and housing colonies. About 44 species of birds were recorded at the talav. This water body has been considered and enlisted for restoration and beautification in near future.

6. Sarsiya, also known as Warasiya Talav, is a medium-sized water body with concrete banks, surrounded by dense slums and religious complexes of Hindu and Muslim faiths, along with a small graveyard. Within the talav, there is a small quiet island and its eastern edge is a marshland, once formed due to its connection to an old Gaekwadi water feeding canal, planned for regulating the flow of water, and flood control. Across the years, the connection was lost due to urban encroachment. The devotees from both the faiths, offer puff rice, fried food items and Ataa pellets (wheat flour pills) to fishes and turtles. Since last four years, there have been reports about 2 to 3 large adults GSTs found dead in the talav each year. Presently, a small population of GSTs survive, sharing their habitat with pollutants (non-biodegradable solid waste) and invasive plants (*Eichhornia*). The current condition of the water body is pathetic, and the water smells foul. The entire area is an eyesore, and reminds us of a public garbage dumping site (Image 6).

The reducing numbers of GST noticed in this Talav, shows how large numbers of turtles have gradually died, or were poached or were migrated elsewhere. Because once upon a time, this wetland was known to inhabit a notable number of large adult GSTs. Earlier there were about seventy large adult GSTs, translocated from 'Raja-Rani' talav by the local authority (Vyas 1989).

7. Kishan Wadi Talav is a small pond surrounded by human habitation. Small populations of both turtle species survive in the talav. In the last month (6 October 2014), authority (?) decided upon filling up the cavity, and acquiring upon a habitable land resource out of the pond. Orders for emptying the pond and draining the water were given out immediately. The water was pumped out, and the solid waste was dumped aside. Along with this, four large GSTs and six flap shell turtles were translocated and released into Mahi River with the help of local NGOs and the forest department. As of now the ownership of talav, is under legal dispute, and meanwhile all developmental activities have

Image 10. A dead Ganges Soft-shell Turtle at Sarsiya, Vadodara City.

ceased.

8. Raje Talav, also known as 'Raja-Rani' talav, is situated in the core of Vadodara City surrounded by dense slums on all sides (Image 7). This wetland is divided by a water pipeline into two halves, and is, therefore, known as Raja-Rani talav. It is a highly polluted water body, with huge quantities of garbage dumped in it. Despite of the unfavourable living conditions, low numbers of both species inhabit the water body.

9. Chhani Gam Talav is a large water body with a small island (connected with road), situated on the northern edge of the city. The north-east area of wetland still remains un-encroached with pockets of natural beauty (Image 8), aquatic vegetation and agricultural fields. Twenty-two species of local and migratory bird species have been recorded from the wetland (Soni & Bhatt 2008). High numbers of GSTs and Flap shell turtle populations are found in the talav. A recent report shows 5-6 flap shell turtles and a large adult GST along with fishes found dead in the talav. It might have happened due to the toxicity caused by untreated sewage discharge. The western side of the water body has been colossally polluted, by PVC plastic garbage and invasive plants (*Eichhornia*), causing eutrophication and extremely depleted levels of dissolved oxygen.

10. Chhipa Talav is a medium-sized wetland at Padra town, surrounded by slums, houses and a temple complex. This talav contained a small number of Muggers (*Crocodylus palustris*: Image 9) (2014), Ganges Soft-shell Turtle and a bigger population of *L. punctata*. Last year in 2013, the wetland was dried, by emptying the water, due to the recurrent complains of locals, about Mugger crocodiles. The members of a local NGO caught three muggers and five large specimens of Ganges Soft-shell Turtles, all to be translocated elsewhere.

11. The Gomati Talav is situated in Dakor Town and is an integral part of the sacred premises of Lord Ranchhodrai Temple. It is well known for its large-sized turtle population, since a century. The temple devotees offer puff rice, bread crumbs and chapati (homemade wheat bread) regularly to the turtles. Now it has been observed that the turtle population is declining within the water body, with only a few Ganges Soft-shell Turtles remaining. Most interesting observation to be noted here is the presence of an adult specimen of a Red-eared Slider *Trachemys scripta elegans*; found on January 2012 from the water body. This is a South American species, and its presence here is questionable. Another clue, to the declining population was the recent report, which talked about the death of GSTs during summers, and the mysterious reason behind this loss.

Results & Discussion

Highest diversity of turtle fauna was noted at Gomati Talav with four turtle species, followed by Harni Talav (with three species) and remaining water bodies with two species. No turtles were found at Siddhnath Temple Tank, because the tank has totally dried (See Table 1). High numbers of GSTs were observed at Ratan and Chhani Talav, whereas the remaining water bodies had low numbers. Almost no GSTs were found in Siddhnath, Kishanwadi and Chhipa Talav because turtles were eliminated from the water body. Earlier, Vyas (1989, 1989a) mentioned high numbers of GSTs in Raja-Rani and Sarsiya Talav, but within 25 years, the status has depleted from high to low. This shows the turtle fauna especially GST, is under tremendous pressure and facing major threat.

The Harni and Chhani Gam Talav are in a considerably better state, with natural ecosystems to support avian and aquatic biodiversity. Occasionally, they house a small floating population of mugger crocodiles also, which migrate during floods or heavy rains from their home habitat of River Vishwamitri (Vyas 2010). Earlier, a report about an invasive species from Malan River, near Mahuva town (Munjpura 2014) and the present record of exotic turtle species *T. s. elegans* (Image 10) from Gomati Talav at Dakor, indicates substantial invasion of habitat by foreign invasive species, causing threat to the Indian fresh water turtle fauna. Speculatively, this might be a result of the illegal pet trade. The turtle trade is active in a stealth mode within the state, and large

quantities of turtles are supplied to pet dealers and especially fish aquarists; who sell these turtles as conveniently as gold fishes in the market. The implied repercussions on the local native turtle fauna are a subject of further research, but definitely these species have some connection with the new pathogens and parasites causing damage to local turtles.

Number of sub adult and adult GSTs died (Image 11) at Ratan, Sarsiya and Gomati Talav, showing some unknown pathogenic infection by devotees definitely does not happen to be the natural diet of the species. Thus prolonged feeding on this fattening human diet, causes digestive disorders to the turtles. Another notable threat to GSTs is poaching (Vyas 2010). Small scale illegal hunting was noticed at Gomati, Harni, Chhani and Sarsiya.

Generally, it was observed, that all the wetlands were encroached less or more. About 25 % of area was either infringed by locals for housing necessities or reserved by the local planning authority in

Image 11. Highly fungal infected Ganges Soft-shell Turtle found from Ratan Talav, Bharuch City.

particular induced to the turtle population (Image 12), but determining the exact reason is a subject of scientific investigation and veterinary diagnosis. The regular practice of offering unhealthful synthetic food, including ganthiya, puff rice, bread crumbs, biscuits, Ataa pellets etc. (all of these along with their packaging) to turtles; could be a major cause of sickness in GSTs. Normally, GST is a carnivore, scavenges on dead animals and rarely feeds on plants matters (Das 1995). Food offered

the name of infrastructural development land or restoration and beautification project without realizing the ecological significance of the wetland. Earlier, Sharma et al. (2004) mentioned that about 60% of the wetlands that existed in the past in Vadodara are either lost or are degraded, and the same is happening continuously, through encroachment and degradation.

The overall quality of water was found to be very poor and highly polluted; by untreated

sewage discharge, plaster of paris deposits from the immersion of idols, floating debris of non-biodegradable waste (polythene, PVC, aluminum foils, styrofoam etc.) and eutrophication caused by the saturation of invasive *Eichhornia* plants. These water bodies have ideally become breeding grounds for mosquitoes, making the vicinities highly vulnerable to epidemics.

It was noticed, that whatever remains of the natural buffers with green cover and suitable datum exist in these water bodies, are likely to be damaged or lost in the upcoming projects proposing development and beautification of these reservoirs. The proposals are designed insensitively, devoid of any efforts to preserve the ecologically significant pockets of biodiversity, either for environmental or aesthetic priorities. Unfortunately, a research report advocates the construction of concrete interfaces for urban water bodies, concluding as 'ponds having natural boundary receive more contaminants in comparison to the ponds with constructed boundary' (Manthan & Makodi 2013). However, natural boundary evidently supports many forms of life and forms a complex ecological barrier between the aquatic and terrestrial life. Usually these peripheries act as the breeding grounds aquatic reptiles. One of the best examples to learn from, is the recent project of 'Ranmal Lake', controversially designed and developed by the Jamnagar Urban Authority (Ashar 2014). The casual approach of urban planning authorities, while dealing with these water bodies, is both very generalized and callous. Either the water body is concreted peripherally, with least or no provision to natural edges or vegetative cover, or the water body is filled up, to create more urban land, causing solid imbalance in the natural aquifer and watershed pattern of that area. Both of these solutions ultimately cause floods and loss of ecology. The design development teams of urban planning authorities do not encourage a say from any ecologist or biologist, and thus continue to ignore urban ecology.

Eliminating the turtles and filling up the land are actually well intended scams, especially the case of 'Kishanwadi Pond'. It illustrates the land pooling and tactful profit sharing business between land mafias, local legislative members, real estate players and a few officials from the local authority. Earlier, Sharma et al. (2004) stated that 'these urban ponds are generally an unwanted entity, and are perceived as useless pieces of land, without any 'productivity'. Slowly they become the abode of weeds, slums, garbage, breeding grounds of mosquitoes and various diseases. Eventually, they are reclaimed by filling the land for other uses'.

The present study, however, shows the blur future of GSTs in the dilapidating urban wetlands. It also shows that the wetlands with a good number of GSTs are also facing threats, for they fall short of proper breeding grounds, causing no new recruitments and a gradual decline in the population in a long run. That day is not very far, when the urban wetlands would have disappeared, and the only urban entities where GSTs could exist, would be zoos.

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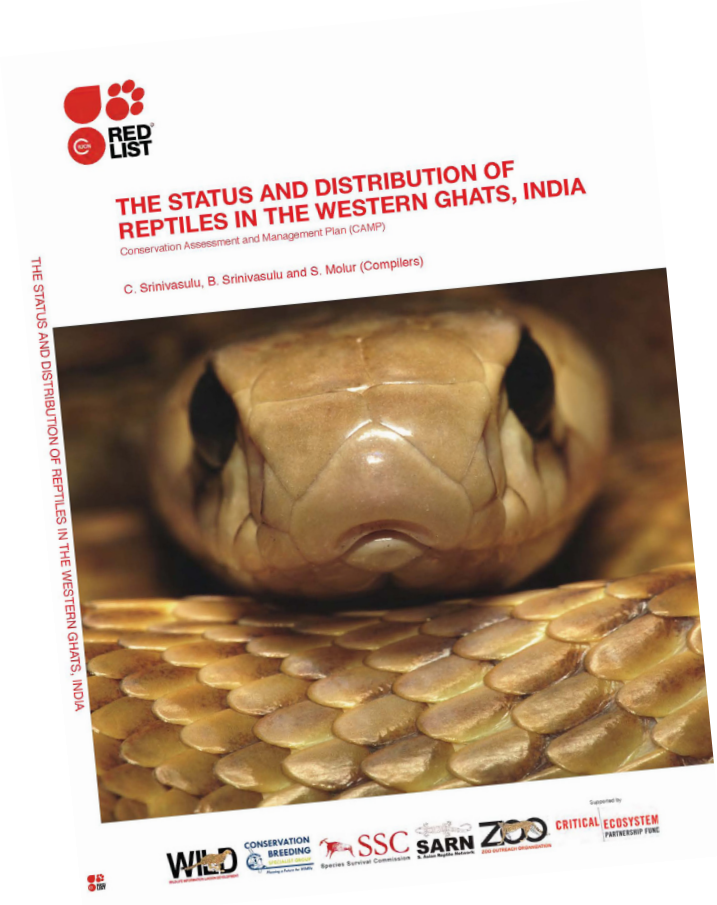
IUCN Red List Assessment of Reptiles of Western Ghats, India



Key Findings:

- 227 species assessed from Western Ghats

- 107 species endemic of which 18 are threatened

- 38 species assessed as Data Deficient

- 50 species endemic to peninsular India

Conservation Recommendations:

- Research needed: Taxonomy, population status, true distribution extent, ecology, habitat requirements and foraging niche, threats to the habitat.
- Conservation education programs
- Amendment of the existing legislation
- Improving the existing protected area network

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Jeopardized future of Indian Star Tortoise *Geochelone elegans*

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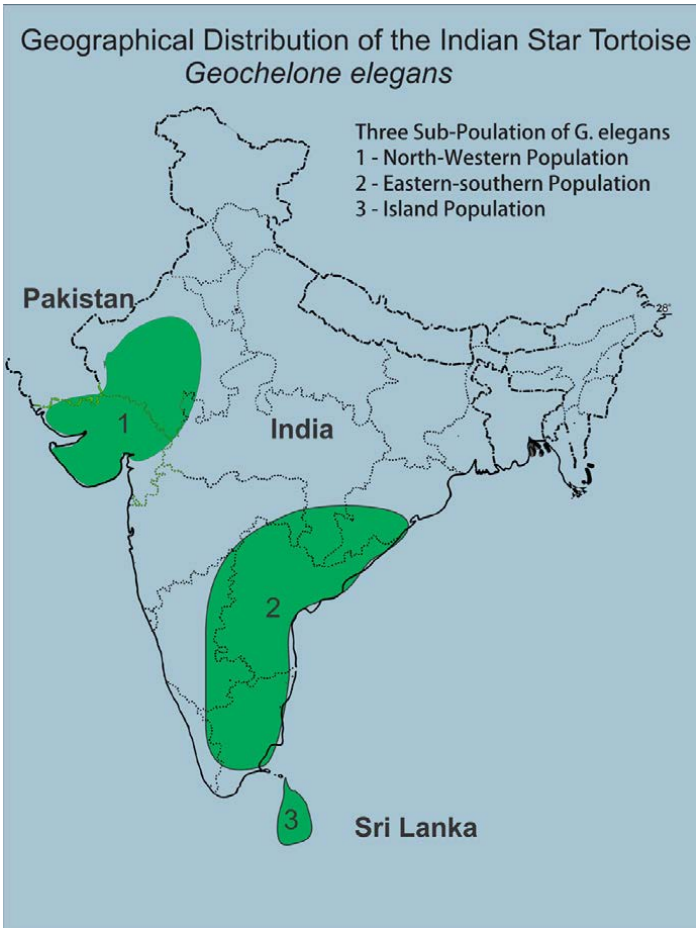
Modern man's urge for intense urbanization and rapid industrial development has pushed many reptilian species into a state of great dilemma, ultimately exposing them to numerous threats of varying extents. These threats have rendered a series of events which impact the survival of native reptiles negatively, thus pushing some reptilians to the brink of extinction, and others likely vulnerable to it, like the Indian Star Tortoise *Geochelone elegans* (Vyas 2010). This species is widely distributed in Pakistan, India and Sri Lanka and is known by three discontinued populations, western, southern and island populations (Table 1; Figure 1) (Daniel 1983; Frazier 1992; Das 1995; Vyas 2010) and it confirmed genetically also (Gaur et al. 2005). Indian Star Tortoise (Figure 2) is legally protected in the native range of these three countries, by national legislation: under the Indian Wildlife Protection Act 1972, and the Sri Lankan Fauna and Flora Protection Ordinance of 1938 (Amendment 1993) and in Pakistan by the provincial legislation of the Sind Wildlife Protection Ordinance 1972 (Sind Province is the only natural range in Pakistan) (Anand et al. 2005).



The Indian Star Tortoise (IST) is currently facing various small to large sized threats in the wild, some natural and some not, in the range countries (Vyas 2010a) (Table 2). The most serious threat to the species is the massive number of tortoises illegally collected from the wild and smuggled for commercial pet markets (Jenkins 1995; Nijman & Shepherd 2007; Shepherd & Nijman 2008) and same as on the name of captive breeding stocks (Vinke & Vinke 2010). It's observed that IST is the most favorite pet in the world. Therefore, this species is synchronic with wildlife trade globally. From over a few last 23 years (1991-2013) the gathered information from various sources, like published scientific papers, news papers, internet and various official raids by state forest department, pet traders and other enforcement agencies, including customs and export departments of native and overseas countries shows that about 49,452 live IST were smuggled, (Table 3) an alarming and an eye opening fact. This trade trend is rising day by day. Most of the tortoises are confiscated at international air ports, but there exists an unseen complex network of smugglers, other modes of

Table 1. The geographically three distinct populations of Indian Star Tortoise *Geochelone elegans*

Population	Geographical Area Occupancy (Approx)	% land occupied by each sub-population	Country / Region	Threats As per the order from high-low (see Table 2 specific threats)
North-western	384656.0	50	Pakistan (Sindh), India (Gujarat, Rajasthan, Madhya Pradesh)	1, 2, 4, 5 & 3
South-eastern	334959.3	44	India (Kerala, Karnataka, Andhra Pradesh, Odisha, Tamil Nadu)	4, 1, 2, 5 & 3
Sri Lanka	45927.0	6	Sri Lanka	4, 1, 2, 3 & 5

transactions and its other derivatives to which we are unknown. Overall the illegal smuggling of IST is a massive tread, bigger and beyond our anticipation and what we imagine is merely the small tip of a gigantic iceberg. Records and figures of tortoises, victimized by this trade, speak of only those specimens which are confiscated before reaching final destination, but the underlying actual numbers of specimens collection from the wild are presumably much larger. High percentage of tortoises die, during such transactions and before consignments are delivered to the target points, because most or all of the confiscated tortoises are immature, small-sized, juvenile or sub-adults, hardly few months to six-seven year olds. It is impossible to quantify the effects and magnitude of tortoise trade in Asia (van Dijk et al. 2000), but an estimate of over 5000 individuals are annually exported (Choudhury & Bhupathy 1993), and within a decade, consider 10,000-20,000 individuals/annually tortoises being stolen from the wild (Sekhar et al. 2004). However, such illegal pet trades involving large numbers of tortoises has a major pessimistic impact on the

Image 1. Indian Star Tortoise *Geochelone elegans*

entire wild populations. This problem escalates two possibilities and thus adversely affecting the species, first is fewer percentages of new recruitment in the wild population and second possibility is the probably caused, genetic pollution in between inter sub-populations and accidental introduction of new pathogens (Alacs et al. 2007).

A huge number of hatchlings, juveniles and sub-adult eradicated from the ecosystem has direct negative repercussions on the global populace, resulting into fever or no new recruitments in nature, the parental stock becoming old and further older, leading to poor breeding performance and shrinkage in the population, finally causing the entire population to suffers for a long term survival and existence in nature.

Whenever any large illegal consignment has been seized, straight away a question rises regarding the original geographical location in wild/native of the seized IST and how the stocks should go back to the native country-location after necessary scientific and official procedure (IUCN 2002). But such practice is not exercised or not observed (shortcuts preferred or mere lacuna of actions) when small consignments/ fewer numbers of IST are seized overseas or at national level, especially during raids by forest department in India. The authority immediately rushes and panics for releasing the stocks of animals into any nearby habitat, without any concern or opinion from any experts. In such cases due to the shortcut practice, the local population of IST suffers genetic pollution due to in between sub-population, and further the healthy sub-populations of IST are prone to chances of infection from new pathogens transmitted by the seized stocks. These two critical issues massively deplete the wild population of IST, and inflate the pet trade trend. The causes responsible for these issues are 1). No provision of ex situ housing facilities for maintaining large numbers of IST within the range countries, 2) lacuna in forensic protocols especially for tracing geographic origin of seized stocks and mandating their return to their origins.

The IST pet trade represents a chronic failure of the management and conservation policies

Table 2. The list of recorded threats on wild population of *Gochelone elegans.*

No.	Type of threats	Threats
1	**HABITAT DESTRUCTION**	**High**
	-Fragmentation	
	- Alteration	
2	**AGRICULTURE PRACTICE**	**High**
	-Pesticide, herbicide	
	- Crop pattern	
	-Protection device for crop field	
	-Irrigation canal system net-work	
3	**FOREST MANAGEMENT**	**Moderate**
	-Fire line practice	
	-Management plan on bases of only bigger or single species conservation guideline, Not entire biodiversity	
	-Interior blocks and boundary demark with concrete wall	
	- Mono-culture plantation	
	-Collection of grasses	
4	**PET TRADE**	**High**
5	**GENERAL DEVELOPMENT**	**Moderate**
	- Expanding Road net-work	
	- Expanding Railway net-work	
	- Urbanization	

formulated for the benefice and long time survival of this species. This issue has to be recognized as a massive lethal threat, to the native and the global populace. And thus treated suitably by law and enforcement, vigilant monitoring of trade, education and awareness programs amongst the locals, along with the provision of alternative survival strategies with proper solutions to the socio-economic problems of poor forest dwellers, especially those who live in the vicinity or natural surroundings of this species, ultimately discouraging them from any sort of direct or indirect participation in the illicit pet trade. Either we might have lost the species with is short periods. We also need to consider all the recommendations suggested by van Dijk et al. (2000) in Cambodia Workshop (Asian Turtle Trade Working Group 2000).

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Table 3. The summarized information on *Gochelone elegans* confiscated in pet trade from various sources (up to date 31 December 2013)

Tortoise	Date	Area /Location	Authority	Sources
2092	1991-1992	Kolkata, International Air Port	Forest Department	Vyas 2000
200	1992	Netherlands	AP Authority	Chouthury & Bhupati 1993
1600	1996	Mundra Sea Port, Kutch, Gujarat	Port Authority	Tiwari, 1996
1000	1997	India	Forest Department	Anon 1997
232	1996	Canada	Canadian Custom Authority	Vyas 2000
2000	1990-1997	International Air Port, Chennai	Chennai Air Port Authority	Katwal 1998
3170	1998-2000	International Air Port, Bangalore	Bangalore Forest Department	Anand et al. 2005
365	Apr-01	International Air Port, Chennai	Chennai Air Port Authority	Anand et al. 2005
440	Jul-01	International Air Port, Chennai	Chennai Air Port Authority	Anand et al. 2005
600	Aug-01	International Air Port, Chennai	Chennai Air Port Authority	Anand et al. 2005
315	Oct-01	International Air Port, Chennai	Chennai Air Port Authority	Anand et al. 2005
200	Apr-02	International Air Port, Chennai	Chennai Air Port Authority	Anand et al. 2005
334	Apr-02	International Air Port, Singapore	Custom Authority	Ananad et al. 2005
1011	Jun-02	International Air Port, Singapore	Custom Authority	Anand et al. 2005
1095	Jul-02	International Air Port, Singapore	Custom Authority	Walker 2002, Anand et al. 2005
714	Aug-02	International Air Port, Chennai	Custom Authority	Choudhury & Rao 2005
441	Jul-03	International Air Port, Chennai	Custom Authority	Anand et al. 2005
580	Jul-03	International AP, Kuala Lumpur	Custom Authority	Anon. 2003, Anand et al. 2005
600	Jul-03	International Air Port, Chennai	Custom Authority	Anand et al. 2005
305	Aug-03	International Air Port, Chennai	Custom Authority	Oppili 2003
960	Aug-03	International Air Port, Chennai	Custom Authority	Manikandan 2003
499	Sep-03	Changi Airport, Singapore	Information not available	Anand et al. 2005
540	Nov-03	International Air Port, Chennai	Custom Authority	Anand et al. 2005
317	Dec-03	International Air Port Singapore	Custom Authority, Singapore	Thirumurugan et al. 2005
130	Feb-04	International Air Port Singapore	Custom Authority, Singapore	Thirumurugan et al. 2005
307	Mar-04	European Studbook Foundation & TCA	Hong Kong	Bulsing 2004
450	Jul-04	International Air Port, Chennai	Custom Authority, Chennai	Anand et al. 2005
452	Jul-04	International Air Port, Chennai	CISF & Custom Authority, Chennai	Anand et al. 2005
500	Jul-04	International Air Port, Chennai	Custom Authority	ATNW 2004
600	Jul-04	International Air Port, Chennai	Custom Authority	ATNW 2004a
9500	2005	data of different raid & scized	Wildlife Authority	Lenin 2007
482	Mar-06	IAP, Thiruvananthapuram	Custom Authority	ATNW 2006
197	May-06	International Air Port, Chennai	Custom Authority, Chennai	Shepherd & Nijman 2008
540	Jun-06	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2006a
1460	Sep-06	IAP & Pets Markets, Thailand	Custom Authority, Thailand	John 2013
430	Nov-06	International Air Port, Mumbai	Custom & Forest Authority, Mumbai	ATNW 2006b
131	Feb-07	International Air Port, Bangkok	Custom Authority, Bangkok, Thailand	ATNW 2007
1020	Mar-07	International AP, Kuala Lumpur	Custom Authority, Malaysia	ATNW 2007a
120	May-07	International Air Port, Singapore	Custom Authority, Singapore	ATNW 2007b
400	Jun-07	International AP, Kuala Lumpur	Custom Authority, Malaysia	ATNW 2007c
870	Jul-07	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2007d
350	Aug-07	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2007e
2016	Aug-07	International Air Port, Mumbai	Custom Authority, Mumbai	ATNW 2007f
600	Oct-07	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2007g
555	Oct-07	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2007g
975	Oct-07	International Air Port, Mumbai	Mumbai	Kaushik & Nitya 2007
335	Apr-08	International AP, Kuala Lumpur	Custom Authority, Malaysia	Menon 2008
950	Aug-08	International Air Port, Chennai	Custom Authority, Chennai	ATNW 2008
1140	Sep-10	International Air Port, Bangkok	Bangkok	Rashid 2010
88	Feb-11	International Air Port, Bangkok	Royal Thai Customs, Bangkok	Anon. 2011
19	Nov-11	International Airport, Jakarta's	Jakarta's, Customs Indonesian	Anon. 2012
601	Dec-11	International AP, Kuala Lumpur	International AP, Kuala Lumpur	NDTV 2011
100	May-12	International AP, Kuala Lumpur	International AP, Kuala Lumpur	ESF 2012
300	Jun-12	Trichy Air Port, Trichy, Kerala	Custom & Air Authority, Trichy	Dennis Selvan 2012
890	Aug-12	International Air Port, Bangkok	Royal Thai Customs, Bangkok	Traffic News 2012
192	Sep-12	From different locations	Forest Department & Wildlife Trust of India	The Hindu News 2012
890	Sep-12	International Air Port, Bangkok	Royal Thai Customs, Bangkok	Cota-Larson 2012
21	Apr-13	Kalkata, International Air Port	Custom Authority	On the Trail-1 2013
50	May-13	Local Bus Stop, Kengeri, Bangalore	Forest Department, Karnataka	On the Trail-1 2013a
952	Sep-13	Boarder Security Force.	Tentulberia, Kolkata, West Bengal	On the Trail-2 2013b
206	Oct-13	Bus Stop, Kolkata, West Bengal	Police Department, Kolkata	On the Trail-3 2013c
423	Nov-13	International Air Port, Bangkok	Royal Thai Customs, Bangkok	Traffic News 2013
600	Dec-13	Railway Station, Allahabad, UP	Forest Department, Uttar Pradesh	On the Trail-3 2013

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First record of scavenging by *Oligodon arnensis* (shaw, 1802) from Tungareshwar Wildlife Sanctuary, India

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Oligodon arnensis (Shaw, 1802) the Common Kukri Snake is a widely distributed member of its genus throughout India. This species is known as 'Kukri snake' because of the shape of their teeth, which are similar to a Kukri (a curved knife used by the soldiers of the Gurkha community from Nepal). These curved teeth help the snake to rupture the egg shell while consuming the contents of an egg. The diversity of prey captured by *Oligodon arnensis* varies as it grows. A small-sized snake feeds on small insects and maggots where as large-sized snakes feed on eggs of reptiles and birds.

A moderate population of *Oligodon arnensis* inhabits Tungareshwar Wildlife Sanctuary (Fig. 1) which is situated about 70km from Mumbai. The forest is an effective corridor and buffer for the fauna of Sanjay Gandhi National Park, Borivali, Mumbai. Tungareshwar is also a favourite destination for nature lovers and naturalists.

Most of the records regarding the scavenging behavior by snakes are noted during occasional observations and a few due to experiments conducted by herpetologists. Some ecologists believe that the scavenging behavior in snakes may be due to curiosity of the snakes towards the food such as carcasses but there are many references giving evidence regarding scavenging behavior in snakes. According to Lillywhite et al. (2002), Cottonmouth snakes (*Agkistrodon piscivorus conanti*) feed on dead fish dropped

Figure 1. Map showing the study area, Tungareshwar Wildlife Sanctuary

by birds. They also recorded the pit viper snake invading an intertidal zone to feed on dead fish. Ayres (2012), studied the scavenging behavior in the genus *Natrix* and found *Natrix maura* and *Natrix natrix* feeding on the carcass of a newt. Some recent experiments proved the presence of this behavior in Cottonmouth Snakes at Island Bird Rookeries (Lillywhite et al. 2002). Similarly, Shivik & Clark (2012), during their study on Brown Tree Snakes observed that snakes rely on different kinds of cues such as visual cues, chemical cues and thermal cues to locate their food. Snakes which use chemical cues scavenge more often than those who find their food by visual cues or thermal cues (Shivik & Clark 1997).

During the trail on 7 July 2012 at Tungareshwar Wildlife Sanctuary, *Oligodon arnensis* was observed feeding on a roadkill of *Calotes versicolour*. Its body was mutilated exposing its intestine and abdominal parts and was in an initial stage of decomposition. The snake approached the dead animal by flicking its tongue. After finding the carcass, the snake started looking for a suitable way to ingest the food. Surprisingly, unlike all other snakes it did not feed by engulfing the prey from the head but from the exposed intestinal coils (Image 1). Though the snake was large enough to eat the animal whole it chose to ingest the separated intestines. *Oligodon arnensis* does not have pits like vipers to locate its prey by thermal cues and relies on its olfactory and visual ability to find its prey. Thus, it can be inferred

Image 1. *Oligodon arnensis* scavenging on roadkill of *Calotes versicolor*

that the snake was led to carrion by its chemical cues. This observation seems to be a first record of the scavenging habit in genus *Oligodon* and also suggests that *Oligodon* sp. use chemical cues to locate their food.

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Record of *Spalerosophis atriceps* (Fischer, 1885) from Keoladeo National Park, Bharatpur, Rajasthan

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A solitary specimen of uncommon Black-headed Royal Snake *Spalerosophis atriceps* (Colubridae) was recorded from Keoladeo National Park (KNP), Bharatpur, Rajasthan. KNP (27°7.6′ - 27°12.2′ N & 77°29.5′ - 77°33.9′ E), is a Ramsar site and an IUCN World Heritage Site (Ali & Vijayan 1986). It is an important global wintering waterfowl area. The total area of KNP is 29km², of which about 20.5km² is terrestrial and 8.5km² is a seasonal wetland. It falls under the semi-arid zone (Province 4A) of India (Rodgers et al. 2002) and is covered by dry mixed deciduous babul forest (Champion & Seth, 1968) and species adapted to semi-arid conditions such as *Acacia nilotica, Prosopis juliflora*, *P. cineraria*, *Salvadora persica*, *S. oleoides*, *Capparis sepiaria* and *C. decidua* (Prasad et al. 1996).

The genus *Spalerosophis* is widely distributed in three distinct arid and semi-arid regions of Saharo-Sindian range i.e. Afro-Arabia, Irano-Turan and Indo-Pakistan (Baig & Masroor, 2008). According to Baig & Masroor (2008) Indo-Pakistan snakes of this genus are mainly *S. atriceps* and *S. arenarius* with some representation of *S. diadema* along the Pakistan border with Iran and Afghanistan, of which *S. atriceps* is distributed from some areas of Himalaya to the west of Indus River that also represents its western boundary. In India, *S. atriceps*is known to be specifically distributed in Gujarat (Kutchchh), parts of Rajasthan, Punjab, Kashmir and Himachal Pradesh (Whitaker & Captain 2004).

Bhupathy (1999) have earlier recorded 29 species of reptiles including 14 species of snakes belonging to 13 genera and five families from KNP. Following latest taxonomic changes in reptiles, Common Sand Boa *Gongylophis conicus* was earlier named under genus *Eryx* and Indian Rock Python belonging to family Pythonidae was earlier listed under family Boidae. Hence KNP had 14 species of snakes belonging to 14 genera and 6 families. Ramesh (2012, unpublished) reported the sighting of *S. atriceps* from KNP and the present record also confirms its presence, thus adding to the existing list of snake species from KNP. The sighting of the snake occurred on June 19, 2014 at

Image 1. *Spalerosophis atriceps* (Close up)

Image 1. *Spalerosophis atriceps* in Keoladeo National Park, Rajasthan

09:30 h (27°11′43″N, 77°30′34″E) during vegetation survey of an ongoing burrow ecology project in KNP. During the survey, loud alarm calls of Red-vented Bulbul (*Pycnonotus cafer*) and Chestnut-shouldered Petronia (*Petronia xanthocollis*) were heard from a nearby *Salvadora persica* thicket. Many birds are known to make alarm calls in response to the presence of a nearby predator. On close observation under the thicket, the snake was found coiled and highly camouflaged in dry foliage (Image 1 & 2). The snake was visually estimated to be approximately 4.5 ft long and was pinkish buff to pale brown in colour with citron-yellow on the flanks; irregular black marking or blotches like spattered tar on back; belly or under part uniform rose pink; head broad, red, mottled with black; prominent strawberry scarlet colour on neck; and eyes with round pupil (Image 3).These characteristics helped its identification as *S. atriceps* (Whitaker & Captain 2004; Baig & Masroor 2008). It is essentially a nocturnal species; can be found in low bushes, thickets, trees and is known to be an excellent climber; lives in rat holes and small crevices; and mainly feeds on rodents, lizards and birds (Daniel 2002). The present observation updates the list of snake species of KNP to 15, representing 15 genera and 6 families. Bhupathy (1999) mentioned that reptile diversity in KNP is significantly high considering its small size which could be due to its strategic location bordering dry semi arid, and wet Gangetic flood plains.

Acknowledgement

The observation was recorded during survey of an ongoing project funded by Science and Engineering Research Board of Department of Science and Technology (DST-SERB), Government of India. I am grateful to the PCCF and CWW, Rajasthan and Dr. Khyati Mathur, Park Director for permission to undertake field work in KNP. I thank the Director, SACON for providing facilities and encouragement. I appreciate Randhir Singh's assistance in field and Devendra Singh for

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Did you know?

Black-headed Royal Snake is a nocturnal species and on being threatened this beautiful snake coils its whole body, hisses loudly with a whistle similar to a pressure cooker and displays mock attacks. (Source: http://www.indiansnakes.org/content/black-headed-royal-snake)

Cases of albinism in Russel's Viper *Daboia russelii* from Mumbai, Maharashtra, India

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Albinism occurs in all the vertebrate groups including reptiles. Albinism is a form of hypopigmentary congenital disorder, characterized by lack of melanin pigment and an animal with such a condition could have either pure or partial albinism. Sazima & Pombal (1986) have stated that true albinos are recognized by their pinkish-yellowish body colour and reddish eyes in life. Besides this there are other pigment abnormalities causing various colour morphs and patterns in animals. In general, the cases of total (complete, true or pure) albinism are very rare in nature (Jadhav et al. 2014).

The Russell's Viper *Daboia russelii*, a highly venomous snake is widely distributed throughout the Indian subcontinent, from Baluchistan in the west, Kashmir in the north to the eastern Himalaya and east wards to Myanmar, Thailand and south to Sri Lanka (Daniel 2002; Uetz & Hosek 2014). It is common in the plains but also recorded up to altitude of 2756 m (Whitaker & Captain 2004).

Two individuals of Russel's Viper snake were rescued from the urban areas of Mumbai (Images 1-2, Table 1).

The snakes were rescued from the location with the care using a snake stick. One of the snakes was small in size thus understood as a juvenile (Image 1). The snake was observed to be very clam not aggressive but another individual being adult was very aggressive (Image 2). Both the snakes were captured during the night and released early morning after measurements and photographs were taken.

Images 1-2. A view of the albino Russel's Viper snake

There are a few records of color anomaly noted in the species, with uniform reddish-brown tinge marked with very indistinct or altogether

Table 1. The details pertaining to the two snakes

	Date/Time and location/ Micro Habitat	Behaviour	Length	Body colour
1	24-07-2014/ 01:09hr Gorai, Mumbai / under the shoe rack	Non-Aggressive	50 cm	Dorsally, golden-yellow in colour, varied from the head portion to the tail portion with decreasing to dull colour. The head was with two white lines which made v shape. Ventrally the belly was with pink spots The eyes were pinkish-red in colour
2	27-07-2014/22:15hr Gorai, Mumbai, in a plant pot	Aggressive	76 cm	Similar to the above snake but the difference is the body spot are visible and the eye is normal colour

Images 1-2. A view of the albino Russel's Viper snake

absent body patterns from a specimen found from Mangalore, Karnataka (Whitaker & Captain 2004). Another record noted light pale whitish-yellow body color with large dull brown-black oval spots on the lateral sides and two light brown stripes on the dorsal from neck to posterior up to tail (Patel & Tank 2014). There is two records of albinism found in species (Uetz & Hosek 2014) and (Vyas & Thakur 2015).

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Counting of probable basking sites of Mugger Crocodile *Crocodylus palustrius* (Lesson, 1831) from Warana Basin, Western Maharashtra, India

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Basking is a phenomenon observed in some poikilothermic animals -- when body temperature decreases, these animals absorb heat from surrounding environment. Temperature regulation is a dynamic process that involves behavioural and physiological adjustments in order to maintain body temperature within a range. Heliothermy (basking in the sun) and thigmothermy (absorbing heat from a warm surface) (Huey 1982) are the two processes that crocodiles use to maintain the body temperature. Ectothermy is advantageous to regulate body temperature on a daily and/or seasonal basis with less energetic costs (Lang 1987). Fluctuating environmental conditions that differ from thermal preferences of reptiles increase the time required to thermoregulate. The consequences of devoting time to thermoregulation have broad behavioural and ecological significance. The time spent in thermoregulation can sometimes reduce the time available for other important activities (Huey, 1982). Climatic conditions, social interactions, circadian rhythms and reproductive state influence thermal behaviour (Lang 1987). The land-water movement of crocodiles is triggered by a light-cued circadian rhythm and the amphibious life of crocodiles has been suggested to serve as a thermoregulatory function (Lang 1976, 1987).

In present study basking sites of crocodile were counted along the entire length of river Warana and its tributaries from 2013 to 2015. The River Warana (Figure 1) begins its course close to the western crest of Sahyadri at a height of about 987m at Patherpunj (17° 18′ N & 73° 51′ E) in Patan Taluka of Satara District and runs in south-east on the

Figure 1. Basking sites of Crocodiles at Warana Basin

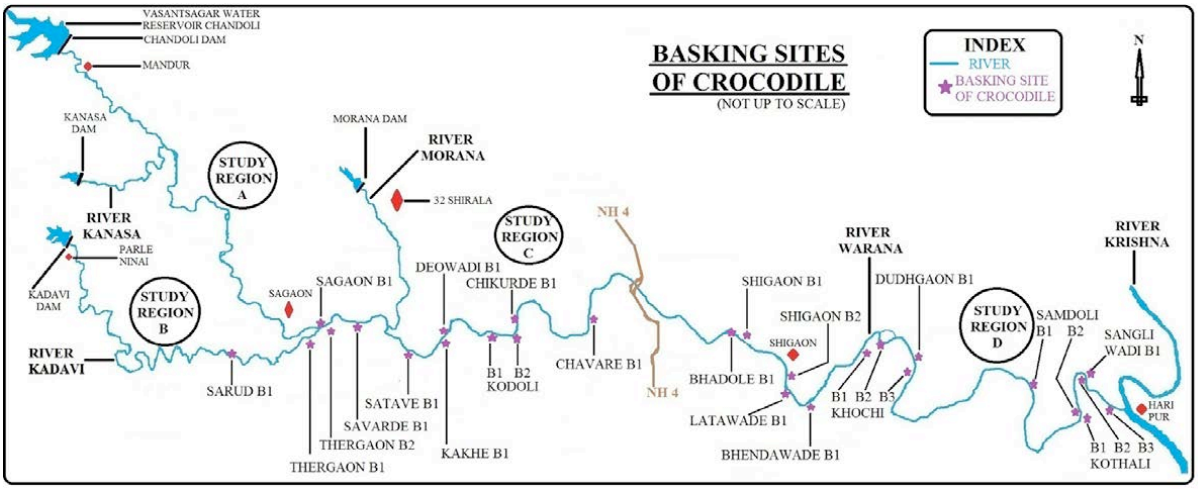

Image 1. Ventral Scale Mark

Image 2. Basking crocodile

hilltop (Sada) in the Sahyadri ranges. A composite earthen Dam (17° 08′ N & 73° 51′ E) is constructed across River Warana near Village Chandoli in Shirala Tahasil of Sangli District. This dam forms famous 'Vasantsagar Water Reservoir' of about 45.5km² submerged area (Nimase et al. 2012). Further the river runs in south-east direction about 130km on the Deccan plateau in Maharashtra, and merges with river Krishna at Haripur (16° 50′ N & 74° 32′ E) near Sangli city. The major tributaries of the river Warana are Morana on the north bank and are Kansa & Kadavi on its south bank. River Morana and Kansa are 14 km each, while Kadavi is 40km long. The study was carried out between Chandoli dam and Haripur by dividing it into four different study regions as study regions 1, 2, 3 and 4 (Figure 1).

No basking sites of crocodiles were observed in the study region A, while 3, 11 and 13 basking sites are counted from study regions 'B', 'C' and 'D' respectively. Single individual at a time was observed at each basking sites and no couples or crocodiles in groups were observed. Total 4 juveniles, 7 sub-adults and 16 adults were observed all along the study area. In study region B, 1 juvenile and 2 adults, in study region C, 1 juveniles, 3 sub-adults and 7 adults while in study region D, 2 juveniles, 4 sub-adults and 7 adults were observed. All the crocodiles were observed basking in the sunlight in morning time between 08.00 and 11.00 AM. All the juveniles were found in the water very close to waterline, while sub-adults and adults were on the ground. The distance of the basking sites of crocodile from the waterline was in the range of 1 to 3 meter. All the basking sites observed were either covered with grass and other vegetation or they were of a clay type of soil and no rocky surface was observed.

No crocodile was sighted in study region A and early part of 37km of study region B, because the rivers-Warana, Kanasa and Kadavi flows through the hilly regions of Sahyadri ranges of Western Ghats. The rivers of this study region meander through river terraces forming small waterfalls. The flow of water in this area of Warana basin is

Image 3. Juvenile in water

with high speed. Also the beds of these rivers have big boulders with highly rough appearance. The river banks have a slope forming 'V' shaped valley. All physical features of these rivers may not be suitable for a crocodile to dwell. This might be the reason that in study region A and early part of study region B, there are no crocodiles and no basking sites observed in this region.

In contrast to study regions 'A' and early part of 'B', study regions 'C', 'D' and lower part of B are found much suitable for crocodiles. In lower part of study region B, 1 juvenile and 2 adults were sighted, in study Region C, 1 Juveniles, 3 sub-adults and 7 Adults were observed while in Study Region D, 2 Juveniles, 4 sub-adults and 7 Adults were observed. All the crocodiles were observed basking in the sunlight in morning time between 08.00 and 11.00 AM. In these regions, the river Warana has a wide and slow flow of river with muddy river banks or they are covered with grass and other herbs and shrubs. The river Warana, in this study region has a good source of food for crocodiles in the form of fishes. Similarly these regions are agriculturally developed areas where other animals like cattles can be the food source for crocodiles. Hence in these regions more number of basking sites is observed. Especially study region 'D' has more flat base with very slow flow of water as the river merges in the river Krishna. Hence in study region 'D' maximum probable basking sites are reported-13. The river Morana of study region 'C' is a very small river in width with the seasonal flow of water. In late winter months and summer months the river Morana totally gets dries. This might be the reason that in river Morana no crocodile and its basking sites are observed.

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Google earth

www.googlemapmaker.co.in

www.mapsofindia.com

Rescued Spectacled Cobra *Naja naja* eggs hatched in captivity

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The Indian Spectacled Cobra *Naja naja* (Linnaeus, 1758) is distributed from sea-level up to 2,000m; found in hills, plains, dense & open forests, open country, agricultural lands and regions populated with human beings. It feeds on a variety of preys like frogs, toads, birds, rodents and snakes (Whitaker & Captain 2004).

It is mostly nocturnal but frequently active during dusk and dawn. It uses rat holes, wood piles, brick piles, tree holes, mounds, caves and heavy rocks for hiding. It frequently enters buildings in search of rodent prey. (Breen 1974 & Burton 1991). Its habit of feeding on rats makes it an inhabitant near human areas, thus making it among the most encountered venomous snakes in India. Even though cobra bites are deadly, it plays a good role in rodent control and economically helps the human beings. Also, cobra venom is a potential source of medicines, including anti-cancer drugs and pain-killers (Burton 1991).

Cobras are oviparous and lay elliptical eggs like all terrestrial elapids. Cobras usually lay 12 to 20 in tree hollows or in the earth, and the female guards them throughout the incubation period, only leaving to feed. Young snakes hatch after approximately 50 days. Immediately freeing itself from the egg, a hatchling is capable of spreading its hood and striking. (Breen 1974; Burton 1991). Newborn cobras have fully functional venom glands.

On 30 April 2014 an adult cobra and 27 eggs were rescued in human habitation in Vaduvenchal, Wayanad District, Kerala. The cobra was found in a termite mound where she had laid eggs. It was caught by Ahammed Basheer, Animal rescuer in South Wayanad Forest Division and was released into the wild and eggs were shifted to terrarium in KVASU- Center for Wildlife Studies, Pookode.

Candling was done to ensure the fertility of eggs; matured embryos were observed in all 27 eggs. Terrarium was maintained at 26-28°C for incubation. Eggs were placed in trays filled with mud and substrates of terrarium were made with leaf litter collected from the wild. In many experiments of artificial incubation, snake eggs were places at or slightly above room temperature (Mori 1996, Mehta 2003).

On 5 May 2014 eggs began to hatch (Fig 1). Hatchlings were observed to make cuts in egg shell with their egg tooth (Fig 2). Heads of five snakes protruded out of the eggs by 11.00hr. (Fig 3) and by 20.30hr. three snakes were completely out of the shell. Hatchlings were observed with only their head exposed for long hours before exiting the eggshell. Young snakes may not emerge from the egg immediately and in some cases remain with their heads out, or moving in and out, for several days. The snake will emerge when all or most of its egg food is exhausted (Barnett 1998).

Hatchlings were observed to flick their tongue in and out to sense its surroundings (Fig 4). The forked tongue of these animals has the ability to sense volatile chemicals which cannot be directly detected by olfactory system. This ability helps the snakes to identify prey, recognize kin, choose mate follow trails. (Schwenk 1995).

On 6 May 2014, 12 snakes were out in the terrarium and eight eggs with hatchling's head protruding out were observed. By 7 May2014 morning, most young ones except three were out from the shell (Fig 6). Two hatchlings were manually helped to come out as their heads were

Image 1. Cobra eggs hatching

Image 2. Cobra using egg tooth to crack egg

Image 3. Hatchling with heads out

Image 4. Hatchlings using tongue to sense surroundings

Image 5. Hatchling emerging from shell

Image 6. Hatched cobras

Image 7. A sevend day-old Cobra with raised hood

found to be locked in the egg shell membrane. Immediately after hatching, hatchlings were observed to raise their hood (Fig 7). All the 27 eggs successfully hatched out and were released into Muthanga Forest range, Wayanad Wildlife Sanctuary on 8 May 2014.

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First report on Whitakers Boa *Eryx whitakeri* feeding on Common Vine Snake *Ahaetulla nasuta*

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Whitaker's Boa is a newly described nocturnal species, a poorly known, endemic to the Western Ghats , nocturnal (Whitaker 2004), and is found mainly close to the seashore (Khaire 2006). The diet of this species is recorded as rats, mice and lizards, mice and geckos (Whitaker 2004, Khaire 2006).

Common Vine Snake is a widely distributed snake, diurnal, mainly found on small bushes or trees and rarely on the ground (Whitaker 2004). It feeds mainly on lizards, frogs, small birds (Khaire 2006). A rare instance of Green Vine Snake feeding on Shieldtail (*Uropeltis macrolepis*) was recorded by Giri() and again by Kulkarni (2010).

We found a Whitaker's Boa swallowing a Common Vine Snake. As per survey we have found Whitaker's Boa is found active mainly either in the morning or in the night. This incidence was recorded in the evening at 15:39hr during our field work in Thokkotu, Mangalore, Dakshina Kannada District, Karnataka (12°26'06"N & 74°51'34"E). The habitat was garden with some ornamental plants. The humidity and temperature was 78% and 28°C respectively. The Whitaker's Boa took nearly 50min to swallow the Green Vine Snake.

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Rescued records of snakes from Nagpur District, Maharashtra with data on unrecorded species

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INTRODUCTION

The Reptilian fauna is one of the targeted faunas facing trouble due to anthropogenic developments (Gibbons et al. 2000). An urban development or expansion victimizes reptile firstly, ultimately resulting in the deterioration of the fauna by habitat destruction or alteration. Such situation ends up with too many reptilian species co-existing with the urban world (McKinney 2006). This has raised the number of reptilian species in the newly developed urban areas located in the outskirt of the city, including numbers of species (Purkyastha et. al. 2011). Nagpur is one of the fastest growing cities in central India causing habitat loss for herpitofauna. D'Abreu (1928) made a comprehensive collection and systematic data of reptiles for the Central Museum Nagpur, which provides information and records of 24 species particularly for the Nagpur region. This paper presents records of 30 snake species with additional data on six unrecorded species from Nagpur District (79°19′ 35″ & 79° 31′ 10″ N & 21°13′ 20″ & 21° 8′ 60′ E). This paper presents the data of snakes with annotations.

The observation shows the abundance of snakes in rural and urban Nagpur. The findings in Pench National Park and Bhiwapur were accidental and no serious attempts were made to explore the herpetofauna over there.

Figure 1. Nagpur District Map

METHODS

A group of seven snake rescuers working in

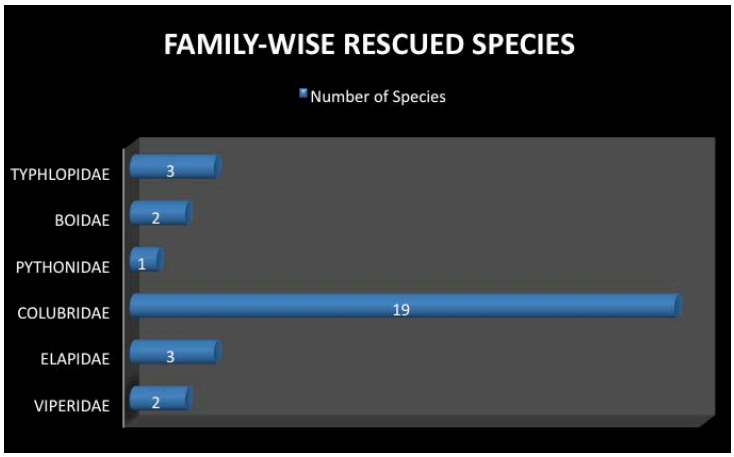
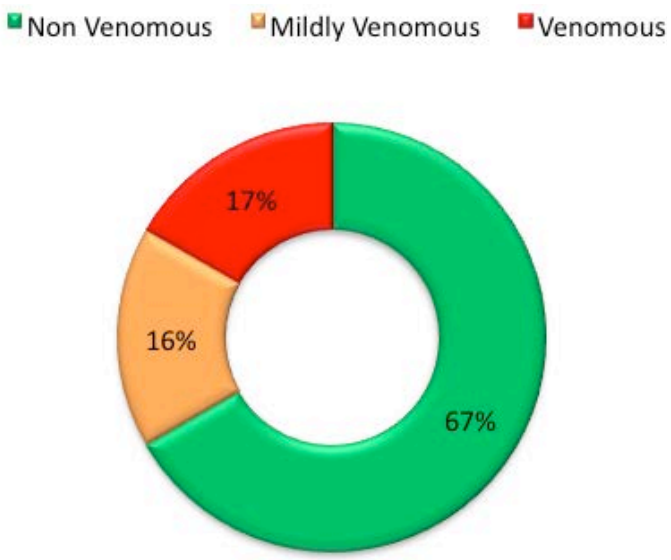


Figure 2. Types of Snakes



urban as well as rural areas rescue snakes from residential areas and minute observation of road killed snakes studied taxonomically by the authors. If any unexpected, uncommon or rare feature was observed the species was studied further and the data tallied with Smith (1943), and Whitaker & Captain (2004).

The scientific names of snakes are after Whitaker & Captain (2004).

RESULTS AND DISCUSSION

A total of 30 species belonging to six families were found to occur in Nagpur District. Family-wise species are - Typhlopidae: three species, Boidae: two species, Pythodidae: one species, Colubridae: 19 species, Elapidae: three species, Viperidae: two species.

The following species reported in Amravati (Nande & Deshmukh 2007) which is adjacent to Nagpur District were not found in the study area, viz.: Montane Trinket Snake *Coelognathus helena monticollaris*. Russell's Kukri Snake *Oligodon taeniolatus*, Walls Sind Krait *Bungarus sindanus walli* and Bamboo Pit Viper *Trimeresurus* cf. *gramineus*.

Similarly, Travancore Wolf Snake *Lycodon travancoricus*, Slender Racer *Coluber gracilis*, Lesser Stripe-necked Snake *Liopeltis calamaria*, and Banded Krait *Bungarus fasciatus* collected by D'Abrue (1928) from Central Provinces (now Madhya Pradesh, Chhattisgarh & Vidharbha) were also not found in the study area by the authors.

International Union for Conservation of Nature and Natural resources (IUCN) 2012 has classified three species *Daboia russelii* Russell's viper, *Elachistodon westemanni* Indian Egg-eater, *Atretium schistosum* Olive Keelback as 'Least Concern' and remaining species are 'Not Evaluated'.

Figures 1 & 2 present family-wise rescued species found in Nagpur District and types of species occurring in Nagpur District, respectively. Similarly, Table 1 presents family and common name, scientific name, number of individuals rescued and road-killed, abundance, schedule under Wildlife (Protection) Act, 1972 and status as per the IUCN Red List.

Annotations:

TYPHLOPIDAE

1. Brahminy Worm Snake *Ramphotyphlops braminus*: (Image 1). Common snake in Nagpur District. Twenty-eight individuals have been rescued so far.

2. Slender Worm Snake *Typhlops porrectus*: (image 2). Common snake in Nagpur. Seven specimens reported so far. D'Abreu (1928) stated that, he had taken few specimens to Nagpur. Pradhan (1994) also mentioned this species in his records.

3. Beaked Worm Snake *Grypotyphlops acutus*: (Image 3). Common snake species here. Fifteen specimens rescued till date. This species is endemic to India. The largest South Asian Worm Snake (Whitaker & Captain, 2004).

BOIDAE

1. Common Sand Boa *Gongylophis conicus*: (Image 4). A common species in Nagpur District. Totally, 182 specimens of this species were rescued.

2. Red Sand Boa *Eryx johnii*: (Image 5). Uncommon snake in Nagpur District. A total of

Image 1. Brahminy Worm Snake

Image 2. Slender Worm Snake

11 individuals rescued till date. D'Abreu (1928) did not mention this species in his records. This is probably the first published report of this species from Nagpur District.

PYTHONIDAE

1. Indian Rock Python *Python molurus molurus:* (Image 29). A common snake found all over Nagpur District. A total of 39 specimens were rescued during study period. This species is protected under Section 14-A of Part II of Schedule I of the Wildlife (Protection) Act, 1972 of India.

COLUBRIDAE

1. Dumeril's Black-headed Snake *Sibynophis subpunctatus:* (Image 6)**.** A common snake in Nagpur District. Total 16 individuals were rescued during study period.

2. Common Kukri Snake *Oligodon arnensis*: (Image 7)**.** Common snake species in Nagpur District. Totally, 219 specimens were rescued.

3. Indian Smooth Snake *Coronella brachyura*: (Image 8)**.** This species is rare in Nagpur District. A total of six individuals were found in which three were road kills. D'Abreu (1928) did not find this species in Nagpur District. Pradhan (1997) mentioned that this snake species is found in Wardha River basin but it is not in Nagpur District.

4. Common Wolf Snake *Lycodon aulicus*: (Image 9). Very common snake found all over Nagpur District. Totally, 714 specimens were rescued till date.

5. Barred Wolf Snake *Lycodon striatus*: (Image 10)**.** This snake is common in Nagpur District, seven individuals rescued and 11 reported road kills till date.

6. Yellow-Spotted Wolf Snake *Lycodon flavomaculatus:* (Image 11)**.** A common snake in Nagpur District. A total of 13 specimens were rescued as well as nine road kills were found during the study period. Though this snake species is common in Nagpur District, it remains unrecorded till publication of this report.

7. Striped Keelback *Amphiesma stolatum*:

Image 29. Indian Rock Python

Image 3. Beaked Worm Snake

Image 4. Common Sand Boa

(Image 12). Common snake species found all over Nagpur District. A total of 565 individuals were rescued.

8. Green Keelback *Macrophisthodon plumbicolor*: (Image 13). A common snake in Nagpur District. Totally, 230 individuals were rescued during the study period.

9. Checkered Keelback *Xenochrophis piscator*: (Image 14). The most common snake found all over Nagpur District. A total of 1515 specimens were rescued. This species is protected in Section [8 of Part II of Schedule II of the Wildlife (Protection) Act, 1972 of India.

10. Olive Keelback *Atretium schistosum*: (Image 15). A rare snake species found in Nagpur District. Only five specimens reported till date. All were from Bhivapur and its adjacent area. Dates of report of five specimens in Nagpur District are as follow- first- 3/08/2011; second- 5/03/2012; third- 29/07/2013 (road killed), fourth- 16/09/2014 (road killed), fifth- 8/11/2014. According to IUCN status (2012) this species is listed as Least Concern. This is the first published report of this species from Nagpur District.

Pradhan (1997) mentioned this species to be found in Wardha River basin (Vidharbha). This species is protected under Section 13 of Part II of

Image 5. Red Sand Boa

Image 6. Dumeril's Black-headed Snake

Table 1. Snakes of Nagpur District

S.N.	Family & common name	Scientific Name	No. of Individual rescued and road killed	Abundance (Local)	Scheduled under IWL (P)Act, 1972	Status (IUCN)
	Typhlopidae					
1	Common Worm (Blind) Snake	*Ramphotyphlops (Typhlops) braminus*	28	C	IV	NE
2	Slender Worm Snake	*Typhlops porrectus*	7	C	IV	NE
3	Beaked Worm (Blind) Snake	*Grypotyphlops (Rhinotyphlops) acutus*	15	C	IV	NE
	Boidae					
1	Common Sand (Russell's Earth) Boa	*Gongylophis (Eryx) conicus*	182	C	IV	NE
2	Red Sand (john's earth) Boa	*Eryx johnii*	11	U	IV	NE
	Pythonidae					
1	Indian Rock Python	*Python molurus molurus*	39	C	I	NE
	Colubridae					
1	Dumeril's Black-headed Snake	*Sibynophis subpunctatus*	16	C	IV	NE
2	Common Kukri Snake	*Oligodon arnensis*	219	C	IV	NE
3	Indian Smooth snake	*Coronella brachyura*	6	R	IV	NE
4	Common wolf Snake	*Lycodon aulicus*	714	C	IV	NE
5	Barred (Shaw's) Wolf Snake	*Lycodon striatus*	18	C	IV	NE
6	Yellow-Spotted Wolf Snake	*Lycodon flavomaculatus*	21	C	IV	NE
7	Striped Keelback	*Amphiesma stolatum*	565	C	IV	NE
8	Green Keelback	*Macrophisthodon plumbicolor*	230	C	IV	NE
9	Checkered Keelback	*Xenochrophis piscator*	1515	CM	II	NE
10	Olive Keelback	*Atretium schistosum*	5	R	II	LC
11	Common Rat Snake	*Ptyas mucosa*	1093	CM	II	NE
12	Trinket Snake	*Coelognathus helene helena*	809	C	IV	NE
13	Common Bronzeback Tree Snake	*Dendrelaphis tristis*	271	C	IV	NE
14	Stout Sand Snake	*Psammophis longifrones*	31	C	IV	NE
15	Banded *Racer*	*Argyrogena fasciolata*	213	C	IV	NE
16	Indian Egg-eater	*Elachistodon westemanni*	21	R	I	LC
17	Common Vine (Whip) Snake	*Ahaetulla nasuta*	12	U	IV	NE
18	Common Cat Snake	*Boiga trigonata*	21	C	IV	NE
19	Forstens Cat Snake	*Boiga forsteni*	7	R	IV	NE
	Elapidae					
1	Slender Coral Snake	*Calliophis malanurus*	11	C	IV	NE
2	Common Indian Krait	*Bungarus caeruleus*	531	C	IV	NE
3	Indian Cobra	*Naja naja*	1348	CM	II	NE
	Viperidae					
1	Russell's Viper	*Daboia russelii*	382	C	II	LC
2	Saw-scaled Viper	*Echis carinatus*	20	U	IV	NE

Schedule II of the Wildlife (Protection) Act, 1972 of India.

11. Common Rat Snake *Ptyas mucosa*: (Image 16). Second most common snake found all over Nagpur District. Totally, 1093 individuals were rescued. This species is listed in Section 9 of Part II of Schedule II of the Wildlife (Protection) Act, 1972 of India.

12. Trinket Snake *Coelognathus helene helena*: (Image 17). A common species found in Nagpur District. Total 809 specimens rescued till date. D'Abreu (1928) had collected four specimens of this species (then called Daudins Coluber *Coluber helena*) three from Nagpur & one From Kamptee (now in Nagpur District).

13. Common Bronzeback Tree Snake *Dendrelaphis tristis*: (Image 18). A common snake found in Nagpur District. A total of 271 individuals were rescued.

14. Stout Sand Snake *Psammophis longifrones*: (Image 19). This species is common in Nagpur district. 14 specimens were rescued & 17 reported as road killed till date.

15. Banded *Racer Argyrogena fasciolata*:

Image 7. Common Kukri Snake

Image 8. Indian Smooth Snake

(Image 20)**.** It is a common snake in Nagpur District. Totally, 213 individuals were rescued during study period mentioned above in Nagpur District.

16. Indian Egg-eater *Elachistodon westemanni*: (Image 21)**.** This is a rare snake in Nagpur District. A total of 21 individuals reported in which 19 individuals were road kills. Of which 18 were found between 27 September to 30 October 2013, and one on 29 August 2010. Only two individuals were rescued, first on 24 June 2012 and second on 5 July 2013. This species is listed in section 7 of Part II of Schedule I of the Wildlife (Protection) Act, 1972. This species is assessed as Least Concern.

One specimen was reported by Captain & Dandge (2005), from Wardha District in Maharashtra. One specimen also reported in Amravati District (Nande & Deshmukh 2007).

17. Common Vine Snake *Ahaetulla nasuta:* (Image 22). This species is uncommon in Nagpur District. Only seven individuals have been rescued and five road kills found till date.

18. Common Cat Snake *Boiga trigonata:* (Image 23). It is common snake species found in Nagpur District. Totally, 15 snakes were rescued and six reported as road kills.

19. Forstens Cat Snake *Boiga forsteni*: (Image

Image 9. Common Wolf Snake

Image 10. Barred Wolf Snake

Image 11. Yellow-spotted Wolf Snake

Image 12. Striped Keelback

24). It is rare snake species in Nagpur District. Only seven individuals reported till date in which three road kills were found. The first specimen was recorded on 18 April 2010, second specimen was found recorded on 19 April 2010 at Saleghat, Pench National Park, Maharashtra. Recently, one specimen rescue from school garden at Navegaon, on 31 October 2014 by one of the authors.

ELAPIDAE:

1. Slender Coral Snake *Calliophis malanurus*: (Image 27). It is fairly common snake species found in Nagpur District. So far 11 specimens were rescued.

2. Common Indian Krait *Bungarus caeruleus*: (Image 28)**.** This venomous species is also common all over the Nagpur District. Totally, 531 individuals were rescued.

3. Indian Cobra *Naja naja*: This is commonest venomous snake all over Nagpur District. A total of 1348 snakes were rescued till date. On 16 July 2012 we rescued one female along with 18 juveniles. This species is protected under Section 11 of Part II of Schedule II of the Wildlife (Protection) Act, 1972

Image 13. Green Keelback

Image 14. Checkered Keelback

Image 15. Olive Keelback

Image 16. Common Rat Snake

of India.

VIPERIDAE

1. Russell's Viper *Daboia russelii*: (Image 25). This venomous snake species commonly found in Nagpur District. A total of 382 individuals were rescued. This species is listed in Section 14 of Part II of Schedule II of the Wildlife (Protection) Act, 1972 of India. As per IUCN status (2012) this species declared Least Concern.

2. Saw-scaled Viper *Echis carinatus*: (Image 26). This is uncommon snake species in Nagpur District. Totally, 20 snakes were rescued during study period mention above in Nagpur District.

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Image 17. Trinket Snake

Image 18. Common Bronzeback Tree Snake

Image 19. Stout Sand Snake

Image 20. Banded Racer

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Image 21. Indian Egg-eater

Image 22. Common Vine Snake

Image 23. Common Cat Snake

Image 24. Forsten's Cat Snake

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Image 25. Russel's Viper

Image 26. Saw-scaled Viper

Image 27. Slender Coral Snake

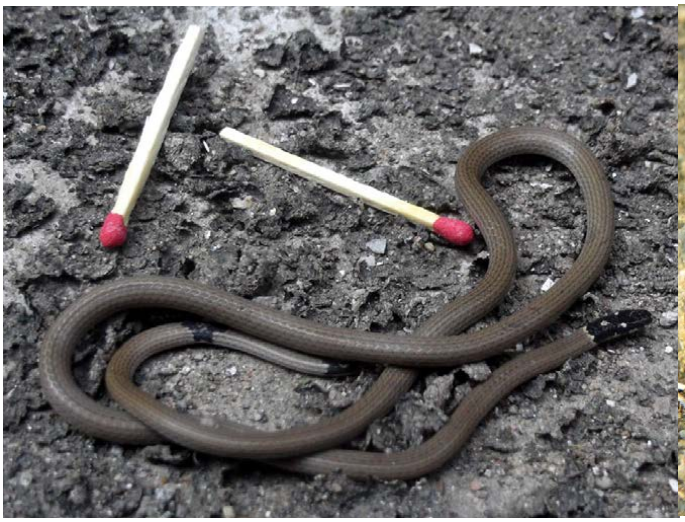

Image 28. Common India Krait

Impact of vehicular traffic on Kashmir rock agama *Laudakia tuberculata* (Gary, 1827) near Kalatop-Khajjiar Wildlife Sanctuary, Chamba, Himachal Pradesh, India

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Roads and highways of all kinds have wide ecological effects on plants and animals which include modification of animal behavior, alteration of the physical and chemical environment, and spread of exotic species with increased use of areas by human interference (Trombulak & Frissell 1999). Herpetofaunal species cross the highways not only to move between fragmented habitats but also to use the open area to ambush prey and for the thermal regulation (Bambaradeniya et al. 2001; Karunarathna & Karunarathna 2005). Owing to such preference, and also use of road surfaces for basking, high mortality of herpetofauna has been reported. Furthermore, the presence of roads can cause direct mortality due to vehicular traffic leading to the reduction of gene flow in mobile

species thus causing drift and loss of genetic diversity (Marsh et al. 2007; Starburg 2006)

Kashmir Rock Agama *Laudakia tuberculata* is found commonly in the Himalayas of Jammu and Kashmir, Himachal Pradesh, some parts of Uttarakhand. In Himachal Pradesh, it has been so far reported from the Trans–Himalayan districts of Lahaul, Spiti and Kinnanur with an altitudinal range extending upto 3650m (Saikia et al. 2007). This species has been also recently reported from Chamba district, Himachal Pradesh (Singh and Banyal, 2014). Other than India, it has also been reported from northwest Pakistan, Eastern Afghanistan and southwest Nepal.

The Kashmir Rock Agama is known for its beautiful coloration (sexually dimorphic with bluish tinge on dorsal side in adult males) adaptability and instincts with its foraging activity. This species of agamid is highly rupicolous, found in the rock crevices both man-made and natural sedimentary rock deposits in the area.

Mortality of wildlife due to vehicular traffic is among the direct impacts when natural habitats are dissected by roads (Karunarathna et al. 2013). While on a short trip to Himachal Pradesh, India two instances of road kill of the Kashmir Rock Agama were observed on a stretch of road between Gajnoi and Jot in Chamba District. This heavily used state highway joins Shimla with other Trans Himalayan districts and passes through the reserve forest that forms the part of Kalatop-Khajjiyar Wildlife Sanctuary. The first road kill instance was observed near Gate (32°31'19.4"N 76°04'34.1"E, 1757m) on 16 April 2013 and the second was near Basudan (32°29'53.5"N 76°03'26.9"E, 2323m) on 18 April 2013. Both these sites are on the stretch of road between Gajnoi to Shimla approximately within 7km distance from the Kalatop-Khajiar Wildlife Sanctuary. Local people informed us that the Kashmir Rock Agama has been frequently sighted in the vicinity of the wildlife sanctuary and its surroundings, and has been frequently observed being impacted due to vehicular traffic, more so between February and May when they come out of their hibernation.

Kashmir Rock Agama were observed being active during warmer times of the day and were not sighted on days with low temperatures and rains. It is an omnivore and its food mainly comprises the insects like ants, small orthopterans and lepidopterns (Singh & Banyal 2014). We have also observed these to be feeding on flowers of the wild shrubs. Tikader & Sharma (1992) have also reported its fondness to vegetable matter including tender leaves, flowers and seeds of wild plants. Breeding season varies from May to August and lays 7-20 eggs in a single clutch (Singh & Banyal, 2014). Although the species was observed to be abundant in Kalatop-Khajjiar Wildlife Sanctuary and its vicinity, the real impact of the vehicular traffic on its population remains unstudied.

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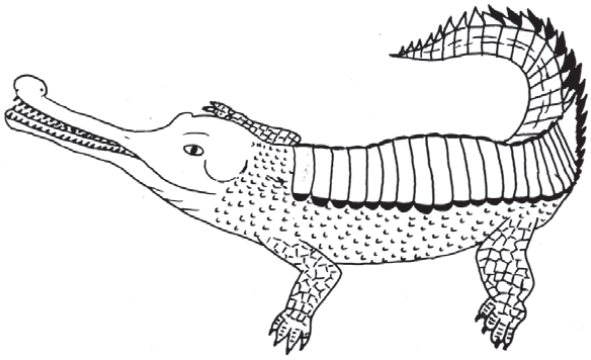

Some incidents of Spectacled Cobra (*Naja naja*) death at Jahangirnagar University campus, Savar, Dhaka, Bangladesh

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The following records are completely accidental and no systemic survey technique or search method was applied for the same.

Jahangirnagar University Campus is situated in the central region of Bangladesh (30°16′N & 90°26′E), 32km north of Dhaka City. The University has 280ha area. It is one of the oldest, renowned, residential universities in Bangladesh. The campus has many different vegetation types, forming a mixture of diverse habitats. In addition, the area consists of agricultural lands, orchards and botanical gardens in and around human settlements. There are 12 student dormitories situated in the campus and some are still being constructed to give residential support to students.

At present, 11 species of amphibians, 19 species of reptiles, 189 species of birds and 12 species of mammals are found in Jahangirnagar University campus.

The incidents of death of some juvenile's spectacled cobra (*Naja naja*) were observed from 11th July to 19th July, 2013 in a student dormitory (Mir Mosharrof Hossain Hall). A total of 18 individuals were killed by the frightened students and by the dormitory authorities. All the 18 individuals fall between the range of 18-26 cm, indicating that they are juveniles. Most adults measure 100-150 cm. Occasional specimens of approximately 210-220 cm have been recorded, especially in Sri lanka. Hatchlings usually measures 25-30 cm (Wuster, 1998).

Mir Mosharrof Hossain Hall is the oldest dormitory and probably it was selected by the mature spectacled cobra pair for breeding site. They are highly adaptable species. Found almost anywhere, in heavy jungle, open cultivated land, and in populated areas where old masonry constructions form ideal refuge (Daniel 2002). All the incidents took place between early evening and night. They are solitary, nocturnal and diurnal, but active mainly at dusk and dawn (Khan 2008).


Ashis Datta

Habitat loss and indiscriminate killing are identified as major threats for this species (IUCN, Bangladesh 2000).

Such incidents and experiences are common in other parts of the country but rare in the university campus. Although record of snake bite in Jahangirnagar University Campus is almost absent. There are many reasons for the snakes to enter human settlements. Degradation of natural habitat, cutting down trees, clearing of undergrowths, increased numbers of vehicles,

construction of new buildings, more students pressure etc are the main threats for this species. If such incidents continue then it would be impossible for this snake species to thrive in Jahangirnagar University campus.

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Contributions to Herpetofauna of Jaisalmer District- some photographic records

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In conservation planning, inventories of a region's species have provided essential data (Oliver & Beattie 1993, Chapman 2005) although the diverse habitats and ecological zones of India remain poorly inventoried and the information is scarce for conservation actions (Das, I. 2002).The database for the reptile records are inchoate for non-protected areas in India.

The reptile fauna of India has significant works by Smith (1931, 1935, 1943). In Rajasthan region, Blanford's work (1879) in Ajmer area and Murray's work (1884) from Sind area and Boulenger's work (1882) are significant. Minton's work on reptiles of Pakistan and Thar (1966), Krishna & Dave (1959, 1960) & Krishna (1975) work is from Jodhpur region and Singh's work (1960) from Pilani are some of the major contributions to herpetofaunal studies. Roonwal (1963) gives elaborate information about reptiles of Rajasthan. Herpetological survey of the region has been mostly undertaken by Zoological Survey of India from 1941-1965 (Biswas et al.1977). Since independence, many herpetological studies focusing on various species or their ecological aspect have been undertaken. Certain works worth mentioning are Prakash (1973), Vazirani (1977), Biswas & Sanyal (1977), Kumar & Rathore (2007), Sharma (1998, 2002, 2003 & 2007). Other work includes Anandale (1907), Murthy (1967-1968), Myers (1968), Sarkar (1993), Rahmani (1997), Sharma (1998-2003) and Chanda (2002). The report of five endangered and endemic saurian species, which differ in their habitat, from Jaiselmer alone, signify the heterogeneity of habitats for the region concluding that it is suited to sustain species of conservation significance (Das 2007).

We present here some opportunistic sightings of reptiles made during the months of July-August 2011 from Shahgarh area of Jaisalmer District, Rajasthan. As a non-protected area within the Great Indian Thar Desert, Shahgarh has gained significance as one of the proposed site for the Cheetah reintroduction (Jhala et al. 2010).

Study Area

The southern Shahgarh Grasslands (27° 18′ to 26° 47′ N & 69° 37′ to 69° 29′ E) cover an area of over 4000km² and are located in Jaisalmer District of western Rajasthan (Ranjitsinh & Jhala, 2010). These grasslands lie in the Desert-Thar (zone 3A) Bio-Geographic zone of India (Rodgers et al.

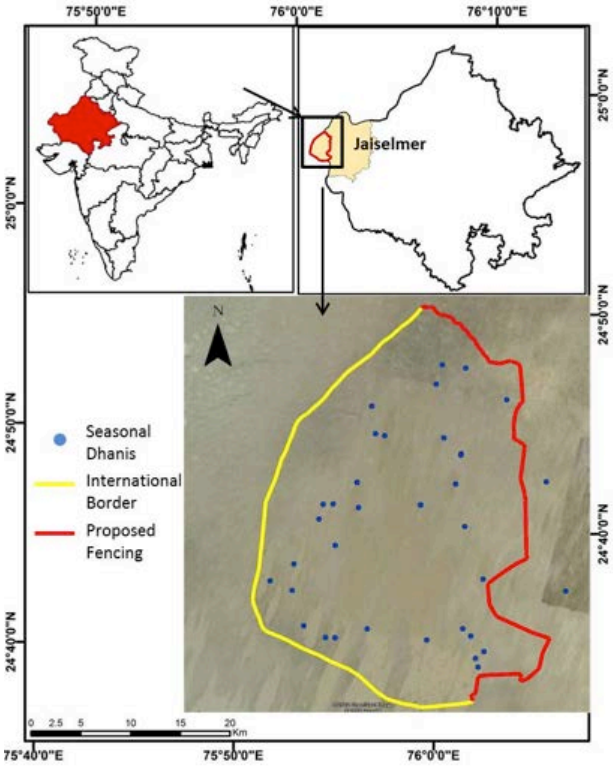

Image 1. Leith's ribbon snake *Psammophis leithii*

2002) and form the eastern limit of the Persio-Arabian desert that extends eastwards from the great Sahara Desert (Rahmani 1997). The area is dominated by sand dunes which are constantly being shifted by winds blowing from the south-west (Krishnan 1982). The grasslands of the Thar deserts come under *Lasiurus-Cenchrus-Dichanthium* type (Dabadghao & Shankarnarayan 1973). In Jaisalmer District the grasslands cover 95% of the area (Rahmani 1997). The area experiences high variation in diurnal and seasonal temperatures. Summer temperatures during the day can exceed 45°C, while night temperatures can be as low as 20°C. Winters are cold with temperatures often going down to -2°C (Sharma & Mehra 2009). Rainfall is erratic and ranges from 100–200 mm (Water Resources Department, Rajasthan).

The area is rich in wildlife. During the two months of survey in the region many mammals, birds and reptiles were observed. Presence of vipers and many non-venomous snakes are reported from the region (District gazeteer, 1973). The Desert Monitor *Varanus griseus*, Spiny-tailed Lizard *Saara hardwickii*, Fringe-toed Lizard *Acanthodactylus cantoris*, and Pakistan Ribbon Snake *Psammophis leithii* were commonly sighted. A species of Rajasthan Toad-headed Lizard *Phrynocephalus laungwalaensis*, that has been identified as a separate genus (1992) is found in this area. It is endemic to the Thar Desert of Rajasthan and Sind (Pakistan) with restricted distribution, and is reported from only a few areas of Jaisalmer District (Das 2004).

The following species were photographed in Shahgarh, highlighting its rich herpetological fauna. Seven species belonging to the seven families are reported.

Image 1. *Psammophis leithii* (Forskal, 1775)
(Leith's ribbon snake)
Lamprophiidae

Its found in Rajasthan, Gujarat, Uttar Pradesh, Maharashtra and Kashmir and elsewhere in Pakistan (Kumar et al. 2010).

Head is narrow and elongated, distinct from neck. The eyes large with rounded pupil. The dorsal body is yellowish–brown in color and with four dark-brown longitudinal stripes. The ventral is un-patterned yellowish cream color (Das 2002).

The snake was found in comparatively moist habitat with sparse vegetation like *Capparis decidua* (Kair) & *Salvadora oleoides* (Mitha jhal). The dominant shrub in the area was *Calligonum polygonoides* (Phog) and *Sweda fructose* (Jagg) while grass was *Lasiurus sindicus* (Sewan). Sewan grass stabilizes the blowing sand dunes (Sinha 1996) providing the snake areas of compact soil with good ground cover. Its habitat is sandy deserts and grasslands along with bushes into which they retreat when alarmed (Das 2002).

Of the four observation, once it was found inside human habitation and one was a road kill.

Image 2. *Platyceps ventromaculatus* (Gray and Hardwicke, 1834)
(Hardwicke's Rat Snake, Glossy-bellied Racer)
Colubridae

It is distributed in Rajasthan, Gujarat, Maharashtra and Uttar Pradesh and elsewhere in Afghanistan, Persia, Israel, Iran and Uzbekistan (Sharma 2007, Kumar et al. 2010).

On the dorsal side, a series of rhomboidal spots are present. Head was found to be greyish in color with regular markings of dark brown color on the top (Sharma 2007).

In the field, it was observed inhabiting rocky and hard surfaces. We encountered it twice during the study period, first time in a fort ruin (Bacchiyachhor Fort) and second time in a house. Rathore and Kandelwal have reported it from Ranthambore fort in 2005 (Kumar et al. 2010).

Image 2. Hardwicke's Rat Snake, Glossy-bellied Racer *Platyceps ventromaculatus*

Image 3.*Varanus griseus* (Daudin, 1803)
(Indian Desert Monitor)
Varanidae

In India, its distribution is in drier parts of Rajasthan, Madhya Pradesh, Punjab and Maharashtra and elsewhere in Pakistan, Afghanistan, Iran and North Africa (Das 2002, Kumar et al. 2010).

It is sandy brown on dorsum and yellow on ventral side with a cylindrical tail. Snout depressed and nostril an oblique slit (Das 2002). Narrow cross bands on dorsum. Prominent streaks on head, eyes and ears. It differs from *V. bengalensis* in its round tail (Sharma 2002).

It was very common throughout the landscape. They were not observed in shifting sand dunes though. The lizard's diet comprises of skinks, agamids and lacertids, bird, reptile eggs, and rodents (Das 2002). This may be a reason for it to found near human settlements and agricultural fields. The *Meriones hurrianae* (Indian Desert Gerbil) was common in the Shahgarh area which is also a prey of the Desert Monitor (Prakash 1997). The species was found in a variety of vegetation throughout the landscape and was encountered very frequently including three road kills. The population is reported to be extremely low (Kumar et al. 2010). Shahgarh seems to be having a good population of this species (pers. obs.). The lizard meat is commonly eaten by locals but also reported to be killed in Shahgarh believeing them to be dangerous and poisonous (Authors' pers. comm. with locals).

Image 4. *Saara hardwickii* (Gray, 1827)
(Indian Spiny-tailed Lizard)
Family: Uromastycidae

The genus has recently changed from *Uromastyx* to *Saara* (Wilms 2009).

Its found in western India, including Gujarat and Rajasthan, and elsewhere in Pakistan (Das 2002, Daniel 2002)

The body is depressed with the tail thick at the base, thick and covered with spinose scales (Das 2002). Its dorsal part is yellowish –brown and ventral cream colored. It is commonly called spiny-tailed lizard due to spine like structures on its tail (Smith 1935). It prefers to live in xerophytic vegetation. In monsoon it makes fresh burrows digging with feet (Kumar et al. 2010). Jaisalmer is reported to be a very good habitat for this lizard, even during the severe drought of 2002 and 2003 they were seen in good number (Das et al. 2005).

Image 3. Indian Desert Monitor *Varanus griseus*

Image 4. Indian Spiny-tailed Lizard *Sarra hardwichii*

Image 5. Sind Gecko *Crossobamon orientalis*

The lizard is strictly herbivorous and prefers to feed on vegetation, mainly tip of grasses. It is reported to feed mainly on flowers and fruits of the khair (*Capparis aphylla*) the beans of *Prosopis spicigera* and the fruit of *Salvadora persica* as well as grass (Daniel 2002). In Shahgarh, it was observed in areas dominated by grasses (*Cynodon dactylon* & *Lasiurus sindicus*).

The species was not found to be dominant in the study area as habitat mainly comprises sand dunes whereas it is found in hard soil especially near agricultural fields. It was observed that the individuals were basking in sun very near their burrows and at slightest noise they would take shelter in the burrows. The main road leading to Sam, a tourist destination has heavy traffic and hence there were many road kills.

Image 5. *Crossobamon orientalis* (Blanford, 1876)
(Sind Gecko)
Family: Gekkonidae

Restricted to western India (Rajasthan state's Thar desert) and adjacent region of Pakistan (Sindh province) (Das 2002)

It is a small gecko with a large head compared to body. The ventral is brownish yellow and dorsal is cream colored. The tail is yellow with distinct dark rings.

It inhabits sand dunes and areas with fine sand and sparse vegetation and they burrow into sand (Das 2002). It was encountered once in Shahgarh where sparse vegetation of *Calligonum polygonoides* and *Sweda fructose* was present.

Image 6 & 7. *Trapelus agilis* (Olivier, 1807)
(Brilliant Ground Agama)
Family: Agamidae

Its distributed in Rajasthan (first record was from Rajasthan & India), elsewhere in Pakistan (Sind, Punjab, Baluchistan), Afghanistan and Iran (Biswas & Sanyal, 1977).

A robust lizard having greyish-brown dorsum with a prominent dark-brown colored crossbars. The ventral side is unpatterned whitish in color. It is observed mostly basking on rocky surfaces with head raised above the ground.

It was also common throughout the landscape and prefers shrubs of *Capparis decidua* (Ker), *Euphorbia* (Thor), *Salvadora oleoides (*Jal) and *Leptadaenia pyrotechnica* (Kheep). In August, the male was observed displaying with brilliant blue body and orange tail on rocks or shrub tops. It was observed that a slight movement would result in the lizard rushing into the nearby bushes losing its brilliant colours.

Image 6. *Trapelus agilis* in its brilliant colour display

Image 7. *Trapelus agilis* in normal colour

Image 8. *Acanthodactylus cantoris* (Günther, 1864)
(Indian Fringe-toed Lizard)
Family: Lacertidae

It is found in Rajasthan (Rajputana) and in Uttar Pradesh; Pakistan, S. Afghanistan and S.E. Iran (Gunther 1864, Biswa & Sanyal 1977)

The head is of moderate length (around 20-25 cm) with narrow snout. It has a bit depressed body and root of tail. The limbs are well developed. The dorsal portion is greenish-olive color with reticulated blackish lines and uniform whitish below. Biswa & Sanyal (1977) reported it as common in Rajasthan.

It was observed that the species was commonly encountered in sandy area where there was less human disturbance. The habitat consisted of scattered shrubs of *Calligonum polygonoides*, though the area was devoid of trees and grasses.

Conclusion

The Shahgarh area is less studied when it comes to its biodiversity due to its proximity to the international border and the restrictions. However, presence of a good number of reptiles, birds and mammals in a non-protected area do highlight its importance. Occasional photographs provide evidence of certain reptiles occurring regularly in the deserts but there is a dire need to undertake herpetofaunal surveys. The barchans (wind-blown shifting sand dunes) are a good habitat for a lot of reptiles like *Phrynocephalus laungwalensis* & *Ophiomorus tridactylus.* These sand dunes were observed in the bordering area of Rajasthan. The habitat is recently undergoing many changes, widely affecting reptiles endemic to the area. The Indira Gandhi canal is converting the moisture content of the land and transforming the desert ecosystem into forest (Sinha 1993). Plantations of *Acacia* spp., *Dalbergia sisso* and *Azadirachta indica* and *Prosopis chilensis* (= *juliflora*) along the fences have also contributed to the increase in forest cover (Ministry of Environment and Forest 2001). The canal has also increased cropland and human settlements. The earlier *dhaanis* dominant in the area are now fast converting into permanent settlements. This has also brought construction of roads and electricity lines along these roads. The hard soil which is the preferred habitat of the spiny-tailed lizards is being utilized for agriculture. The land where these lizards were observed was being ploughed by many tractors. The electric poles and lines were perching sites for many raptors like Laggar Falcon *Falco jugger*, Peregrine Falcon *Falco peregrinus*, Short-toed Snake Eagle *Circaetus gallicus*, Tawny Eagle *Aquila rapax*, Steppe Eagle *Aquila nipalensis*, Egyptian Vulture *Neophron percnopterus*, White-backed Vulture *Gyps africanus*, Eurasian Griffon *Gyps fulvus* and Red-headed Vulture *Sarcogyps calvus*, which prey on these reptiles. The increase in human population is indirectly contributing to the increase in grazing pressure too. People possess thousands of sheep and goats which stay in one area for most part of the year and pose tremendous pressure on the arid habitat.

Water consolidates the soil; imminent danger has emerged for the reptiles which inhabit extremely loose soil like the nocturnal

Image 8. Indian Fringe-toed Lizard *Acanthodactylus cantoris*

lizard *Ophiomorus tridactylus* almost swims with serpentine movements below the soil surface, also prefers barren sand dunes.

Apart from the change in the ecosystem that is threatening the survival of these species, the major issue (as observed) is the road kills, especially that of Brilliant Agama and Spiny-tailed Lizard. The purpose of the present paper is to contribute to herpetofaunal record from this region as any report of herps from the westernmost region of Rajasthan seems significant since no elaborate herpetological research has been undertaken in this area in the recent past (Western Rajasthan survey 1957-58).

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On the predation of *Gekko gecko* (Linnaeus 1758) (Squamata: Gekkonidae) by an Orb Spider of genus *Parawixia* F.O.P. Cambridge 1904 (Araneae: Araneidae)

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Introduction

The vast majority of spiders are typically generalist predators that capture an enormous variety of prey (Punzo 2007). Although insects, spiders, and other arthropods (sow bugs, millipedes, centipedes) are among the most common types of prey for spiders, larger hunting spiders, including the tarantulas (sub-order Mygalomophae) occasionally capture and prey upon small vertebrates (Punzo 2000). An incidence of predation of a juvenile gecko by an orb spider is described in this short note.

Image 1. Lateral view of the spider *Parawixia* sp., early stage of feeding

Materials

On the 23 July, 2008, a large spider was observed constructing an immense orb web, (about 4 feet in Diameter, 12 feet above ground level). It was at 'Tiger Lodge', a charmingly rustic wooden building-on-stilts, located at Raja Bhat Khawa in Buxa Tiger Reserve, Alipurduar District (formerly Jalpaiguri District) of West Bengal (26.6500°N & 89.5800°E, 92m). The spider was subsequently identified as a member of the genus *Parawixia* F.O.P. Cambridge, 1904 based on the identification keys. The distinguishing characters were noted such as - carapace with cephalic region bulging behind the ocular area, possessing numerous granules; abdomen triangular, bearing a prominent pair of shoulder humps with a chalk white transverse band extending between the two with a single, pointed 'tail' hump at the posterior end. The specimen was not collected, but, since there is only one species described from India, there are fare chances of the species being *Parawixia dehaani* (Doleschall, 1859) (Pocock 1900 & Tikader 1982)

'Tiger Lodge' is also inhabited by a large numbers of *Gekko gecko* (Linnaeus, 1758), the second largest living gecko know to man (Manthey & Grossman 1997). The species is readily identifiable by its characteristic large size and more or less distinctive colouration and call. Popularly known as Tokay gecko or the Tuckk-too, these are large, aggressive and voracious predators, displaying strong territorial instinct. Whilst being primarily insectivorous, they are known feed upon any suitable sized organism they can overcome, including smaller house geckos, mice, small birds and even snakes. When cornered or threatened, the species stands its ground, jaws

Image 2. Dorsal view of the spider *Parawixia* sp., late stage of feeding

agape, rushing to bite its aggressor. Its jaws are extremely powerful and once latched on, are not easily detached (Smith 1935). Even juvenile geckos were observed giving an impressive threat display when disturbed, with the back arched, mouth wide open, emitting loud grunting noises. The geckos were often observed hunting large insects, such as beetles of family Cerambycidae, Scarabaeidae, and moths including Sphingidae members and even the largest moth in Asia – *Attacus atlas*. They were occasionally seen praying on other smaller species of geckos too.

Observation

On 12 August 2008, a juvenile Tokay Gecko (Snout to tail-tip - about 130mm) was found ensnared in the web of the aforementioned spider at approximately 1100hr (Image 1). The spider was feeding upon the now dead gecko that was presumably bitten and injected with venom and digestive enzymes around the time it was first trapped. The spider started feeding around the abdomen and proceeded to consume the forelimbs and a hind limb. It chewed the skin and muscles, piece by piece dropping small pellets on the ground. The spider was observed feeding well until 1230 hrs, for approximately one and a half hour. In this way, about 50% of the Gecko's carcass was left behind in the web including head, tail and remnant mass of bones that eventually came off.

Discussion

More than 23 species of vertebrate prey have been reported to be preyed by members of eight spider families including the predation of a juvenile Northern House Gecko (length 55mm), *Hemidactylus flavivirdis* by a Huntsman Spider (presumably *Heteropoda* sp.) belonging to Family Sparassidae (Armas & Alayon 1987, Bauer 1990, Blondheim & Werner 1989, Maffei et al. 2010 & Vyas 2012). Majority of the spiders known to hunt vertebrates belong to a few families such as Lycosidae, Sparassidae, Ctenizidae, Pisauridae, Ctenidae and Theraphosidae. The only known cases of predation of lizards by web weaving spiders are those of spider *Argiope trifasciata* preying on two lizard species, namely *Anolis porcatus* and *Anolis sagrei* in Cuba, North America, but they were young lizards no more than 30mm snout-cloaca length, which apparently fell accidentally in the spider webs (de Armas 2000).

This is perhaps the first time that the predation of a relatively large, aggressive and predatory gekkonid lizard (about 130mm) by a member of the family Araneidae, popularly known as 'Orb Weavers', has been conclusively documented and photographically recorded from the Indian sub-continent.

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Image 3. *Parawixia* sp. feeding on young *G. gecko*, scale to indicate size

REPTILE RAP #17, 27 JULY 2015

Sighting of Hill Keelback *Amphiesma monticola* (Jerdon, 1853) from Thatekkad Bird Sanctuary, Kerala, with new lowest elevation record

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The Hill Keelback *Amphiesma monticola* is a small (57.8cm) non-venomous snake endemic to Western Ghats (Whitaker & Captain 2004). *Amphiesma monticola* was first described by Jerdon in 1853 as *Tropidonotus monticolus* based on specimens collected from Wayanad Hills, Western Ghats (Smith 1943). Its distribution is given as south of Talewadi, Belgaum District, Karnataka to Agasthyamalai Hills, Tirunelveli District, Tamil Nadu (Smith 1943; Whitaker & Captain 2004), while it's altitudinal range is given as 500 to 1,300 m (Srinivasulu et al. 2013).

On 18 April 2013 during a study visit to the Thattekkad Bird Sanctuary (BS), Ernakulam District, Kerala, we spotted and photographed one juvenile *Amphiesma monticola* from trek path on the way to the watch tower of the sanctuary (Image 1). The GPS location of the sighting was 10°07'41.4"N & 76°41'17.7"E at an altitude of 35m. The snake was sighted on the forest floor in a moist deciduous forest patch near a seasonal forest stream, which was dry. However, the forest floor was wet, because of the drizzle the previous night.

Image 1. Hill Keelback *Amphiesma monticola* (Jerdon, 1853) from Thatekkad Bird Sanctuary, Kerala

The present record of the Hill Keelback from Thattekkad Bird Sanctuary, though is within its known distribution range, is the lowest known altitude record of the Hill Keelback. The already known lowest altitude of this snake was 500m (Whitaker & Captain 2004; Srinivasulu et al. 2013), as against the present sighting at an altitude of 35m. Wall (1919) opined that the Hill Keelback juveniles that he had examined at Wayanad in western part of Nilgiris, had bright yellow collar and yellow sides of neck. The Hill Keelback that we spotted and photographed at Thattekkad BS also has a similar pattern thus assuming that the snake that we saw was a juvenile individual, in addition to its gross total length.

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