

Research Article

**DIVERSITY OF LIZARDS (REPTILIA: SAURIA) OF
GANDHAMARDAN HILLS RANGE OF WESTERN ORISSA, INDIA**

Soubhagya Pradhan^{1*}, Devraj Mishra² and K.R. Sahu³

¹Department of Zoology, Dr.C.V.Raman University, Kota, Bilaspur (C.G.), India

²Department of Zoology, Jawaharlal College, Patnagarh, Orissa, India

³Department of Zoology, Govt. E.R.R.(P.G.) Sc.College, Bilaspur, (C.G), India.

¹soubhagya.zoology@gmail.com, ²drdevrajmsr@gmail.com, and ³krsahuseri@gmail.com.

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ABSTRACT

While anthropogenic pressure is very high throughout the globe, the biodiversity needs conservation. However, a lack of good identification literature for certain taxa such as amphibians and reptiles substantially delays ecological research in this region. Here, we compiled an illustrated species list of Lizards (a group of reptiles) based on two years of research i.e. during monsoon and post monsoon of 2012 and 2013 in and around the Gandhamardan Hills Range (GHR) of Western Orissa and supplemented it with data from the literature. In total, our survey and the literature review revealed ten species of lizards in four families and six genera. Our results highlight the GHR area as an important herpetological spot in Orissa as well as in India. Appropriate utilization of species lists like this may facilitate capacity-building of local scientists and knowledgeable local guides working in this field of research.

Keywords: Biodiversity, Lizards, Conservation, Species list, GHR.

INTRODUCTION

The first global assessment of its' kind of reptile species, which include crocodiles, lizards, snakes and turtles estimated that 19% of them are struggling to survive of those under threat, 12% are considered to be critically endangered, meaning they are at the highest risk of extinction, while 41% are endangered and 47% are vulnerable to going extinct, the study in the journal Conservation Biology said 'Almost one in five reptiles is facing extinction due to manmade habitat loss' (McCann, 2013, Davies, 2013). One fifth of all lizards could be wiped out by global warming before the end of the century. From Geckos to Iguanas to Gila monsters and Komodo dragons are the most common lizards on earth will face the extinction crisis (Alleyene, 2010).

The BBC reported on a 'global-scale study' published in the journal 'Science' that found climate change could wipe out 20% of the

world's lizard species by 2080. Global projection models used by the scientists suggested that 'lizards have already crossed a threshold for extinctions caused by climate change' (Shah, 2013). It is predicted that climate change will cause the extinction of lizards and distributional shifts in coming decades (Sinervo *et al.*, 2010). In India herpetologists did some inventory and assessment of snakes, lizards and turtle diversity in an excellent way in different parts (Dar *et al.*, 2008, Pal *et al.*, 2012, Chandramouli and Baskaran, 2012, Chetty, 2010, and Venugopal, 2010). In Orissa and Chhattisgarh some of them also did the survey work in the field of herpetofauna diversity (Dutta *et al.*, 2010, Mahapatra *et al.*, 2008, Chandra and Gajbe, 2005, Sanyal, 1993, Sanyal and Dasgupta, 1990). All these information created an eagerness to prepare a list of lizards in an area rich in biodiversity before these animals going to be extinct. In Gandhamardan Hills Range (GHR) of Western Orissa we carried out an inventory

*Corresponding author email: soubhagya.zoology@gmail.com

and assessment of herpetofauna (both amphibians and reptiles) since last two years and this study is a part of this research work (Pradhan *et al.*, 2014). A wildlife study was performed in the Gandhamardan Hills Range of Western Orissa (Pradhan, 1987). But it was a preliminary step to assess the vertebrate fauna of GHR. We carried out an extensive investigation of herpetofauna diversity of GHR during the monsoon and post monsoon of 2012 and 2013 from which a checklist of lizard fauna of GHR is prepared that will be useful in the scientific research for the generations to come.

MATERIALS AND METHODS

The Study Area

Gandhamardan Hills Range lies between $20^{\circ} 42' - 21^{\circ} 00'$ north latitude and $82^{\circ} 41' - 83^{\circ} 05'$ east

longitude inside the western part of state of Orissa, India (Figure 1). The total area of GHR as reserve forest calculated to be 251 Km^2 (Mishra, 2004). The hills range is a part of Eastern Ghats of India (Sahu *et al.*, 2010). This hills range forms a natural boundary on the North Western side of Bolangir district and the Southern boundary of Bargarh district of Orissa. A range of GHR runs East ward and touches the boundary of Bastar district of Chhattisgarh. The richness of GHR is due to its' water resources with 840 springs perennial in nature, which feed water into 54 small streams and 14 larger streams joining two rivers the Ong and the Suktel. These two rivers join the Mahanadi of Orissa (Pradhan, 1987). This forest ecosystem is rich in Biodiversity (Bhadra and Dhal, 2010). Figure 2 shows the satellite image of GHR taken from the Google map.

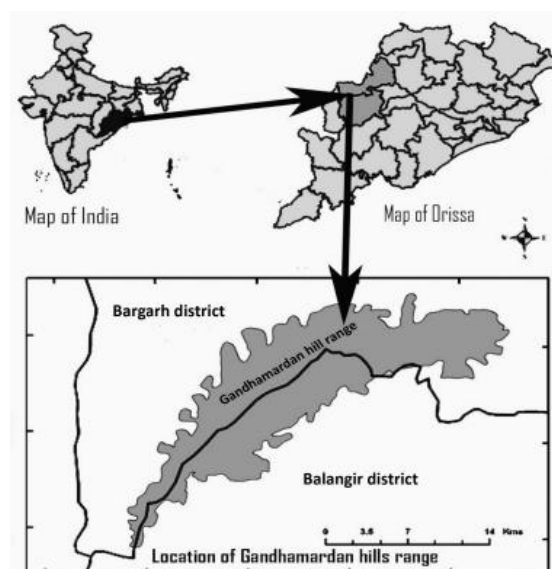


Figure 1. Map of Gandhamardan Hills Range of Western Orissa, India.



Figure 2. Satellite image of Gandhamardan Hills Range.

Reptiles showed positive correlation with leaf litter. This was particularly more evident in case of skinks and agamids. The association of geckos, skinks and agamids with microhabitat availability has already been earlier shown (Dar *et al.*, 2008, Heatwole 1977, Kumar *et al.* 2001, Vijayakumar *et al.* 2006). Agamids which were dominated by calotes preferred more rocky and open canopy than skinks. The specific habitat features are essential for leaf litter reptiles as they can meet the conflicting demands of thermoregulation, predator avoidance and participation in other activities (Lima and Dill, 1990). Lizards are most active during monsoons and post monsoons. During the rest of the year, most of the species hibernate/aestivate and are difficult to sight. Hence, the months from July to November of 2012 and 2013 were selected as the period of study timing. This period represents the active period of the lizard fauna. This time of visit was well suited for their optimum activity.

The lizards are both diurnal, nocturnal and some are crepuscular. So, the survey was conducted at day, evening and night time. The visual encounter survey (VES) technique was used. The VES technique involves walking through the study site systematically searching for lizards. No time constrained studies (TCS) were utilised and hence a varied amount of time was utilised at the sites based on species diversity. Microhabitat studied included terrestrial, arboreal and fossorial during the study period (Mahapatra *et al.*, 2008). Periodical searches under rocks, debris and leaf litter were carried out ensuring that microhabitats were not disturbed. Multiple sampling technique (MST) was used which is broadly divided into two categories i.e. direct and indirect sampling methods given in Table 1 (Pal *et al.*, 2012; Dar *et al.*, 2008, 2008 and Pradhan *et al.*, 2014). Identification of lizards was performed capturing the animals by hand using the gloves and hooks and then these were photographed. All the specimens were released in the same microhabitats where these were captured. The photographs were matched with referred literatures and identified properly (Das, 2008; Daniel, 2002). The equipments which used for survey work were the hand gloves, hooks, torches for night searches, measuring tape, Nikon-L 810 (24X zoom camera) and a Nikon coolpix-2500 camera for photography. All animals after diagnosis and photographed were

released into their habitats *in situ* (Chandramouli and Baskaran, 2012).

RESULTS AND DISCUSSION

Lizards of GHR include Geckos, Skinks, Garden lizards and Monitor lizard. The Geckos (Family: Geckonidae) are a distinctive group of lizards, characterised by soft skin covered with granules, no symmetrical shields on the head and the automatic detachable tail by autotomy. These represent four species of one genus (*Hemidactylus*). The skinks (Family: Scincidae) are typically represented by long body, enlarged head scales, little neck, scales on the body keeled, shiny and limbs well developed. Three species of skinks under two genera were found in GHR during investigation. The agamids (Family: Agamidae) are old world lizards, characterised by their nature of teeth. These are arboreal and terrestrial in nature. This family is represented by two species (*Calotes versicolor* and *Sitana ponticeriana*). A single species of monitor lizard (Family: Varanidae) was found which is the largest lizard of the area. It is *Varanus bengalensis* with a long neck, bifurcated tongue and tough body. From all these family Geckonidae dominates the other three families (Table 2). The scientific names, vernacular names, local names and their IUCN status are given in Table 2. Their micro habitats in which these animals are available is given in Table 3. The percentage of four families of lizards is given in the pie chart (Figure 3). Local residents when interviewed told that many species of lizards disappeared from the area in the near past (*Chamaleon zeylanicus*) and the number of present lizard species is decreasing sharply.

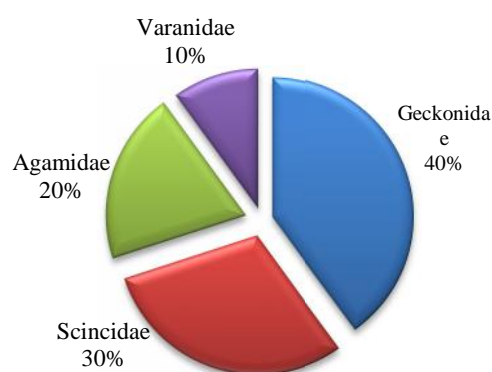


Figure 3. Percentage of families of lizards in GHR.

Table 1. Different methods used for identification and documentation of reptilian diversity. (+ indicate the method applied for particular reptile group recognition during present study.)

Methods	Sampling methods	Lizards	Snakes	Terrapins	Comments
Direct method	Hand Capturing	+	+	+	Simple and most reliable method
	Extensive Search in microhabitats	+	+	+	Applied in all micro- habitats.
	Opportunistic spotting	+	+	+	Spotted accidentally, Best result obtained during early hours after day break and evening
Indirect method	Acquiring information from local people	+	+	+	Useful for chronological comparison of reptilian diversity

Table 2. Lizard fauna of Gandhamardan Hills Range.

Family	Scientific Name	Common Name	Local Name	Status
Geckonidae	<i>Hemidactylus fleviviridis</i> (Ruppell,1835)	Indian House Gecko	Jhitipiti	LC
Geckonidae	<i>Hemidactylus frenatus</i> (Dumeril and Bibron,1836)	Smooth House Gecko	Jhitipiti	LC
Geckonidae	<i>Hemidactylus brookii</i> (Gray,1845)	Spotted Indian House Gecko	Jhitipiti	LC
Geckonidae	<i>Hemidactylus leschenaultia</i> (Dumeril and Bibron, 1836)	Bark Gecko	Jhitipiti	LC
Scincidae	<i>Lygosoma punctatus</i> (Gmelin, 1799)	Common Snake Skink	Nali lenzia champei	R
Scincidae	<i>Mabuya carinata</i> (Schneider,1801)	Common Indian Skink	Champey Neula	LC
Scincidae	<i>Mabuya macularia</i> (Blyth,1835)	Eastern Bronze Skink	Champey Neula	LC
Agamidae	<i>Calotes versicolor</i> (Daudin,1803)	Indian Garden Lizard	Tengta/Endua	LC
Agamidae	<i>Sitana ponticeriana</i> (Cuvier,1844)	Fan Throated Lizard	Mati Endua	LC
Varanide	<i>Varanus bengalensis</i> (Daudin,1802)	Common Indian Monitor Lizard	Godhi	R

LC=Least Concern, R=Rare.

The lizards belong to 04 families 06 genera and 10 species.

Table 3. List of species names (lizards), microhabitats and their adaptation.

S. No.	Name of the Species	Microhabitat and their adaptation
1	<i>Hemidactylus fleviviridis</i>	N/A , SC//HH and O.
2	<i>Hemidactylus frenatus</i>	N/A , SC/HH and O.
3	<i>Hemidactylus brookii</i>	N/C/A/T , SC/DF/HH and O.
4	<i>Hemidactylus leschenaulti</i>	N/A/T , SC/DF/HH/AG and O.
5	<i>Lygosoma punctatus</i>	D/C/T, HH/SC/DF and O.
6	<i>Mabuya carinata</i>	D/T//A, HH/SC/DF and O.
7	<i>Mabuya macularia</i>	D/T/A , HH/SC/DF and O.
8	<i>Calotes versicolor</i>	D/A, HH/SC/DF and O.
9	<i>Sitana ponticeriana</i>	D/T, HH/SC/DF/AG and O.
10	<i>Varanus bengalensis</i>	D//T/A/AG/, HH/AG/SC/DF and O.

Habitat types: The habitats of these animals are classified into four types such as, HH = Human Habitation of the tribal people, AG = Agricultural Fields of the tribal villages, SC = Scrub Forest, and DF= Deep forest. The scrub forest includes the areas where small bushes grow densely. The deep forest is near by the hill streams.

Adaptive types: N=Nocturnal D=Diurnal, C=Crepuscular, A = Arboreal, T = Terrestrial, O= Oviparous and V=Viviparous.

CONCLUSION

Having a small land area, where the primary forest vegetation is rapidly declining, and the lizard population is facing an imminent threat. Therefore, immediate conservation actions are recommended. Specific attention must be paid over restoration of microhabitats with native fast growing forest species and establishment of habitat corridors to bridge the neighbouring forest patches to yield space and resources to sustain the minimum viable populations. Establishment of a buffer is imperative to mediate the anthropogenic pressure. The nearby tribal people must be encouraged to adopt agro-forestry practices instead of monoculture allowing establishment of small populations of herpatofauna in those agro forestry plots adjoining the reserve forest (Thilina *et al.*, 2006). The tribal people of this area argued that if deforestation and fragmentation will be checked, the biodiversity including the lizards will be safe in future. So that its' our primary duty to lessen the human activities in the forest and allow the activities of the lizards *in situ*.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interests associated with this article.

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