

The Herpetofauna of the Southern Jordan

Saleh Al-Quran

Department of Biology, Faculty of Science, Mutah University, Karak, Jordan

Abstract: A total number of 70 herpetofaunistic species organised in 3 orders and 18 families were surveyed during a period of two years (2005– 2007) in southern Jordan. The orders are (1) Ophidia has 7 families: Leptotyphlopidae (1 species), Typhlopidae (2 species), Boidae (1 species), Colubridae (17 species), Atractaspididae (1 species), Elapidae (1 species) and Viperidae (5 species). (2) Sauria has 7 families: Gekkonidae (12 species), Chamaeleonidae (1 species), Agamidae (8 species), Lacertidae (3 species), Sincidae (8 species), Anguillidae (1 species), Varanidae (1 species). (3) Testudines has 4 families: Cheloniidae (2 species), Dermochelyidae (1 species), Emydidae (1 species) and Testudinidae (1 species). The species listed were all resident and were mostly found throughout the year. The diversity of terrestrial and aquatic ecosystems in the study area encouraged the occurrence of the species. The results reinforce the necessity of longterm inventory plannings in order to understand the ecology and the dynamics of herpetofaunistic and other wildlife communities in the study area. The over-increasing of human impact on the existing natural resources in the southern Jordan has threatened the ecology diversity of wildlife species, where the populations of some herpetofaunistic species (especially frog species) and many reptilian species are declining in diversity status and abundance. The author recommend at the end the improving cooperation of different parties to enhance the public awareness and to implement environmental laws and legislation to conserve the sensitive and rare species of herpetofauna components.

Key words: Herpetofauna % Reptiles % Amphibians % Southern Jordan

INTRODUCTION

Southern Jordan lies at the junction of the Levantine and Arabian regions of the Near East. Generally, from the physiographic angle of view, four main regions are usually recognised: (1) Rift Valley, (2) Mountain ranges, (3) South eastern desert and (4) Marine environment of the Gulf of Aqabah. This gives southern Jordan rather diversified morphology, reflected also in the diversity of its herpetofauna [1-22]. Southern Jordanian territory forms, due to its geographical position, a crossroad of different zoogeographic realms (Afrotropical, Saharo-Sindian, Oriental, Palearctic), which influences the composition of the Jordanian herpetofauna. Distribution of individual types of biogeographical regions in Jordan is, mainly in the west, influenced by the altitude [23-28]. The complicated mosaic of high mountains, steep slopes and deep wadis leads to the formation of extremely narrow borders between individual ecozones, or to their overlapping and causes mixing of floral and faunal elements with different biogeographical affinities in individual localities. There are apparent declines and extinction of the herpetofaunal communities throughout the world, the causes may include habitat loss and

degradation, unsustainable use, invasive species, environmental pollution, disease and global climate change [29-31]. Habitat loss appears to be the most serious threat to herpetofauna as they are the more affected than other vertebrates by serious human encroachment on their habitats. Habitat destruction, wetland draining and/or pollution represent actual threats to amphibian populations and their reproduction. A variety of herpetological surveys and studies has been conducted in different countries and environments worldwide. The previous studies showed that lizards were the most common group of reptiles in terms of species identified or the species caught. Three Anuran species (*Bufo viridis*, *Rana ridibunda* and *Hyla arborea*) that were investigated in the different areas of Turkey have a wide distribution throughout the Middle East countries [4-9]. In southern Jordan, reptiles were surveyed species were recognized [18,22]. The two species of turtles (the Caspian Terrapin *Mauremys caspica rivulata* and the terrestrial Spur-thighed Tortoise *Testudo graeca terrestris*) were found to occur in most areas of the Mediterranean basin and the countries of the Middle East as well [23-28]. In spite of the threats facing freshwater turtles worldwide, they have. With regard to poisonous

snakes, recorded 10 species occurring in Israel and Jordan belonging to 3 families. The most dangerous and the most common snake is the Palestine Viper *Vipera palaestinae*. All these venomous snakes seem to pose a serious threat to humans, where several hundred bites are reported every year in Israel and Jordan [23-28]. Rough data on wildlife species indicated that approximately 500 birds, 100-120 mammals and 120 herpetofaunistic species, in addition to about 400 fish were known to inhabitants [1-22].

MATERIALS AND METHODS

Study Area: The wetland of southern Jordan is bordered by tall emergent plants like *Phragmites australis* and *Arundo donax*. *Tamarix nilotica* covers considerable areas as part of the maritime influence on the type of vegetations.

In recognition of the importance of the study area as a natural and touristic area, it has sporadic records of herpetofaunistic species and other related species. The study area comprises Aqaba as a wetland (considered as site I), which supports a certain kind of vegetation mentioned before, Ras Al Naqab as a mountainous land (site II), which supports the vegetation of trees and shrubs like *Juniperus phoenicea*, *Sarcopoterium spinosa* and *Daphne linearifolium* and Araba Valley as Jordan valley land (site III), which supports the irano-tur anian type of vegetation like *Calotrops procera*, *Salvadora persica* and *Acacia* species.

Field Methods: Field methodologies [3-15] used in this study can be divided into the following categories: (1) survey period covered two years (October 2005–September 2007). (2) additional visits have been conducted after the study period for confirmation. Data collected in the field were recorded in a special sheet designed for this purpose. (3) live traps and aquatic nets were used as relevant and appropriate. (4) Frequent visits and observations and discussions with local people were used to determine herpetofaunistic species and their ecological importance in the study area. However, many visits were carried out in earlier hours and others extended to later hours for monitoring some nocturnal species. (5) Examination of the eggs, their parts and identification of some species sound and tracks were also used to supplement the direct field survey. (6) Road kills are good indicators for identifying such bird species. (7) Preserved specimens in Jordan Natural History Museums at both Yarmouk and Mutah Universities in addition to the zoologic museum at Jordan University were used as

additional records. (8) A long range of international, regional and even local guidelines were used to identify bird species [1-31].

Abundance and Status Considerations: Usually the possible status of recorded species [1-21] is given as follows:

Resident (R): Virtually present

Winter Visitor (WV): Present in winter.

Summer Visitor (SV): Present in summer

Passage Migrant (PM): Only present in spring and/or autumn migration periods

Vagrant (V): Migratory species that swerved from normal migratory routes

Unknown (UN): It's status is unknown While for the abundance of each species (Bibby and Marsden, 1998) as follows:

Very Rare (VR): The species seen once or twice.

Rare (R): The species seen in very low numbers

Uncommon (UC): The species seen in small numbers but more than R.

Common (C): The species seen in relatively large numbers.

Very Common (VC): The species seen in large numbers.

RESULTS

A total number of 70 herpetofaunistic species belonging to 3 orders and 18 different families was recorded in southern Jordan; The three orders are (1) Ophidia has 7 families: Leptotyphlopidae (1 species), Typhlopidae (2 species), Boidae (1 species), Colubridae (17 species), Atractaspididae (1 species), Elapidae (1 species) and Viperidae (5 species). (2) Sauria has 7 families: Gekkonidae (12 species), Chamaeleonidae (1 species), Agamidae (8 species), Lacertidae (3 species), Sincidae (8 species), Anguidae (1 species), Varanidae (1 species). (3) Testudines has 4 families: Cheloniidae (2 species), Dermochelyidae (1 species), Emydidae (1 species) and Testudinidae (1 species).

Table 1: List of herpetofaunistic species of Class Reptilia with their orders and families

Family	Scientific Name	Status	Abundance
Ophidia			
Leptotyphlopidae	Leptotyphlops macrorhynchus	R	R
Typhlopidae	Typhlops vermicularis	V	U
	Typhlops simoni	R	C
Boidae	Eyrx jaculus	V	C
Colubridae	Coluber elegantissimus	R	C
	Coluber jugularis asianus	R	C
	Coluber nummifer	R	VC
	Coluber ravergieri	PM	VC
	Coluber rhodorachis	R	R
	Coluber rogersi	R	VR
	Coluber rubriceps	SV	VC
	Coluber schmidtii	R	VR
	Coluber ventromaculatus	V	R
	Eirenis coronella	R	C
	Eirenis decemlineata	R	C
	Eirenis lineomaculata	R	VC
	Eirenis rothi	WV	C
	Lytrotrhynchus diadema	R	R
	Lytrotrhynchus kennedyi	UN	R
	Natrix tessellata	R	VR
	Rhynchocalamus melanocephalus	R	VC
	Spalerosophis diadema cliffordi	UN	VC
	Malpolon monspessulanus insignitus	V	C
	Psammophis schokari	R	C
	Telescopus dhara	V	C
	Telescopus fallax syriacus	R	C
	Telescopus nigriceps	R	R
Atractaspididae	Atractaspis microlepidota engaddensis	R	R
Elapidae	Walterinnesia aegyptia	R	UC
Viperidae	Cerastes cersates	R	C
	Macrovipera lebatina	R	C
	Echis colorarus	R	C
	Pseudocerastes persicus fieldi	R	R
	Vipera palaestinae	PM	VR
Sauria			
Gekkonidae	Bunopus tuberculatus	R	UC
	Cyrtodactylus scaber	V	C
	Cyrtodactylus kotschyi	R	C
	Hemidactylus turcicus turcicus	R	C
	Pristurus rupestris	R	VC
	Ptyodactylus hasselquistii	V	C
	Ptyodactylus guttatus	R	VC
	Ptyodactylus puiseuxi	R	UC
	Stenodactylus doriae	UN	C
	Stenodactylus grandiceps	R	C
	Stenodactylus sthenodactylus	WV	C
	Tropicolotes nattereri	R	UC

Table 1: Continued

Chamaeleonidae	Chamaeleo chamaeleon recticrista	UN	VC
Agamidae	Laudakia stellio stellio	PM	UC
	Laudakia stellio brachydactyla	R	C
	Laudakia stellio picea	R	C
	Pseudotrapelus sinaita	R	C
	Trapelus blanfordi fieldi	R	C
	Trapelus pallda haasi	R	C
	Phrynocephalus arabicus	R	C
	Uromastix aegyptius microlepis	R	C
	Lacertidae	Acanthodactylus grandis	V
Mesalina olivieri schmidti		R	R
Ophisops elegans		R	C
Lacerta laevis		R	VR
Lacerta trilineata israelica			
Sincidae	Ablepharus rueppellii	R	C
	Chalcides ocellatus	R	C
	Chalcides guentheri	R	VC
	Eumeces schneideri pavimentatus	R	C
	Eumeces schneideri schneideri	R	C
	Mabuya vittata	SV	UC
	Ophiomorus latastii	V	VC
	Sphenops sepsoides	R	VC
	Anguidae	Ophisaurus apodus	R
Varanidae	Varanus griseus	R	UC
Testudines			
Cheloniidae	Chelonia mydas	R	UC
	Eretmochelys imbricata	PM	C
Dermochelylidae	Dermochelys coriacea	R	C
Emydidae	Mauremys caspica rivuluta	R	C
Testudinidae	Testudo graeca terrestris	R	C

All the taxonomic categories with their species are listed in Tables 1. The three amphibians belonging to one order and three families were recorded to inhabit wetlands, seasonal rainwater pools, rainwater harvesting schemes, irrigated canals and wastewater ponds of the study area. Reptiles and amphibians of the area were all resident and mostly found throughout the year. Some reptiles may cause harm to local people.

DISCUSSION AND CONCLUSION

Notably, isolated relict ecosystems with faunal and floral elements, which can be confined to this ecozone, are found in the south eastern desert in the borders with Saudi Arabia and also in high elevations and deep valleys of the Rum Mountains. The majority of species of the herpetofauna in the Mediterranean ecozone are of Palearctic origin. Most of species of amphibians and reptiles that inhabit this ecozone are widely distributed

in the eastern Mediterranean region, namely *Rana bedriagae*, *Hyla savignyi*, *Testudo graeca*, *Hemidactylus turcicus*, *Lacerta laevis*, *Typhlops vermicularis*, *Eryx jaculus*, *Malpolon monspessulanus* and several others. However, some of the local reptile species can be considered as Levant endemics, namely *Chalcides guentheri*, *Rhinotyphlops simoni* and *Micrelaps muelleri*. It is clear that the Mediterranean ecozone of the southern Jordan is generally confined to the south western highlands, typical by highest rainfall in the region. The vegetation used to be dominated mostly by pine forests in higher altitudes and oak forests at lower elevation. Grazing of numerous herds of domestic animals leads to forming secondary, heavily disturbed and rather dry steppes. While the Irano-Turanian ecozone, an ecozone defined mainly phytogeographically, forms a strip of mostly steppe habitats surrounding the Mediterranean. It is often considered to be only a transitional zone between drier parts of the Mediterranean and surrounding

ecozones. Afrotropical (or Sudanian) ecozone - often called the Afrotropical penetration, extends from Al Karama region in the north through the Rift Valley to Aqabah and also to the east, including the sea shore. This zone is typical by the presence of various African elements and by extensive penetration of Arabian herpetofaunal elements. *Phrynocephalus arabicus*, *Coluber elegantissimus*, *Atractaspis engaddensis* and some other reptile species are typically confined to this ecozone. Relatively humid regions of SW Jordanian highlands from southern Jordan represent the centre of amphibian diversity in Jordan. Unfortunately, this region is, logically, also widely influenced by urbanisation, agriculture and industry. The distribution of some amphibian species, namely *Pelobates syriacus* and *Triturus vittatus* is limited only to this region and the current occurrence of these species is questionable. *P. syriacus* has not been reported since 1973 and the occurrence of *T. vittatus* needs confirmation as well. So thanks to the above-mentioned overlap of biogeographical realms, the Jordanian territory hosts surprisingly rich reptile fauna compared to that present in neighbouring countries and even at the level of regional middle east level. So far, more than 70 species are known to occur in Southern Jordan. Interestingly, the occurrence several reptilian species was proved very recently [1-32]. Among the most recent additions, the presence of *Phrynocephalus maculatus* in vicinity of Wadi Araba and discovery of new form of *Lacerta* in Wadi Rum should be noted. Thus, it is still probable that list of southern Jordanian reptiles, as given above, is incomplete, awaiting further additions. Regardless completeness or incompleteness of the list of Jordanian species, it is evident, that our knowledge about the distribution and biology of several species is only anecdotal, requiring further intense field research. To give a complete commented checklist of all Jordanian reptiles is behind the frame of present lecture. Thus, I give a overview of typical habitats with their remarkable herpetofaunal elements and notes on the conservation. Regardless the poor definition, this ecozone is typical by prevailing steppe habitats with some typical herpetofaunal elements, e.g. *Trapelus ruderatus* and *Acanthodactylus tristrami*. Saharo-Arabian ecozone also called the Badyiah, covers the major part of the Southern Jordanian inland. Depending on the geology, geomorphology and latitude and altitude, this region is formed by the various types of arid semidesert and desert habitats. Permanent natural water resources are extremely rare, the most important is the water springs. Various

reptile taxa are typical for this ecozone, i.a. *Trapelus pallidus agnetae*, *Acanthodactylus robustus*, *A. grandis*, *Malpolon moilensis*, *Pseudocerastes persicus* and numerous others.

The results reinforce the necessity of long-term inventories in order to understand the dynamics of animal communities in the study area. It is expected that the population over-crowding, the residential and agricultural expansions, the intensive and extensive infrastructural and developmental projects and the poor implementation of environmental laws and legislations are major factors contributing to the gradual decline of biodiversity in the area. The arid to semi-arid environment of southern Jordan hosts reptile populations comprising desert species that are also found in the neighboring countries and particularly the Sinai Peninsula. Many reptilian species recorded in the present study resemble the species recorded in other studies carried out in different Middle East countries. These similarities could be attributed to the fact that these countries lie in the east Mediterranean basin where climatic conditions are nearly the same.

The diversity of agro-environments and wetland habitats in southern Jordan also attracts more insects and other micro-fauna to happen and this, in turn, constitutes a major trophic level in the food chain of lizards. The Desert Monitor *Varanus griseus* is the largest among lizards occurring in the area. Venomous and non-venomous snakes play an ecological role in eliminating pests and harmful animals from the environment. However, this role was not acknowledged and they were usually killed. This may confirm the fact that most identified snake species throughout the study period were either killed or stuffed in educational institutions. People feared the former due to its black color and length which may exceed two meters, while the fear from the latter comes from the public knowledge of its dangerous bites. Solutions to this problem lie in improved education of the local community and in enforcing laws regarding wildlife protection. Ten species of venomous snakes belonging to three families (Viperidae, Elapidae and Atractaspididae) occur in southern Jordan.

The strategic position of the study area at the terrestrial meeting point between Asia, Europe and Africa along with its climate and topography facilitates the interaction and spread of faunistic and floristic species of the three continental masses. The diversity of ecological habitats in general in particular contributed much to species diversity though 70 herpetofaunistic species were recorded. The various ecosystems including wetlands, sand dunes, natural vegetation and agricultural orchards

provide reptiles and amphibians with all needs; shelter, food, breeding and camouflaging sites. However, the overincreasing human impact on the existing natural resources in the southern Jordan has threatened many wildlife species including herpetofaunistic ones. The populations of frogs and many reptilian species are declining in clear pattern. The current deterioration and drainage of wetland habitats will seriously threaten the existence of the species. Human intervention by habitat alteration, drainage of riparian wetlands, water pollution and turtle collection was reported to endanger the existence of certain populations of the amphibian and reptilian species. The author in this regard, recommend improving cooperation of different governmental and non governmental organisations to enhance the public awareness and to implement environmental laws and legislation to conserve nature and to protect wildlife especially the sensitive and rare species of herpetofauna of southern Jordan. Finally, the author recommend carrying out more studies regarding wildlife and biodiversity in Southern Jordan.

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