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Conserving the Herpetofaunal biodiversity at Kevdi Eco-tourism camp site, Mandvi, Surat, Gujarat, India

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Abstract

This study aims to illuminate the herpatofaunal diversity within Kevdi eco-tourism, which is pivotal for wild life biodiversity conservation. Total 17 distinct species identified. Among this, 12 species from class reptilia and rest 5 from class amphibia. This includes 7 species of snake, 5 species of frog, 5 species of lizard and 1 species of tortois. This finding underscores its significance as a sanctuary for herpatofauna. The study provides brief overview of species diversity, distribution, seasonal variation, statistical analysis and ongoing efforts to study and protect this unique wildlife ecosystem.

Keywords: *Herpatofauna, Reptilia, Amphibian, Bio-diversity*

Introduction

Herpetofauna, comprising amphibians and reptiles, are ectothermic vertebrates highly sensitive to environmental fluctuations. They function as key trophic links, biological pest regulators, and reliable ecological indicators due to their sensitivity to climatic and photoperiodic changes. (Lips, 1998; Roy 2002; Daniels, 2003). Amphibian and reptilian population has been decimated by drivers such as climate change, pollution, and infectious diseases both globally and locally.

There are 8,342 species of amphibian recorded globally, of which 7363 species belong to anura (frogs and toads), 766 species to caudata (salamanders and newts), 213 species to gymnophiona (caecilians) (Frost and Robert, 2021). Globally there are 11, 440 species of reptiles, of which 201 species are of amphisbaenia, 6,972 species of sauria (lizards), 3,879 species of serpentes (snakes), 361 species of testudines (turtles), 26 species of crocodylia (crocodiles) and single species of rhynchocephalia (tuataras) (Uetz et al. 2021).

India harbors over 1,000 herpetofaunal species, many of which are endemic and recently described. The country supports 342 amphibian species, including 306 anurans, 35 gymnophionans, and one salamander species (Dinesh et al. 2021). Consequently, biological and population data for many species remain limited. Of the 518 reptile species recorded in India, 3 are crocodilians, 34 turtles and tortoises, 202 lizards, and 279 snakes across 28 families (Aengals et al. 2011).

The Western Ghats is one of the global biodiversity hotspots (myers et al. 2000) and its herpetofauna has been explored by many authors (Ferguson, 1895; Hutton, 1949; Hutton and David, 2008; Inger, 1994; Ishwar et al. 2001; Kumar et al. 2002; Malhotra and David 1991; Karthikeyan et al, 2001; Wall, 1919). Out of 181species of amphibians and 203 species of reptiles found in the Western Ghats, 80% and 60% respectively, are endemic to the region (Radhakrishnan and Rajmohana 2012). These reports have enriched our understanding about their diversity, distribution patterns and ecology in these hill ranges. Climatic factors like temperature and precipitation are key drivers to the diversity, distribution, and richness of amphibian species (Pyron, 2014). However, an increase in temperature and pH in aquatic habitat increases morphological malformation and even death of the embryo in amphibians (Boyer and Grue, 1995). Amphibian diversity and abundance are strongly influenced by the availability of aquatic habitats essential for completing their life cycle. (Wells, 2007).

According to the IUCN Red List, Indian amphibians are categorized as 24% Data Deficient, 30% Least Concern, 9% Endangered, 6% Threatened, 5% Critically Endangered, 2% Near Threatened, and 0.3% Extinct. Of the 342 recorded species, 47% remain Data Deficient, and only two frog species are listed under Appendix II.

Herpetofauna are vital indicators of ecosystem health; however, Indian research has largely focused on protected areas, with limited data available on their status across urban and rural–urban gradient ecosystem (Pathey and Ghate, 2002; Purkayastha, 2012; Pal and Roy, 2012; Hegde and Sthapit, 2013). There is a critical need to assess herpetofaunal diversity and conservation status at regional and local scales, particularly in India where distributional data remain limited.

Accordingly, the present study documents baseline taxonomic and ecological information on herpetofauna from the Kevdi Eco-tourism camp site, recognizing their ecological significance and role in ecosystem functioning.

Materials and Methods

Study Area:

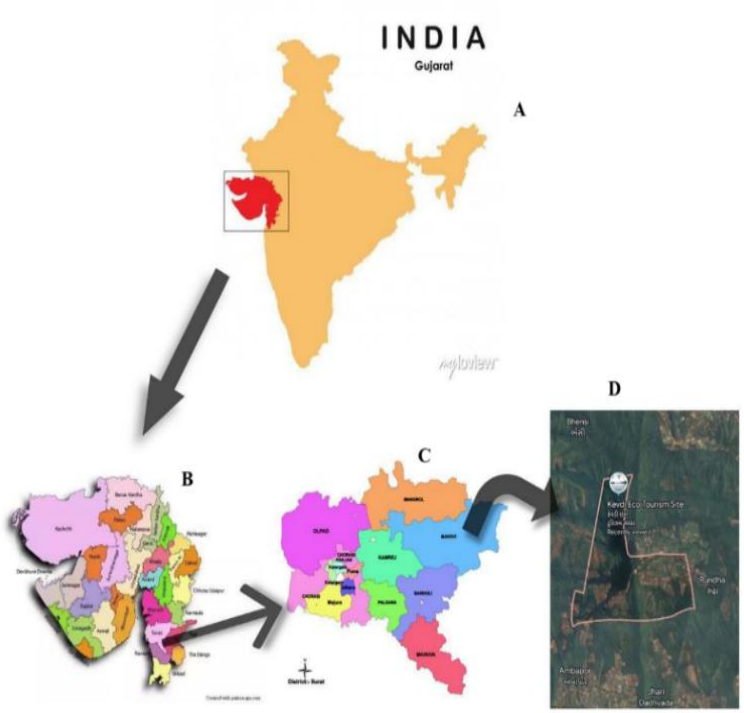

Fig 1: Map of India (A) and map of Gujarat (B) and map of Surat districts (C) and satellite images showing the study area of Kevdi Eco Tourism (D).

Kevdi Eco Tourism Camp-site (21°20′N, 73°24′E) is situated adjacent to a dam within approximately 2300 hectares of dry deciduous forest. The landscape exhibits marked seasonal variation, appearing lush during monsoon and winter and relatively arid in summer. The area supports diverse avifaunal, entomological, herpetofaunal, and mammalian assemblages and functions as an ecological corridor linking Shoolpaneshwar Wildlife Sanctuary in the north with Purna Wildlife Sanctuary in the south, facilitating migratory bird movement. Developed by the Gujarat Forest Department, the site promotes ecotourism, environmental education, and forest conservation awareness.

The study was conducted from July 2023 to February 2024 through systematic monthly surveys. During the monsoon, 4–5 visits per month (1–2 per week) were undertaken. Surveys were conducted during morning (08:00–11:00 h), evening (16:00–19:00 h), and nocturnal periods using LED torches. Predetermined, strategically distributed sampling points were established to ensure comprehensive spatial coverage of the study area.

Methods:

***Visual encounter surveys* (VES).**

The Visual Encounter Survey (VES) method is a technique used in wildlife biology and ecology to estimate population densities of animals, particularly amphibians and reptiles. It involves systematically walking along predetermined transects or routes while searching for and counting individuals of the target species.

Net traps.

Dip nets are handheld nets with a frame and mesh bag, used to capture amphibians and reptiles in aquatic habitats.

Hand picking method for small specimens

GPS Map Camera:

This mobile application was used to take live Geotagged photographs of the any objects. This application will paste the map, address, weather and date to picture. (GPS latitude/longitude information also could be included).

Nikon d3500 DSLR camera

Species identification:

Identification of species was directed by morphological structure and body pattern. Other sources like Sarp sandarbh (2017) by Ajay Desai and online websites were also referred.

Data analysis

Data analysis was carried out by using Shannon Weiner's diversity index. The formula for calculating the Shannon diversity index (H') is:

$$H = -\sum^{s} Pi\ lnPi$$

- **Where:**
- (H') represents the Shannon index of diversity.
- (*pi*) denotes the proportion of individuals belonging to the (i)th species, calculated as (*pi* = ni N), where (ni) is the count of individuals of the (i)th species, and (N) is the total count of individuals across all species.
- (s) Represents the total number of species in the community.

Result and discussion

The biodiversity of herpetofauna within the Kevdi Ecotourism area represents a significant aspect of its ecological richness. Throughout the study period, a diverse array of herpetofaunal species were documented, comprising a total of 17 distinct species. Among these, 12 species were classified under the reptile class while the remaining five were categorized as amphibians. Notably, these species belong to 12 different families, indicating a considerable diversity within the ecosystem. Specifically, the survey identified 7 species of snake, 5 species of frog, 5species of lizard and 1 species of tortoise, highlighting the multifaceted nature of the herpetofaunal community within the Kevdi Ecotourism area.

Fig. 2 provides a visual representation of the herpetofaunal diversity within the Kevdi Ecotourism area. It graph shows the species distribution based on their respective classes, primarily focusing on reptiles and amphibians. Reptiles emerge as the dominant class, boasting a total of 12 distinct species observed during the survey period. Although Amphibians are fewer in number, contribute significantly to the overall biodiversity with a count of 5 species. The graph underscores the intricate balance of ecosystems within Kevdi, where both reptiles and amphibians find their ecological niches. The diversity within each class suggests a rich and varied habitat supporting a multitude of species interactions and ecological dynamics. Through eight lines of visual representation, the graph encapsulates the essence of the herpetofaunal community thriving within Kevdi Ecotourism. These insights illuminate the importance of preserving and conserving the delicate balance of herpetofaunal diversity in the region for future generations to appreciate and study.

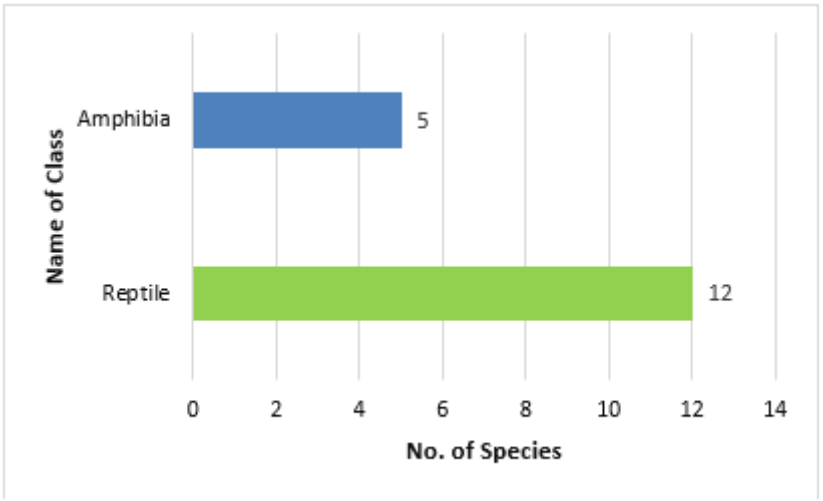

Figure 2: Graph of Class wise species count

Table 1: List of observed species along with their respective texonomic position

Sr. No.	Class	Family	Common name	Scientific name
1	Reptilia	Elapidae	Cobra	*Naja naja*
2		Natricidae	Striped Keelback	*Amphiesma stolatum*
3		Colubridae	Common Trinket	*Coelognathus helena*
4			bronzeback tree snake	*Dendrelaphis tristis*
5			Green Keelback	*Rhabdophis plumbicolor*
6			Common Wolf Snake	*Lycodon capucinus*
7		Pythonidae	Indian Rock Python	*Python molurs*
8		Agamidae	South-indian Rock Agama	*Psammophilus dorsalis*
9		Skinks	Keeled Indian Mabuya	*Eutropis carinata*
10		Testudinidae	Indian Star Tortoise	*Geochelone elegance*
11		Agamidae	Indian Garden Lizard	*Capotes versicolor*
12		Chameleonidae	Common Chameleon	*Chameleo chameleon*

13	**Amphibia**	Rhacophoridae	Common Tree Frog	*Polypedates leucomystax*
14		Bufonidae	Asian Common Toad	*Duttaphyrynus melanostictus*
15		Dicroglossidae	Common Indian Cricket Frog	*Minervarya agricola*
16			Indian Bull Frog	*Hoplobatrachus tigerinus*
17			Indian Skipper Frog	*Euphlyctis cyanophyctis*

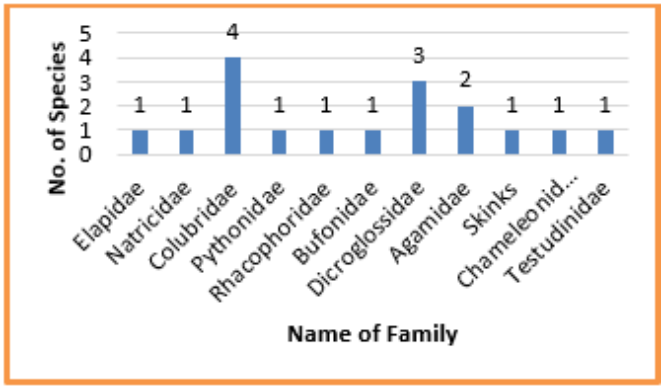

Figure 3: Family wise count of observed species

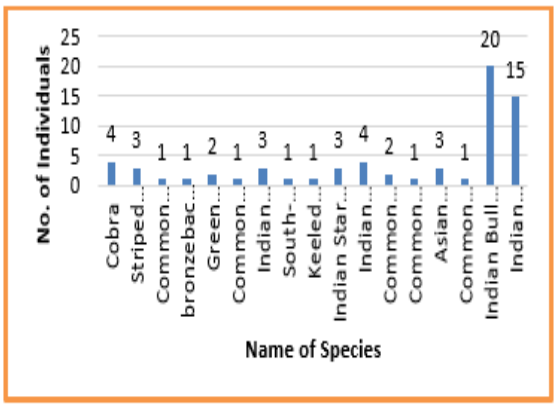

Figure 4: Graph of total no. of individuals of observed species

The family-wise distribution of herpetofauna at the Kevdi Eco Tourism Site (Fig. 3) comprised 17 species across 11 families. Colubridae was the most represented family (four species), followed by Dicroglossidae (three species), while the remaining families were each represented by a single species. This distribution pattern highlights the relative dominance of Colubridae and Dicroglossidae and provides a basis for understanding family-level species richness and informing targeted conservation strategies.

Table 2 and accompanying graph shown in fig. 4 provide a comprehensive overview of the total number of individuals observed across various herpetofaunal species within the study area. Indian bullfrog emerges as the most frequently observed species, indicating its prevalence and significance within the ecosystem.

Table 2: Total no. of individuals of observed species

Common name	Total no. of individuals
Cobra	4
Striped Keelback	3
Common Trinket	1
bronzeback tree snake	1
Green Keelback	2
Common Wolf Snake	1
Indian Rock Python	3
South-indian Rock Agama	1
Keeled Indian Mabuya	1
Indian Star Tortoise	3
Indian Garden Lizard	4
Common Chameleon	2
Common Tree Frog	1
Asian Common Toad	3
Common Indian Cricket Frog	1
Indian Bull Frog	20
Indian Skipper Frog	15
Total	66

Table 3: IUCN status of the observed species

Common name	IUCN Status
Cobra	VU
Striped Keelback	LC
Common Trinket	LC
Bronzeback Tree Snake	LC
Green Keelback	LC
Common Wolf Snake	LC
Indian Rock Python	NT
Common Tree Frog	LC

Asian Common Toad	LC
Common Indian Cricket Frog	LC
Indian Bull Frog	LC
Indian Skipper Frog	LC
Indian Garden Lizard	LC
South-indian Rock Agama	LC
Keeled Indian Mabuya	LC
Common Chameleon	LC
Indian Star Tortoise	VU

The IUCN status of observed herpetofaunal species at the Kevdi Eco Tourism Site is illustrated in table 3 and fig 5. One species is categorized as Vulnerable (VU), while another is classified as Near Threatened (NT) in the observed species. In addition, the majority of observed species, fall under the category of Least Concern (LC). This comprehensive documentation provides valuable insights into the conservation status of herpetofauna within the Kevdi ecosystem.

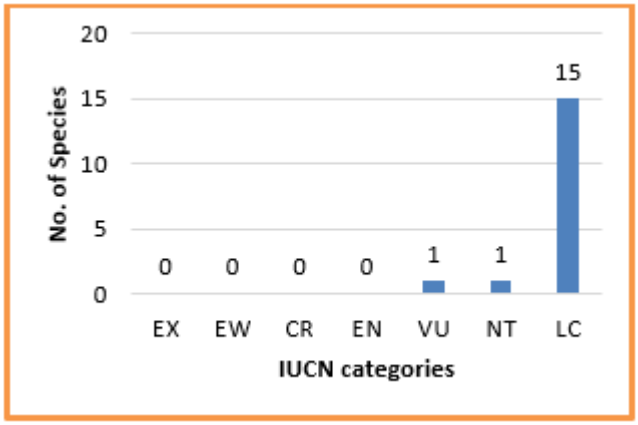

Figure 5: IUCN status of observed species

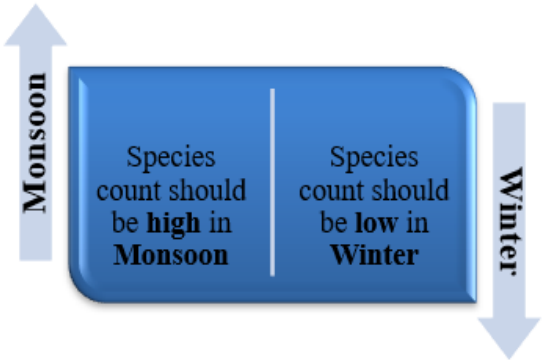

Figure 6: Seasonal variation in Herpetofaunal diversity

Table 4: Seasonal variation in Herpetofaunal diversity

Species name	Monsoon	Winter
Cobra	+	+
Striped Keelback	+	+
Common Trinket	+	-
bronzeback tree snake	+	-
Green Keelback	+	-
Common Wolf Snake	+	-
Indian Rock Python	+	+
Common Tree Frog	+	-
Asian Common Toad	+	+
Common Indian Cricket Frog	+	-
Indian Bull Frog	+	+
Indian Skipper Frog	+	+
Indian Garden Lizard	+	+
South-indian Rock Agama	+	-
Keeled Indian Mabuya	+	-
Common Chameleon	+	-
Indian Star Tortoise	+	-

The overall diversity of herpetofauna were found be highest in the July to October month and lowest diversity was observed in November to February. We noticed a notable pattern in the seasonal variation of the Herpetofaunal diversity. There is a surge in the herpetofaunal diversity during the monsoon season as compared to winters, reflecting favorable breeding and feeding conditions. Certain snake and amphibian species are observed evenly during both the monsoon and winter period, highlighting their acclimatization to the diverse environmental conditions, whereas, some species were absent during winter, indicating potential migration or hibernation strategies to cope with colder temperatures. The dynamic interaction between Herpetofauna and their environment is clearly shown in the seasonal variation which shaping their annual distribution and behavior.

Table 5: Data table of Herpetofaunal species for the Shannon Weiner's diversity index

No.	Common name	Total	Mean	Pi	lnPi	Pi lnPi
1	Cobra	4	0.333333	0.060606	-2.80336	-0.1699
2	Striped Keelback	3	0.25	0.045455	-3.09104	-0.1405
3	Common Trinket	1	0.083333	0.015152	-4.18965	-0.06348
4	bronzeback tree snake	1	0.083333	0.015152	-4.18965	-0.06348
5	Green Keelback	2	0.166667	0.030303	-3.49651	-0.10595
6	Common Wolf Snake	1	0.083333	0.015152	-4.18965	-0.06348
7	Indian Rock Python	3	0.25	0.045455	-3.09104	-0.1405
8	Common Tree Frog	1	0.083333	0.015152	-4.18965	-0.06348
9	Asian Common Toad	3	0.25	0.045455	-3.09104	-0.1405
10	Common Indian Cricket Frog	1	0.083333	0.015152	-4.18965	-0.06348
11	Indian Bull Frog	20	1.666667	0.30303	-1.19392	-0.36179
12	Indian Skipper Frog	15	1.25	0.227273	-1.4816	-0.33673
13	Indian Garden Lizard	4	0.333333	0.060606	-2.80336	-0.1699
14	South-indian Rock Agama	1	0.083333	0.015152	-4.18965	-0.06348
15	Keeled Indian Mabuya	1	0.083333	0.015152	-4.18965	-0.06348
16	Common Chameleon	2	0.166667	0.030303	-3.49651	-0.10595
17	Indian Star Tortoise	3	0.25	0.045455	-3.09104	-0.1405
		66	N=5.5	1	-56.967	-2.2566

The data obtained was utilized to calculate the Shannon Index of Diversity which is found to have a value of 2.2566. The Shannon Index (H') serves as a metric for measuring the intra-community diversity. Higher values of H' indicate greater diversity among the species present. For instance, a community comprising a single species would yield an H value of 0, given that each (pi) (proportion of individuals of each species) equals 1 and the natural logarithm of 1 is 0. On the contrary, if species are evenly distributed, resulting in high H values, it suggests a diverse community where species abundance is well-distributed. Therefore, the H value not only quantifies species richness but also signifies the distribution of species abundance within the community. A higher H value signifies greater species diversity, while a lower H value corresponds to lower diversity. An H value of 0 indicates a community dominated by a single species, which is not the case in Kevdi ecosystem.

Moreover, the Shannon Equitability Index complements the Shannon Index by measuring the evenness of species distribution within the community. A high equitability index suggests stability within the community, with numerous niches available and low competition, indicative of both high richness and evenness. Conversely, a low equitability index indicates limited niches within the community, with only a few dominant species present, resulting in low richness and evenness.

Conclusion

A total of 17 herpetofaunal species (5 amphibians and 12 reptiles) representing 11 families were documented from Kevdi Eco Tourism, with Colubridae and Dicroglossidae being the most dominant families. Most species were classified as Least Concern (LC), though the presence of two Vulnerable (Cobra and Indian Star Tortoise) and one Near Threatened (Indian Rock Python) species highlights conservation significance. The Shannon–Wiener index ($H' = 2.2566$) indicates moderate species diversity. Overall, the study establishes baseline data on species richness and conservation status, emphasizing the ecological importance of the area and the need for long-term monitoring and sustainable conservation measures.

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We express our sincere gratitude to all those who contributed to the successful completion of this study on herpetofaunal diversity at Kevdi Eco-tourism Camp Site.

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Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. Aengals, R., Kumar, V.S. and Palot, M.J., 2011. Updated checklist of Indian reptiles. *Occasional Papers, Zoological Survey of India*, *24*.
2. Boyer, R. and Grue, C.E., 1995. The need for water quality criteria for frogs. *Environmental health perspectives*, *103*(4), pp.352-357.
3. Daniels,R.J.R.(2003). Impact of tea cultivation on anurans in the Western Ghats. Current Science 85:1415-1422
4. Dinesh, K.P., Radhakrishnan, C., Gururaja, K.V., Deuti, K. and Bhatta, G.K., 2021. A Checklist of Amphibia of

India with IUCN Red List Status, Updated till April 2013.
5. Ferguson S. H. (1895), "List of snakes taken in Travancore from 1888 to 1895," J. Bombay Nat. Hist. Soc., 10, 68 – 77
6. Frost, Robert. *Mountain interval*. Graphic Arts Books, 2021.
7. Hutton, A.F. and David, P., 2008. Note on a collection of snakes from South India, with emphasis on the snake fauna of the Meghamalai Hills (High Wavy Mountains).
8. Hutton, A.F., 1949. Notes on the snakes and mammals of the High Wavy Mountains, Madura District, South India. Part II-Mammals. *Journal of the Bombay Natural History Society*, *48*, pp.681-694.
9. Inger, S., 1994. Magmagenesis associated with extension in orogenic belts: examples from the Himalaya and Tibet. *Tectonophysics*, *238*(1-4), pp.183-197.
10. Ishwar, N.M., Chellam, R. and Kumar, A., 2001. Distribution of forest floor reptiles in the rainforest of Kalakad–Mundanthurai Tiger Reserve, South India. *Current Science*, pp.413-418.
11. Karthikeyan Vasudevan, K.V., Ajith Kumar, A.K. and Ravi Chellam, R.C., 2001. Structure and composition of rainforest floor amphibian communities in Kalakad-Mundanthurai Tiger Reserve.
12. Kumar, A., Chellam, R., Choudhury, B.C., Mudappa, D., Vasudevan, K., Ishwar, N.M. and Noon, B.R., 2002. Impact of rainforest fragmentation on small mammals and herpetofauna in the Western Ghats, south India. *WII-USFWS Collaborative Project Final Report, Wildlife Institute of India, Dehradun, vii+ 146pp.*
13. Lips, K.R.,. Decline of a tropical montane amphibian fauna. *Conservation Biology*, 1998, *12*(1), pp.106-117.
14. Malhotra, A. and Davis, K., 1991. A report on a herpetological survey of the Srivilliputtur Reserve Forest, Tamil Nadu. *Journal of the Bombay Natural History Society*, *88*(2), pp.157-166.
15. Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. and Kent, J., 2000. Biodiversity hotspots for conservation priorities. *Nature*, *403*(6772), pp.853-858.
16. Padhye, A.D. and Ghate, H.V., 2002. An overview of amphibian fauna of Maharashtra state. *ZOOS'Print Journal*, *17*(3), pp.735-740.
17. Pal, A., Dey, S. and Roy, U.S., 2012. Seasonal diversity and abundance of herpetofauna in and around an industrial city of West Bengal, India. *Journal of Applied Sciences in Environmental Sanitation*, *7*(4), pp.281-286.
18. Purkayastha, J., 2012. Showcasing Urban Herpetofauna: A Conservational Effort through Community Participation. *Rufford Small Grant Final Report.*
19. Pyron, R.A., 2014. Temperate extinction in squamate reptiles and the roots of latitudinal diversity gradients. *Global Ecology and Biogeography*, *23*(10), pp.1126-1134.
20. Radhakrishnan, C. and Rajmohana, K., 2012. Fauna of ecosystems of India-Western Ghats. *Director, ZSI, Kolkata, India*, p.14.
21. Ramesh, V., Hegde, N. and Sthapit, B., 2013. Promoting the community management of garcinia genetic resources in the central Western Ghats, India. In *Community Biodiversity Management* (pp. 163-168). Routledge.
22. Roy, D.2002 Amphibians as environmental sentinels. *Journal of biosciences*, *27*(3), pp.187-188.
23. Uetz, P., Koo, M.S., Aguilar, R., Brings, E., Catenazzi, A., Chang, A.T. and Wake, D.B., 2021. A quarter century of reptile and amphibian databases. *Herpetol. Rev*, *52*, pp.246-255.
24. Wall, F., 1919. Notes on a collection of snakes made in the Nilgiri Hills and the adjacent Wynaad. *Journal of the Bombay Natural History Society*, *26*(2), pp.552-584.
25. Wells, K.D., 2007. The Ecology and Behavior of Amphibians Chicago: Univ.

Class: Repltilia

1. Family: Elapidae

Cobra (*Naja naja*)

2. Family: Colubridae

Common wolf snake (*Lycodon capucinus*)

3. Family: Pythonidae

Indian rock python(*Python molurs*)

4. Family: Agamidae

South-Indian rock agama (*Psammophilus dorsalis*)

5. Family: Skinks

Keeled Indian mubaya (*Eutropis carinata*)

6. Family: Agamidae

Indian garden lizard (*Capotes vericolor*)

Class: Amphibia

Family: Dicroglossidae

Common Indian cricket frog (*Minervarya agricola*)

Family: Dicroglossidae

Indian bull frog (*Hoplobatrachus tigerinus*)