

Abundance of Lacertilians in Relation to Elevation and Vegetation in Jebel Al Dayer Biosphere Reserve, North Kordofan State

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Abstract

Jebel Al Dayer (3,715 km²) because of its richness in flora and diversity in faunal forms it became a UNESCO's world biosphere reserves in 2017. Its lacertilians comprised 14 species, belonging to 11 genera in 7 families. Its lacertilians species comprises 15% of those known for Sudan. Adults and juveniles of *Hemidactylus angulatus*, *Tarantula annularis*, *Latastia longicaudata*, *Agama agama*, *Agama doriae*, *Trachylepis quinquetaeniata* and *Acanthodactylus boskianus*, were found during all seasons. *Agama agama*, *A. doriae* and *T. quinquetaeniata* were found in all elevations. Some residents of the biosphere reserve endangered the existence of *Varanus niloticus* by eating its meat and trading in its leather or using *Chamaeleo africanus* in traditional medicine.

Keywords: Biosphere; Lacertilians; Endangering; Kordofan; Sudan

species [3]. However, the diversity of JDBR is under threat from human collection of fire wood, cutting of trees, large scale collection of aromatic and medicinal plants, bush meat and trade in wild animals and their parts. The long term consequences of such practices are loss of diversity and abundance [4]. The aim of this work is to study the lacertilian richness, abundance and distribution along four altitudinal gradient and six vegetation types in JADBR [5].

Case Presentation

The study area

JADBR is mostly a massive volcanic rock mountain with a lot of peaks. It is located at El Rahad locality of North Kordofan state. It lies between 12°28" and 30°30"N; 13°12" and 42°30"E. It rises over 1,000 m above the surroundings terrain and covers 6,374 km² [6].

Lacertilians collection and identification

The lacertilians were recognized directly or captured by a trap. Their photos were taken by a digital camera (Nikon 18-55, 1:3.5-5.6 GVR, AF. S DX Nikkor). Their identification followed Spawls et al. Some species might had been missed, in view of difficult access or hiding [7].

Lacertilians measurements

The morphometric measurements recorded in cm included: Total length from the tip of the mouth to the end of the Tail (TL); body length from the mouth to the vent (SVL); head length from the tip of the mouth to the beginning of the first neck vertebrae (HL); Length of the Front Leg (LFL); Length of the Hind Limb including claws (LHL); Tail length from the end of the anal pore to the tip of the Tail (TAL). Body weight was recorded to the nearest gm [8].

Introduction

Jebel Al Dayer rises over 1,000 m above the surroundings terrain and 1,451 m above sea level. The area was declared as a biosphere reserve on 25th of July 2010 by the presidential decree No. 196. Its total surface area is 6,374 km², the core area is 1,672 km², its buffer zone 987 km² and its transition area is 3,715 km². In July 2017 it became a world biosphere reserves [1]. Studies of its fauna are very few. Abdel Hameed recorded nine species of wild mammal from Jebel Al Dayer Biosphere Reserve (JDBR) and Adam studied its bird species. JADBR is composed of dry savannah woodlands, forest ecosystems with over 112 plant species and a network of streams (International fund for agriculture development, 2008). IFADP recorded some wildlife animals including agamas and snakes. List of reptiles of Sudan showed the presence of 187 reptilian species with lacertilians constituting 30 genera and 95 species [2].

JDBR provide important ecosystem services, such as niches, food for wild animals and stop over for some migratory bird

Results

The seasonal distribution of lacertilians at JADBR (Table 1) showed that: Fourteen species, belonging to 11 genera falling into seven lizard families were recorded [9]. Adults and juveniles of 7 species were found during all seasons. These were: *Hemidactylus angulatus* and *T. annularis*; *A. agama*, *A. doriae*, *Trachylepis quinquetaeniata* and *A. boskianus* and *Latastia longicaudata* [10]. *Chalcides ocellatus*, *S. faciatus*, *V. exanthematicus*, *C. africanus* and *P. flavipunctatus* were encountered only during winter season [11]. A total of 2,846 specimens were collected. The number of *A. agama* (916) represented 32% of the lacertilians collected [12]. Only one specimen of *S. faciatus* was found in JADBR (Figures 1-6 and Table 1).

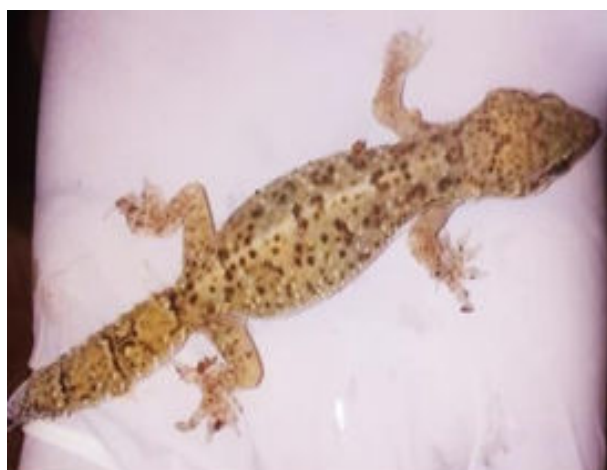


Figure 1: *Hemidactylus angulatus*.



Figure 2: *Tarentola annularis*.



Figure 3: *Agama agama*.



Figure 4: *Agama doriae*.



Figure 5: Juvenile *Trachylepis quinquetaeniata*.



Figure 6: *Acanthodactylus boskianus*.

Table 1: Seasonal distribution of adult (A) and Juvenile (J) lacertilians at JADBR.

Species	Seasons						Total No.
	Winter		Summer		Autumn		
	A	J	A	J	A	J	
Family: <i>Gekkonidae</i> , Gray 1825							
<i>Hemidactylus angulatus</i> Hallowell, 1854	22	17	35	11	15	3	103
<i>Pristurus flavipunctatus</i> Ruppell, 1835	0	0	0	0	25	8	33
<i>Tarentola annularis</i> Geoffroy St. Hilaire, 1827	20	9	1	3	34	386	453
Family: <i>Agamidae</i> , Spix 1825							
<i>Agama agama</i> L., 1858	276	191	161	43	24	221	916
<i>Agama doriae</i> Boulenger, 1885	62	45	87	113	1	23	331

Family: <i>Chamaeleonidae</i> , Gray 1825							
<i>Chamaeleo africanus</i> Laurenti, 1768	0	0	0	0	2	0	2
Family: <i>Varanidae</i> , Mrrem, 1820							
<i>Varanus exanthematicus</i> Bosc, 1792	9	0	0	0	45	7	61
<i>Varanus niloticus</i> L. 1766	0	0	1	0	9	2	12
Family: <i>Lacertidae</i> Oppeel 1811							
<i>Acanthodactylus boskianus</i> Daudin, 1802	9	187	94	25	18	6	339
<i>Latastia longicaudata</i> Reuss, 1834	10	6	9	2	1	11	39
Family: <i>Scincidae</i> Oppeel 1811							
<i>Chalcides ocellatus</i> Forsskal, 1775	0	0	0	0	2	0	2
<i>Trachylepis perrotetii</i> AMC Dumeril and Bibron, 1839	0	1	2	0	1	0	4
<i>Trachylepis quinquetaeniata</i> Lichtenstein, 1823	177	135	152	33	22	126	640
<i>Scincopus fasciatus</i> Peters, 1864	0	0	0	0	1	0	1

Vertical distribution of lizard species at JADBR (Table 2) showed that: All lacertilians were seen in elevation 0<5 m. The genera *Agama* is widely distributed in JADBR. *Chalcides ocellatus*, *T. perrotetii*, *S. faciatus*, *A. boskianus*, *L. longicaudata* and *C. africanus* are confined to elevation 0<5 m. *Agama*

agama, *A. doriae* and *T. quinquetaeniata* were found in all elevations (Table 2) [13].

Table 2: Vertical distribution of lacertilians at JADBR, + (present), - (absent).

Species	Elevation in m			
	0<5	5<100	100<500	500 to 1200
<i>Hemidactylus angulatus</i>	+	+	-	-
<i>Pristurus flavipunctatus</i>	+	+	-	-

<i>Tarantula annularis</i>	+	+	+	-
<i>Agama agama</i>	+	+	+	+
<i>Agama doriae</i>	+	+	+	+
<i>Chamaeleo africanus</i>	+	-	-	-
<i>Varanus exanthematicus</i>	+	+	-	-
<i>Varanus niloticus</i>	+	+	-	-
<i>Acanthodactylus boskianus</i>	+	-	-	-
<i>Latastia longicaudata</i>	+	-	-	-
<i>Chalcides ocellatus</i>	+	-	-	-
<i>Trachylepis perrotetii</i>	+	-	-	-
<i>Trachylepis quinquetaeniata</i>	+	+	+	+
<i>Scincopus fasciatus</i>	+	-	-	-

Morphometric measurements of Lacertilians were given in Table 3. The highest morphometric measurement was scored by *V. niloticus* except in BW which was not measured. However, *V. exanthematicus* scored the highest BW.

The minimum readings were scored by *P. flavipunctatus* which shared the same value of LFL with *V. exanthematicus*. Clear sexual dimorphism in measurement in favour of males was found in *P. flavipunctatus*, *T. quinquetaeniata*, *V. exanthematicus* and *A. agama* except in TAL (Table 3) [14].

Table 3: Lacertilians morphometric measurements. All measurements were in cm, except BW in gm.

Species	TL	SVL	HL	LFL	LHL	TAL	BW
<i>A. agama</i> ^b	22.7	8.5	2.2	4.4	6.5	14	NM
<i>A. agama</i> ^a	23.6	10.6	2.8	5.5	7.8	12.4	40.3
<i>A. doriae</i> ^a	23.4	7.6	2.2	4	5.5	15.7	16.5
<i>H. angularis</i> ^b	10.9	5.4	1.6	1.8	6.3	5.5	3.3
<i>H. angularis</i> ^a	9.9	5.7	1.7	1.8	2.2	4.2	4.2
<i>P. flavipunctatus</i> ^b	5.8	2.2	0.9	1.1	1.5	3.6	3
<i>P. flavipunctatus</i> ^a	7.9	3.5	1	1.6	2	4.4	7.2
<i>T. annularis</i> ^a	18	9.6	3.1	3.5	4.8	8.1	NM
<i>T. perrotetii</i> ^a	25.4	10.3	3.5	3.1	4.1	16.8	NM
<i>T. quinquetaeniata</i> ^b	13.9	5.5	1.9	2.1	2.9	8.3	NM

<i>T. quinquetaenitata</i> ^a	18.1	7.2	2	2.5	3.6	113	NM
<i>V. exanthematicus</i> ^b	66.5	34.2	7.3	1.1	12.7	32.2	665
<i>V. exanthematicus</i> ^a	85	41.1	8.5	1.4	16	43.9	1044
<i>V. niloticus</i> ^b	140	55.5	11	19.5	25	84.5	NM

Note: ^aMale; ^bFemale; NM=Not measured

Discussion

According to all the encountered lacertilians are at least concerned according the IUCN Red List. *Chalcides ocellatus*, *T. quinquetaeniata*, *H. angulatus*, *Varanus niloticus*, *Crocodylus niloticus* and *T. annularis* were found by Mahmoud et al. in the fourth cataract area. The same species were reported from the sixth cataract area by Mahmoud. The current study reported the same species from JADBR, except *C. niloticus*. Mulleir et al. investigated the herpetofauna of the red sea hills of Sudan and recorded *T. annularis* and *P. lavipunctatus*. The present study recorded it from JADBR. Three species of genus *Hemidactylus* (*H. sinaitus*, *H. laviviridis* and *H. robustus*) were recorded by Mulleir et al. A different species (*Hemidactylus angulatus*) was found during this study. Mulleir et al. recorded *Agama spinose*, while the present work found *A. agama* and *A. doriae*. Hassan and Abukashawa recorded *T. annularis*, *A. boskianus*, *T. quinquetaeniata* and *C. ocellatus*. The current study confirmed their presence in JADBR [15].

Recently, Native reptiles of Sudan recorded 184 reptile species from Sudan of which the lacertilians constituted 30 genera and 95 species. The lacertilian species recorded during study were previously listed by list of reptiles of Sudan except the reptile database recorded for *A. agama* from Sudan. *Tarentola annularis* can break off their tails at more than one point to distract a predator or an attacker. They then regenerate their tail. Some people in JADBR use the leather of *V. niloticus* in skin trade and some eat its meat. At least *C. africanus* is used by some residents in traditional medicine. Such practices endanger the existence of some biota forms in JADBR.

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