



# Herpeto-faunal Diversity Study: Analysis and Critical Observations from South-eastern Rajasthan, India

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**Abstract:** Herpeto-fauna provides an important array to wildlife and also tangible and intangible ecosystem services. The diversity of Herpeto-fauna in a specific area solely determines the qualitative as well as quantitative rapid data analysis of habitat modifications because of its resilient nature. The present investigation deals with the amphibians and reptile survey conducted between years 2017-2019 at Jhalawar District of Rajasthan. Random plots were selected along with relevant habitats were surveyed and observed for amphibians and reptiles. Relevant habitats include streams, floodplains, mountain meadows, caves, cliffs, bogs and manmade structures. A total of amphibians and reptiles, representing 45 species, using area-constrained searches of random plots and specialized habitats, placement of artificial cover boards, night driving and incidental observations. The regress survey revealed that species belonging to 18 families included 20 snakes, 8 lizards, 5 turtles and tortoise, and 12 amphibians. In lizards, a species was recorded first time from the south-eastern Rajasthan, i.e. Indian Chameleon (*Chamaeleo zeylanicus*) new distribution record in Rajasthan and Short-tailed Agama (*Calotes minor*) was re-reported after 20 years from South-eastern Rajasthan. In the present study observation and data recorded will serve as information among the students, researchers and nature lovers.

**Keywords:** Amphibian, Diversity, Habitats, Jhalawar, Rajasthan, Reptiles

Amphibians and reptiles being cold-blooded animals and found all over the world, excluding the regions with extreme cold. In India, three orders of amphibian viz. Anura, Caudata and Gymnophiona are found, and in reptiles also have a representative from all three living orders viz. Crocodylia, Testudines and Squamata. Approximately 472 species of amphibians and 610 species of reptiles are found, and almost 50% have reported endemic to the Indian region. In India, amphibians are relatively less studied with few dedicated and comprehensive resources on their taxonomy, biology and conservation (Gosavi et al 2021, Khandekar et al 2021). The updated checklist of amphibians 405 species in India, including 3 orders and 15 families (Dinesh et al 2017). Aengals et al (2018), documented 572 species of reptiles, which includes lizards (231 species), turtles and tortoises (34 species), crocodiles (3 species), and snakes having 36 families (304 species) in India. In the South-eastern Rajasthan primarily, faunal diversity comprises various species of carnivores and herbivores. It also provides a suitable habitat for the growth of the different medicinal plants. Hadauti region contains one of the finest forests in Rajasthan as indicated by the presence of Mosses and Ferns which require necessary moisture for their growth. This area is most rich in avian biodiversity estimated more than 400 birds reported this area. Fortunately, this part of Rajasthan is

taming closely very threatened herpetes from their entire representative. Reptiles and amphibians play vital roles in ecosystems as predators, prey, herbivores and commensal taxa (Hopkins 2007, Böhm et al 2013, Ingle 2020). The present survey was undertaken to document the Herpeto-fauna of the Jhalawar district which acts like an ecotone between Rajasthan and Madhya Pradesh states.

## MATERIAL AND METHODS

**Study area:** The study area Jhalawar lies at the edge of the Malwa plateau, The south-east corner of Rajasthan. It is surrounded by dense green forests and natural landscapes. The district is situated between 23°45'20" and 24°52'17" north latitudes and 75°27'35" and 76°56'48" east longitudes. It has an average elevation of 312 m. The climate is very similar to the Indo-Gangetic plain. The annual maximum rainfall reported (Average-900mm) in Rajasthan. The habitat types were identified and sampled during the survey were home gardens, cultivated fields, riverine forests, grasslands, road sides, rock-outcrops, shrublands or woodlands, small pond, streams and tanks are characterized by the very modest undulations at the west side, while a fertile area on the east, which is expanding over an area near about 150-180 sq. km. This division of forest exclusively falls in the territory (24°37" to 24°46" N and 76°02" to 76°11" E) which is extending from

the Gagron fort (24°37' 41.5" N, 76°10'52.6" E) along with the western bank of Kalisindh River up to the Khanpura village. Far off that study area it forms the peculiar stripes which ultimately join the Mukundara Hill National Park in the north-west, formed stripes width have been recorder of an average 10 km. The high temperature generally around 40°C and can exceed 45°C during summer and fall up to 1°C in winter. In the state of Rajasthan, Jhalawar district receive 890 mm precipitation annually, which is a key factor in maintaining and keeping the environment cool, gentle and sustainable ultimately supporting the diversity of flora and fauna.

**Methodology:** Field observations were started from April 2017 up to July 2019 with a total of 70 field days (6 hrs/day) covering both the wet and dry seasons. A combination of methods was adopted to study the diversity of herpeto-fauna associated with all of the representative habitats and micro-habitats types in the Jhalawar district of Rajasthan. This includes methods viz. litter cleaning methods (LCM), Digging loose soil method (DLS) and Visual encounter surveys (VES) with utmost efficacy. During the study, avoided the Pitfall trap exclusively as this practice is associated with Herpeto-faunal mortality, predation and also a hindrance in the active process of forest regeneration. All specimens collected from the study area were examined carefully and recorded. They

were released back to their original place of capture after identification without harming. Basic environmental parameters such as temperature and humidity were also recorded from the nearest weather station, where specimens were observed. Roadkills were examined, but not collected because most of the roadkills were extensively damaged and thus are not included as could not be identified to the species level. The specimens were identified through the use of field guides and identification keys given by Whitaker and Captain (2004) and Das and Das (2018).

## RESULTS AND DISCUSSION

During survey of two years recorded 45 species of batrachofauna and ophiofauna. Amphibians include both frogs and toads whereas, reptiles include venomous and non-venomous snakes, lizards, geckos, turtles and tortoise. In lizards, Indian Chameleon (*Chamaeleo zeylanicus*) was reported first time from the South-eastern Rajasthan earlier it's known from the South-western Rajasthan (Sharma and Koli 2018) and Short-tailed Agama (*Calotes minor*) was also reported first time from the Jhalawar district, but Vyas and Singh (1998) reported from the Baran district of South-eastern Rajasthan (Khan and Kumar 2010). Chauhan and Kavita (2012) reported 6 reptiles and two amphibian species

**Table 1.** Identified snake species location of Jhalawar District, Rajasthan, India

Common name	Scientific name	Family
Brahminy Worm Snake	<i>Ramphotyphlops brahminus</i> (Daudin 1803)	Typhlopidae
Common Sand Boa	<i>Gongylophis conicus</i> (Schneider 1801)	Boidae
Red Sand Boa	<i>Eryx johnii</i> (Russell 1801)	Boidae
Spectacled Cobra	<i>Naja</i> (Linnaeus 1758)	Elapidae
Common Krait	<i>Bungarus caeruleus</i> (Schneider 1801)	Elapidae
Saw Scaled Viper	<i>Echis carinatus</i> (Schneider 1801)	Viperidae
Russell's Viper	<i>Duboisia russelli</i> (Shaw and Nodder 1797)	Viperidae
Indian Rock Python	<i>Python molurus</i> (Linnaeus 1758)	Pythonidae
Common Trinket	<i>Coelognathus helena helana</i> (Daudin 1803)	Colubridae
Banded Kukri	<i>Oligodon arnensis</i> (Shaw 1802)	Colubridae
Russell's Kukri	<i>O. taeniolatus</i> (Jerdon 1853)	Colubridae
Common Bronzeback Tree Snake	<i>Dendrelaphis tristis</i> (Daudin 1803)	Colubridae
Common Wolf Snake	<i>Lycodon aulicus</i> (Linnaeus 1758)	Colubridae
Barred Wolf Snake	<i>L. striatus</i> (Shaw 1802)	Colubridae
Checkered Keelback	<i>Xenocrophis piscator</i> (Schneider 1799)	Colubridae
Striped Keelback	<i>Amphiesma stolatum</i> (Linnaeus 1758)	Colubridae
Common Cat Snake	<i>Boiga trigonata</i> (Schneider 1802)	Colubridae
Green Vine Snake	<i>Ahaetulla nasuta</i> (Lacépède 1789)	Colubridae
Rat Snake	<i>Ptyas mucosa</i> (Linnaeus 1758)	Colubridae
Ornate Flying Snake	<i>Chrysopelea ornate</i> (Shaw 1802)	Colubridae

from the Jhalawar. Sen and Nama (2013) concluded that out of 19 species of snakes belonging to 6 different families have so far been reported from the study area, excluding amphibian fauna. Overall, 45 species of herpeto-fauna were recorded belonging to 34 genera and 18 families from Jhalawar district during the study period (Fig. 1). Out of which, 20 species of snakes (4 highly venomous, 1 mildly venomous and 15 non-venomous) belonging to 18 genera in six families (Fig. 2, Table 1, Plate 1); 8 species of lizards belong to 5 genera in five families (Table 2, Plate 2); 5 species of turtles and tortoise with 5 genera in three families (Table 3, Plate 3) and 12 species of amphibians belonging to 6 genera in four families (Table 4, Plate 4). Among the snakes, the Colubridae family represents a maximum number of species (12 species). In the case of lizards of Gekkonidae (3 species), turtles of Trionychidae and Geoemydidae (2 species each) and amphibians of Dicoglossidae (7 species) represented the maximum number of species which also shows their frequency distribution in the area. High forest diversity influences associated factors and bring seasonal variations and a variety of forest ecosystems offer available resources for better development, growth, feeding and breeding, environmental gradients are of utmost importance in establishing the Prey-Predator relationship, which lies on the plant species composition. The pattern of distribution in herpeto-fauna was much varied among different habitat of Jhalawar. The present herpeto-faunal diversity may be proven as a vital indicator to predict the quality of biotic interference in the forest ecosystems, diversity of herpeto-

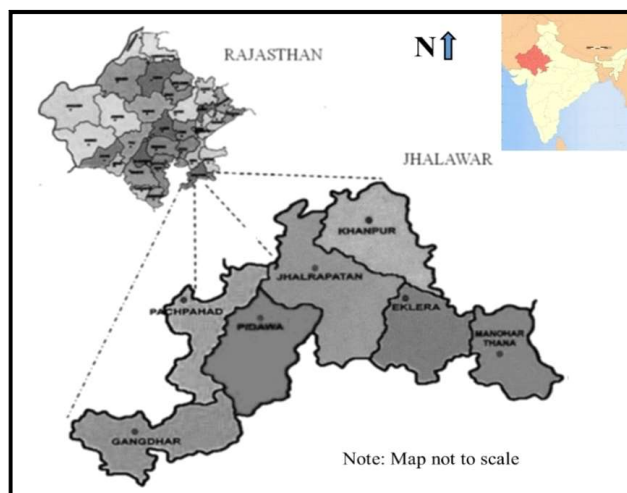


Fig. 1. Map of study area Jhalawar district, South-eastern Rajasthan, India

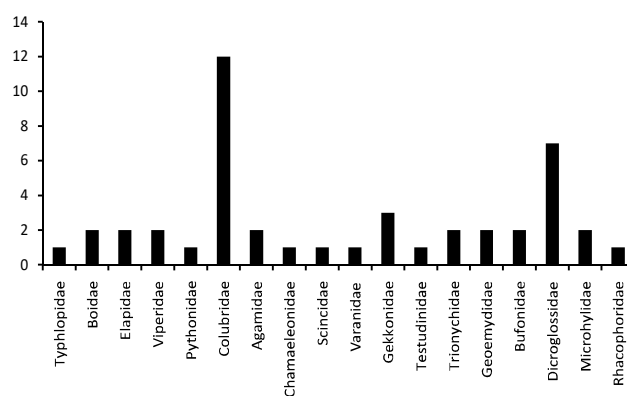


Fig. 2. Herpeto-faunal species distribution in families

Table 2. Identified lizard species location of Jhalawar District, Rajasthan, India

Common name	Scientific name	Family
Oriental Garden Lizard	<i>Calotes versicolor</i> (Daudin 1802)	Agamidae
Hardwicke's Bloodsucker/Dwarf Rock Agama	<i>C. minor</i> (Hardwicke & Gray 1827)	Agamidae
Indian Chameleon	<i>Chamaeleo zeylanicus</i> (Laurenti 1768)	Chamaeleonidae
Bronze Grass Skink/Bronze Mabuya	<i>Eutropis macularia</i> (Blyth 1853)	Scincidae
Bengal Monitor Lizard	<i>Varanus bengalensis</i> (Daudin 1802)	Varanidae
Termite Hill Gecko/Dakota's Leaf-toed Gecko	<i>Hemidactylus triedrus</i> (Daudin 1802)	Gekkonidae
Brooke's House Gecko/Spotted House Gecko	<i>H. brookii</i> (Gray 1845)	Gekkonidae
Northern House Gecko	<i>H. flaviviridis</i> (Ruppell 1835)	Gekkonidae

Table 3. Identified testudines' species location of Jhalawar District, Rajasthan, India

Common name	Scientific name	Family
Indian Star Tortoise	<i>Geochelone elegans</i> (Schoepff, 1795)	Testudinidae
Indian Flapshell Turtle	<i>Lissemys punctata punctata</i> (Bonnaterre, 1789)	Trionychidae
Indian Softshell Turtle	<i>Nilssonia gangetica</i> (Cuvier, 1825)	Trionychidae
Three-striped Roofed turtle	<i>Batagur dhongoka</i> (Gray, 1832)	Geoemydidae
Indian Tent Turtle	<i>Pangshura tentoria</i> (Gray 1834)	Geoemydidae




















			
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Common Krait <i>Bungarus caeruleus</i> (Schneider, 1801)	Saw Scaled Viper <i>Echis carinatus</i> (Schneider, 1801)	Russell's Viper <i>Duboisia russelli</i> (Shaw and Nodder, 1797)	Indian Rock Python <i>Python molurus molurus</i> (Linnaeus, 1758)
			
Common Trinket <i>Coelognathus helena helena</i> (Daudin, 1803)	Banded Kukri <i>Oligodon amensis</i> (Shaw, 1802)	Russell's Kukri <i>Oligodon taeniolatus</i> (Jerdon, 1853)	Common Bronzeback Tree Snake <i>Dendrelaphis tristis</i> (Daudin, 1803)
			
Common Wolf Snake <i>Lycodon aulicus</i> (Linnaeus, 1758)	Barred Wolf Snake <i>Lycodon striatus</i> (Shaw, 1802)	Checkered Keelback <i>Xenocrophis piscator</i> (Schneider, 1799)	Striped Keelback <i>Amphisma stolatum</i> (Linnaeus, 1758)
			
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Plate 1. Snakes of Jhalawar district, South-eastern Rajasthan, India

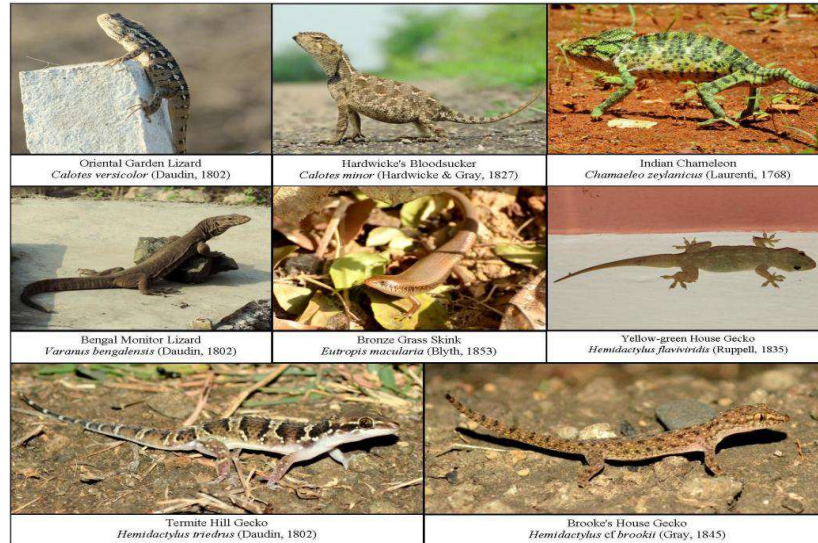


Plate 2. Lizards of Jhalawar district, South-eastern Rajasthan, India



Plate 3. Turtles and tortoise of Jhalawar district, South-eastern Rajasthan

Table 4. Identified anuran species location of Jhalawar district, Rajasthan, India

Common name	Scientific name	Family
Asian Common Toad	<i>Duttaphrynus melanostictus</i> (Schneider 1799)	Bufoidea
Indian Marbled Toad	<i>D. stomaticus</i> (Lutken 1864)	Bufoidea
Indian Skipper/Skittering Frog	<i>Euphlyctis cyanophlyctis</i> (Schneider 1799)	Dicoglossidae
Asian Grass/Rice Field Frog	<i>Fejervarya cf limnocharis</i> (Gravenhorst 1829)	Dicoglossidae
Indian Cricket Frog	<i>Minervarya spp.1</i>	Dicoglossidae
Cricket Frog	<i>Minervarya spp.2</i>	Dicoglossidae
Cricket Frog	<i>Minervarya spp.3</i>	Dicoglossidae
Cricket Frog	<i>Minervarya spp.4</i>	Dicoglossidae
Indian bullfrog	<i>Hoplobatrachus tigerinus</i> (Daudin 1803)	Dicoglossidae
Marbled Balloon Frog	<i>Uperodon systoma</i> (Schneider 1799)	Microhylidae
Painted Baloon Frog	<i>Uperodon cf taprobanicus</i> Parker 1934	Microhylidae
Indian Tree Frog	<i>Polypedates maculatus</i> (Gray 1830)	Rhacophoridae

\* = Species not confirmed



**Plate 4.** Amphibians of Jhalawar district, South-eastern Rajasthan, India

fauna in intermediate forest habitats is mainly due to the presence of different microhabitats, including human-altered habitats that are providing favourable conditions to amphibians and reptiles for their survival.

#### CONCLUSIONS

The present study communicates that the reptile diversity of the Jhalawar and its surroundings, it's an important location

in terms of herpeto-faunal diversity. Awareness education should be providing, on schools and university level to increase acquaintance of the natural habitats of the area. The present survey exhibits that the dominant families were Colubridae in snakes and Dicroglossidae in amphibians represented 12 and 7 species respectively whereas, 7 families namely Typhlopidae and Pythonidae in snakes, Chamaeleonidae, Scincidae and

Varanidae in lizards, Testudinidae in tortoise and Rhacophoridae in amphibians represented only single species which requires ecological conservation and scientific management study. This conducted study will support in compiling a complete distribution list of amphibian and reptiles species and also assist in determining the conditions of the different species within the region. This paper will serve as baseline data and also to enhance the current knowledge of the herpeto-faunal diversity within the area studied.

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