

## The diversity of wild animals at Fezzan Province (Libya)

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### ABSTRACT

Fezzan province (Libya) is a segment of true Sahara, is characterized by diverse habitats that are utilized as shelters and feeding ground for many desert wildlife species. Oases with water table near the surface are the most prominent feature in the Libyan desert. The diversity in habitats resulted in diversity in wildlife, as well as the plant cover (trees and bushes) is the most effective factor for the existence and the abundance of wild animals, in particular bird species. This study observed many species of reptiles, birds and mammals. In the study is also reported the rock hyrax *Procavia capensis* Pallas, 1766 (Hyracoidea Procaviidae) a rare and endemic species at the area.

### KEY WORDS

Oases; diversity; endemic; wild animals.

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### INTRODUCTION

Libya is mostly characterized by arid climatic conditions, except the coastal strip and the northern hills toward the east and the west, while the rest of the country is located under the conditions of desert and semi-desert because of its geographical location in terms of latitude. This resulted in the presence of environments with distinct characteristics in terms of temperature, humidity and rainfall that reflected on the biological components of the plants and the animals that are able to co-exist in various ways with those difficult environmental conditions (Hufnagel, 1972).

In Libya there are a lot of ecosystems that range from the coastal environment with all its scattered salt marshes along the coastline, to green plains in the northeastern region and northwest highlands (which include Nafusa Mountains), to desert and semi-desert ecosystem showing its content of oases and valleys (Toschi, 1969). The desert is ecologic-

ally sensitive and very important in terms of wildlife (flora and fauna), which coexist in this habitat in spite of the harsh living conditions as much heat, especially during the summer months in addition to water scarcity and drought. However, these systems include a few diversity and abundance of species particularly those that have the capacity to live under these circumstances and some of them are endemic.

Fezzan province is a segment of true Sahara, is characterized by many habitats that are utilized as shelters and feeding ground for many desert wildlife species (Bundy, 1976). It is situated in the southwest of Libya within the desert ecosystem, which includes desert wadis, oases, palm plantations and irrigated cropland. Studies and reports, which are relatively scarce since the period of Italian occupation until the present, concluded that the wildlife in this region has declined in terms of number of species and individuals to alarming situation where some taxa are either subject to

extinction or already had disappeared from their previous range. The reason of it can be attributed to: (i) urbanization in some areas on the expense of natural resources and natural vegetation; (ii) construction of roads leading to the open areas where the shelters and habitats for wildlife are; (iii) modern vehicles which facilitated access to rugged areas; (iv) overhunting; (v) explorations and oil investments and activities associated with this industry; (vi) establishment of some sites for the purpose of various agricultural activities which led to the presence of human activity with a negative impact on wildlife communities and, (vii) desert tourism that led to the emergence of some negative effects (Sbeta et al., 2006).

In spite of all the mentioned circumstances met in this region, either due to Nature (high temperatures and scarcity of water surfaces and precipitation), or to different activities of humans that have negative effects on wildlife, especially those onset early in the sixties, there still are a number of species inhabiting the desert wadis and oases.

In this study we report some examples of animal species which were recorded in the region, and whose presence we hope to continue to record in some areas of the region, even if they are few in number. However, wildlife studies in the province of Fezzan need to focus on areas that may be susceptible of urbanization and Industrial sprawl, in order to save (for future generations) what can be saved of wildlife that still inhabit some of these sites. This study is based on a review of available publications and reports since the last decades until now, supported by field visits to the selected sites of the region to investigate the species of reptiles, birds and mammals.

### Study area

This study was focused on the diversity of animals in eight sites (Wadi Al-shati, Sebha, Traghen, Murzuq, Ubari, Al-awenat, Ghat and Akakus) at Fezzan region (Fig. 1).

The habitat type is mainly arid (72% of the total area of the region) with very harsh environmental conditions which are unsuitable for the growth of plants (Sbeta et al., 2006). The rest of the region can be classified into; irrigated crops area, plantations of palm trees, pastoral land and salt marshes (Table 1).

## MATERIAL AND METHODS

Field visits were conducted in summer 2006 by the authors of the present paper. Observations, collection of samples and bird watching started from dawn to dusk. Opticron binoculars (with magnification 10x50) and Optolyth spotting-scope were used for accounting of birds, as well as for some wild mammals. Field guides (Heinzl et al., 1998;



Figure 1. Map of Libya showing the study area.

Habitat type	Area in hectare	%
Irrigated agricultural land	137.500	0.25
Plantation of palm trees	39.675	0.07
Pastures and dry valleys	80.651	0.15
Arid land	40,137.185	72.25
Sands and sand dunes	15,109.334	27.20
Salt marshes (Sobkhas)	36.536	0.07
Urban areas	11.949	0.02
<b>Total</b>	<b>55,552.830</b>	<b>100.00</b>

Table 1. The percentage of each habitat type in Fezzan province. Source: Project of natural resources mapping for agricultural use and planning (Libya/04).

Mullarney et al., 2001) were used to identify birds. However, the status of bird species was assigned by their frequency of occurrence.

The following categories were adapted from Bundy (1976) and Toschi (1969): MB - Migrant breeder; PV - Passage visitor; RB - Resident breeder; WV - Winter visitor. Reptiles were collected by using rubber bands, while life traps were fitted for overnight to catch rodents species.

## RESULTS AND DISCUSSION

### Amphibians and Reptiles

Despite the harsh climatic conditions in the

whole province, which is inappropriate for the presence of life, the streams and cultivated areas, including some wetlands easily available, provided an opportunity for some amphibian species to inhabit the area. Amphibian diversity in the Mediterranean basin is much lower than reptile diversity. This being largely a reflection of the extent to which arid and semi-arid habitats predominate in large parts of the region (Cox et al., 2006). In this study two species of amphibians and fourteen species of reptiles were encountered (Table 2).

The sub desert Toad *Amietophrynus xeros*, previously known as *Bufo xeros*, was observed in pools and farms in Sebha and Ghat, this finding is in accordance with the results of Ibrahim (2008). We also observed Green Toad *Bufo viridis* in either

	COMMON NAME	SCIENTIFIC NAME	SITE OF OBSERVATION
1	Sub desert Toad	<i>Amietophrynus xeros</i> (Tandy, Tandy, Keith et Duff-MacKay, 1976)	Sebha, Ghat
2	Green Toad	<i>Bufo viridis</i> (Laurenti, 1768)	Sebha, Murzuq, Al-awenat and Ghat
3	Bibron's agama	<i>Agama impalearis</i> Boettger, 1874	Al-awenat, Akakus
4	Desert agama	<i>Trapelus mutabilis</i> (Merrem, 1820)	Ubari, Al-Awenat
5	Bell's dabb-lizard	<i>Uromastix acanthinura</i> Bell, 1825	Al-shati, Traghen, Al-awenat
6	Ragazzi's fan-footed gecko	<i>Ptyodactylus ragazzii</i> Anderson, 1898	Traghen
7	Elegant gecko	<i>Stenodactylus sthenodactylus</i> (Lichtenstein, 1823)	Traghen
8	Moorish gecko	<i>Tarentola mauritanica</i> Linnaeus, 1758	Al-shati, Sebha, Traghen, Murzuq
9	Tripoli dwarf gecko	<i>Tropiocolotes tripolitanus</i> Peters, 1880	Al-Shati, Sebha, Traghen
10	Nidua lizard	<i>Acanthodactylus scutellatus</i> (Audouin, 1827)	Traghen, Murzuq, Ubari
11	Leopard Fringe-fingered Lizard	<i>Acanthodactylus pardalis</i> (Lichtenstein, 1823)	Murzuq
12	Red-Spotted Small Lizard/ Desert-Racer	<i>Mesalina rubropunctata</i> (Lichtenstein, 1823)	Traghen, Murzuq
13	Ocellated skink	<i>Chalcides ocellatus</i> Forsskål, 1775	Al-Shati, Sebha, Murzuq
14	Sand fish	<i>Scincus scincus</i> (Linnaeus, 1758)	Al-Shati, Traghen, Ubari
15	Schokari Sand Snake	<i>Psammophis schokari</i> (Forskål, 1775)	Traghen, Ubari
16	Horned viper	<i>Cerastes cerastes</i> Linnaeus, 1758	Al-shati, Sebha, Traghen, Murzuq

Table 2. Species of amphibians and reptiles recorded in study area.

cultivated lands or wetlands in Sebha, Murzuq, Al-awenat and Ghat. Scortecci (1935) mentioned the presence of this species in the province of Fezzan.

Studies on reptiles are very rare, but the desert valleys and some habitats in the region are the most important areas for some species of lizards, such as: Desert monitor *Varanus griseus* (Daudin, 1803), Chameleon *Chamaeleo chamaeleon* Linnaeus, 1758 and Spiny-tailed lizards *Uromastyx acanthinura*. Furthermore, the most important species of snakes that live in this environment is the Horned desert viper *Cerastes cerastes* (Bennett, 1970; Awami, 1976; Ibrahim, 2008). A total of 14 species of reptiles were recorded in the present paper in the province (Table 2). However, the majority of them are mentioned in some previous studies (e.g. Kramer & Schnurrenberger, 1963; Schleich et al., 1996; Frynta et al., 2000; Ibrahim, 2008), except the Desert agama *Trapelus mutabilis* which was observed in Al-Awenat and Akakus and recorded for the first time in these sites (Fig. 2). Schleich et al. (1996) reported the presence of this species in Cyrenaica (east to Tubruk) and Wagner et al. (2011) mentioned another record of this species in Tripoli.

## Birds

The present study accounted a total of 2975 individuals belonging to 26 bird species; the majority of them were non-waterbirds species with a disparity in numbers of species and individuals between sites (Table 3). A total of 12 species were reported as resident breeders (Bundy, 1976). However, many previous studies during decades ago reported the presence of more than 100 species as winter visitors during their migration from Asia and Europe to Africa, where they stop for few days and then continue to the south. While around 20 species were recorded as residents along the year seasons such as; Sandgrouses *Pteracles orientalis*, *Pteracles senegalus*, Owls *Bubo bubo*, Partridge *Alectoris barbara* and some species of raptors (Toschi, 1969; Bundy, 1976; Brehme et al., 2002a, b, 2003a, b, 2004).

Fezzan province is composed of many oases, cultivated areas, irrigated crop sites, urban and residential areas, these may provide roosting sites and shelters for many bird species, particularly, those who adapted to live within and adjacent to anthropological environments. This reflects the large numbers of sparrows that inhabit the urban areas

(Spanish sparrow and Desert sparrow; fig. 3), whilst those species were absent in Akakus.

Furthermore, there was a difference in species diversity among the study sites depending on habitat types. Five waterbirds species (*Ardea cinerea*, *Egretta garzetta*, *Ardeola ralloides*, *Anas querquedula* and *Gallinula chloropus*) were observed in Sebha (sewage site) and Ubari (oases); while the rest of species were found on plant covers (bushes, shrubs and trees; pers. obs.).

## Mammals

The province of Fezzan is reasonably characterized by good diversity of Mammal species. During this study a total of 11 species were recorded.

### Order *Erinaceomorpha* and *Chiroptera*

Two species of hedgehogs belong to the family Erinaceidae were observed: Long-eared hedgehog, *Hemiechinus auritus* S.G. Gmelin, 1770 and desert hedgehog, *Paraechinus aethiopicus* (Ehrenberg, 1832) close to the farmlands in Traghen and Murzuq. These two species are common in the area (Hufnagel, 1972).

A bat species from family Vespertilionidae (*Pipistrellus* sp.) was observed just after the sunset at all visited sites. As all species of mammals in the south of Libya, bats need to be addressed in a comprehensive study in order to identify the extant species and their relations to other bats populations in the north.

### Order *Carnivora*

Of this group of mammals, only two species were recorded, the Jackal *Canis aureus* Linnaeus, 1758 was only identified by tracks left in sites in Traghen. It usually inhabits areas with optimum food and shelter. This species is reported in different types of Libya habitats (Hufnagel, 1972). However, IUCN classified this species as Least Concern, due to its widespread range, but due to the urbanization and destruction of natural habitats, these animals were no longer seen in the nature (pers. observations). Furthermore, a caracas of Fennec, *Vulpes zerda* Zimmermann, 1780 was found on the road between Al-awenat and Ghat. Despite, this species is very common in the province; especially close to human dwellings.

	Scientific name	Common name	Wadi Al-shati	Sebha	Traghen	Murzuq	Ubari	Al-awenat	Ghat	Akakus	Status
1	<i>Ardea cinerea</i> Linnaeus, 1758	Grey heron	-	1	-	-	-	-	-	-	PV
2	<i>Egretta garzetta</i> (Linnaeus, 1766)	Little egret	-	6	-	8	-	-	-	-	PV
3	<i>Ardeola ralloides</i> Scopoli, 1769	Squacco Heron	-	5	-	-	-	-	-	-	PV
4	<i>Ciconia ciconia</i> Linnaeus, 1758	White stork	-	-	-	-	36	1 died	-	-	PV
5	<i>Anas querquedula</i> Linnaeus, 1758	Garganey	-	8	-	-	-	-	-	-	PV
6	<i>Circus aeruginosus</i> Linnaeus, 1758	Marsh harrier	-	-	-	-	2	-	-	-	PV
7	<i>Falco biarmicus</i> Temminck, 1825	Lanner Falcon	-	-	-	-	5	-	-	-	RB
8	<i>Gallinula chloropus</i> (Linnaeus, 1758)	Morhen	-	1	-	3	7	-	-	-	RB
9	<i>Pterocles coronatus</i> Lichtenstein, 1823	Crowned Sandgrouse	-	-	-	-	38	-	-	-	RB
10	<i>Columba livia</i> Gmelin, 1789	Rock dove	-	-	-	-	-	-	77	55	RB
11	<i>Streptopelia turtur</i> (Linnaeus, 1758)	Turtle dove	-	50	38	20	22	-	-	-	MB
12	<i>Streptopelia senegalensis</i> (Linnaeus, 1776)	Laughing Dove	60	17	70	30	50	42	28	-	MB
13	<i>Apus pallidus</i> Shelley, 1870	Pallid swift	-	65	-	-	30	-	-	-	MB
14	<i>Galerida cristata</i> (Linnaeus, 1758)	Crested lark	-	-	-	-	-	1	19	-	RB
15	<i>Ammomanes deserti</i> (Lichtenstein, 1823)	Desert lark	-	-	-	-	23	7	15	-	RB
16	<i>Riparia riparia</i> (Linnaeus, 1758)	Sand martin	-	-	-	-	-	-	33	14	PV
17	<i>Cercotrichas galactotes</i> (Temminck, 1820)	Rufous Bush Robin	18	-	-	10	17	14	18	-	PV
18	<i>Oenanthe leucopyga</i> (Brehm, 1855)	White-crowned Wheatear	18	-	17	11	22	36	14	2	RB
19	<i>Acrocephalus scirpaceus</i> (Hermann, 1804)	Reed warbler	-	18	-	18	-	-	-	-	PV
20	<i>Iduna pallida</i> (Hemprich et Ehrenberg, 1833)	Olivaceous Warbler	22	-	-	-	11	5	17	-	MB

Table 3. Numbers of birds species observed in Fezzan province and their status (continued).

	Scientific name	Common name	Wadi Al-shati	Sebha	Traghen	Murzuq	Ubari	Al-awenat	Ghat	Akakus	Status
21	<i>Lanius meridionalis</i> (Temminck, 1820)	Great grey shrike	17	29	-	12	2	-	-	-	RB
22	<i>Turdoides fulva</i> (Desfontaines, 1789)	Fulvous Babbler	28	-	14	13	9	-	-	-	RB
23	<i>Corvus ruficollis</i> Lesson, 1830	Brown-necked Raven	9	-	-	7	100	12	-	-	RB
24	<i>Passer hispaniolensis</i> Temminck, 1820	Spanish Sparrow	150	200	120	150	150	160	300	-	WV
25	<i>Passer simplex</i> (Lichtenstein, 1823)	Desert Sparrow	-	50	50	100	-	-	90	4	RB
26	<i>Emberiza sahari</i> Levaillant, 1850	House Bunting	-	-	-	-	-	-	25	-	RB
		<b>TOTAL</b>	<b>322</b>	<b>450</b>	<b>309</b>	<b>382</b>	<b>524</b>	<b>277</b>	<b>636</b>	<b>75</b>	<b>2975</b>

Table 3 (continued). Numbers of birds species observed in Fezzan province and their status.

#### Order Hyracoidea

One of the most important finding of this study is the observation of Rock hyrax, *Procavia capensis* Pallas, 1766. It occurs throughout most of Africa from the southernmost tip north to a line from Senegal throughout southern Algeria, Libya and Egypt into the Middle East, except Congo and Madagascar (Olds & Shoshani, 1982). The rock hyrax is one of the four living species of the order Hyracoidea, and the only living species in the genus *Procavia* Storr, 1780. However, the distribution of this species in Libya is limited to the far southern mountains (Hufnagel, 1972). Study on distribution, density and biology of this species in Libya is needed. We had a visit to Akakus mountains, where usually this species had been found, but we could not observe any individuals in the area. However, our observation of this animal is based on four captives of this species kept in an old rocky house of a local family (Fig. 4).

#### Order Artiodactyla

Even-toed ungulates are more or less rare in the province. In this study two species of family Bovidae were sighted; Barbary sheep, *Ammotragus lervia* Pallas, 1777 and Dorcas gazelle, *Gazella*

*dorcas* Linnaeus, 1758). Only horns of barbary sheep were recovered in Al-Awenat (Fig. 5a). It was a clear evidence of the presence of this species around the area. Moreover, locals emphasized that this species still exists in the region. A total of 12 Dorcas gazelle were observed in Al-jaza'a protected area in Al-Shati (Fig. 5b). This species cover a wide range in Libya (Bennett, 1970; Hufnagel, 1972; Essghaier, 1980), but population trend has recently declined due to overhunting and habitat destruction.

#### Order Lagomorpha

Rabbit, *Lepus* sp. is the most common widely distributed species in Libya (Hufnagel, 1972); usually inhabits macchia-type vegetation, grassland, bushveld, and semi-desert areas. This species was observed in the most study sites (Wadi Al-shati, Sebha, Traghen, Murzuq and Ubari).

#### Order Rodentia

Two species of rodents were reported by the present study, Jerboa *Jaculus jacuulus* (Linnaeus, 1758) of family Dipodidae and Gerbil, *Gerbillus* sp. of family Muridae, which is in accordance with the findings of Hufnagel (1972). A total of 5 specimens



Figure 2. Desert agama *Trapelus mutabilis* (Akakus). Figure 3. A female of Desert sparrow. Figure 4. Rock hyrax in an old house in Al-Awenat.

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Figure 5. Horns of Barbary sheep. Figure 6. Dorcas gazelle in Aljaza'a protected area in Al-Shati.

of Gerbil were caught by life traps at the area between Wadi Al-shati and Sebha. However, the distribution of these species can be estimated by their wholes.

## CONCLUSIONS

In conclusion, the present study, conducted during summer 2006, documented some species from different orders of vertebrates. It is also highlighted the importance of biodiversity in Fezzan province. Although the survey was in summer, and thus few numbers of species and individuals were observed, nevertheless, it is emphasized the wild animal diversity and urged the need to implement a comprehensive study for the province in different seasons of the year.

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