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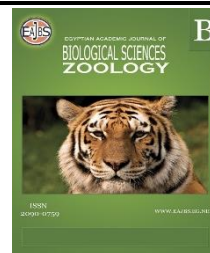


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## Ecological Studies on The Diversity of Amphibian Species in Jazan Region, Kingdom of Saudi Arabia

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### ABSTRACT

This study was carried out in the Jazan region in the Southwestern part of Saudi Arabia. The study area is one of the richest regions of the Kingdom in biodiversity. The work focused on the diversity of amphibian fauna found in the region.

Five species of tailless amphibians (Anura) were recorded in the study area, which includes three families: family Bufonidae; includes three species, the Arabian Toad *Sclerophrys arabica*, Tihama Toad *Sclerophrys tihamica* and Dhofar Toad *Duttaphrynus dhufarensis*; Family Ranidae, represented by one species, the Marsh Frog *Pelophylax ridibundus* and finally Family Dicroglossidae, represented by, the Skipper Frog *Euphlyctis ehrenbergii*. The abundance of amphibians in Jazan depends on the amount of rain and habitat diversity in the region. It was found that the family Bufonidae is the most widespread and abundant in the study area. It was observed that two species of amphibians have not been recorded in the present study, although they were recorded between the seven species of amphibians in the Kingdom of Saudi Arabia. They are: *Bufotes viridis* Family Bufonidae and *Hyla savignyi* Family Hylidae.

This work was suggested to throw light on the diversity of amphibians in the Jazan region as an important part of the ecosystem that must be maintained and to determine the species composition of amphibian communities in different ecosystems as indicators of biodiversity in the study area. It came also to suggest strategies and techniques to determine the abundance of these species.

### INTRODUCTION

Desert covers most areas of the Kingdom of Saudi Arabia. Geographically Saudi Arabia is located between temperate and tropical climatic regions, together with the extreme variations in its climatic conditions, which make it unique in harbouring many species of amphibia. Despite this, very few ecological studies have been undertaken on Saudi Arabian amphibian species.

The conservation status of animals and plants is one of the most widely used indicators for assessing the condition of ecosystems and their biodiversity. It also provides an important tool in priority-setting exercises for species conservation. At the global level, the best source of information on the conservation status of animals and plants is the IUCN

Red List of Threatened Species (IUCN, 2024).

All of Saudi Arabia's native amphibians have been listed given their vulnerability, as they are restricted to freshwater wetlands, seeps and ephemeral pools, and their ecological roles within these communities. Another reason for their inclusion is the unexplained worldwide decline in amphibians that has been observed in recent years. Four of the seven species recorded in Saudi Arabia are endemic, while the other three are Palearctic relicts (Abuzinada *et al.*, 2004).

Amphibians hold a significant place in the kingdom of Saudi Arabia's nature, playing crucial roles in ecological balance and biodiversity. Serving as sensitive indicators of environmental health, these adaptable creatures reflect the overall well-being of ecosystems (Masood and Asiry, 2012).

All Arabian amphibians are listed as Least Concern (LC) in the International Union for Conservation of Nature (IUCN) Red List 2024 (IUCN, 2024), a notable decrease in amphibian species has been observed due to drought, habitat destruction, and pollution. Some studies have described small collections of amphibians from different regions in Saudi Arabia. The most impressive work on Arabian amphibians was done by Balletto, *et al.* (1985). They reported seven species from Saudi Arabia, out of nine species known to occur in Arabia. Of these, four species (*Sclerophrys arabicus*, *Duttaphrynus dhufarensis*, *Sclerophrys tihamicus*, and *Euphlyctus ehrenbergii*) are endemic to Saudi Arabia and three of which occur elsewhere in the Palearctic region; *Bufo viridis*, *Hyla savignyi*, *Pelophylax ridibudus*. However, most of their records were concentrated within the western side of the country. Schätti and Gasperetti (1994) reported four species in the southwest of Saudi Arabia.

In the present time, amphibians of Saudi Arabia have received more attention. Al-Qahtani, (2011) studied amphibian diversity in the southwestern wetlands of Saudi Arabia, recording seven species. Masood and Asiry, (2012) studied amphibian diversity in the Asir region of Saudi Arabia, recording seven species of amphibian. Al-Johany *et al.* (2014) reported on three species of amphibians in the central region of Saudi Arabia, focusing on their distribution and habitats. Dehlawy and Sarhan (2017) studied the herpetology of the southwestern area of the kingdom, revealing five species of amphibians, most of which were from the Makkah region. Farag and Banaja (1980) identified four anuran species and mapped their distribution in the Western region of Saudi Arabia. Al-Mutairi (2004) studied animal diversity in the Ibb Reserve near Hota Bani Tamim where the Dhofar toad (*Duttaphrynus dhufarensis*) was recorded inside the reserve as the first record of the species in Al-Houta area, South of Riyadh. Al-Qarni (2011) studied Amphibians of the Central region of Saudi Arabia. Al-Osaimi (2016) studied the Amphibians of the Eastern region of Saudi Arabia, revealing one species of amphibia (*Pelophylax ridibudus*). Hamdi and Fathy, (2021) reported on three 3 species of amphibians belonging to the family Bufonidae from the Jazan region of Saudi Arabia.

Balletto, *et al.* (1985) attributed the small number of amphibians in Saudi Arabia to the aridity of the country and probably the loss of amphibian habitat. There are different water bodies in the area such as dam reservoirs, agricultural irrigation pools, and natural rain bodies. Since the beginning of humanity, the environment has had a special concern for people especially its ability to provide them with food, water, and other resources. As our numbers have grown and our technology has developed, we have become increasingly concerned about the impact we are having on our environment (Hunter, 1996).

Modern technology has given humans greatly increased power over nature. This power has done nothing to reduce human dependence on biological diversity, which simply means the wealth of life forms found on earth: Millions of different plants, animals, and micro-organisms, the genes they contain and the intricate ecosystems they form. Biodiversity studies have received great interest. Amphibia is one of the most important taxa especially

in hot countries where amphibians are considered as bio-indicators to changes in environment and climate (Lambert, 1984). Since amphibians are among the most vulnerable taxa facing extinction, they have drawn a lot of study attention, according to Wake and Vredenburg (2008) and Catenazzi (2015). In the last three decades, numerous changes happened in the southern region of Saudi Arabia, such as new roads, city expansions and habitat degradation. These changes have affected natural habitats, especially wetlands and other suitable amphibians' habitats (Al-Obaid *et al.*, 2017 Al-Qahtani and Al-Johany, 2018).

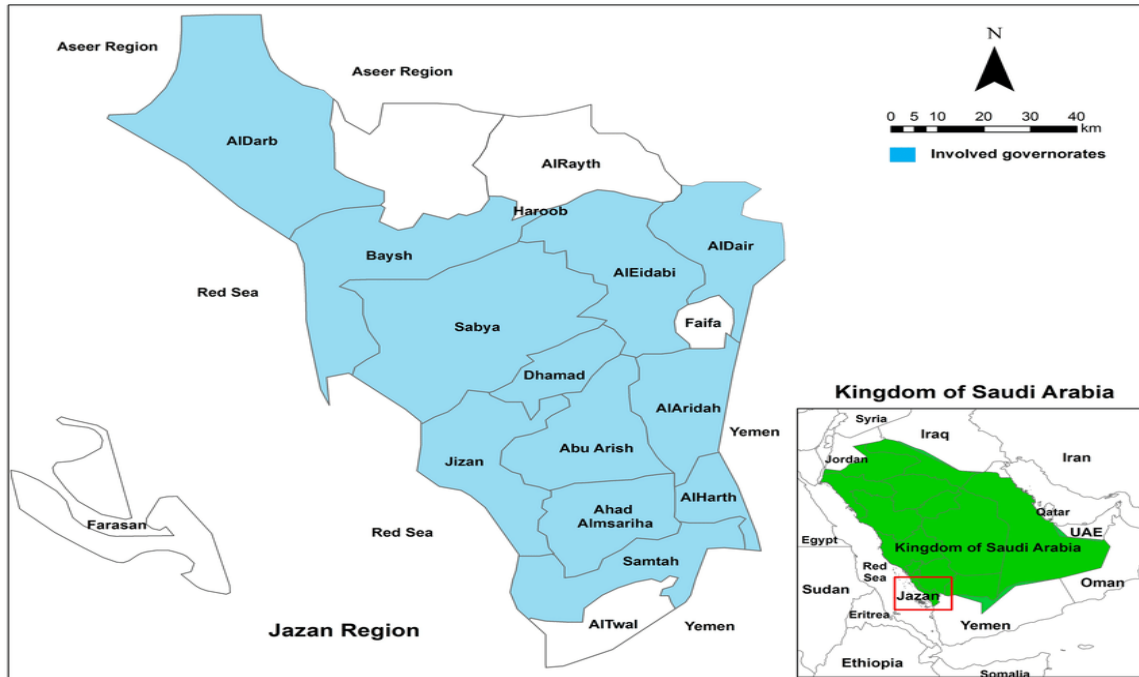
Since amphibians are known to be extremely sensitive to changes in their environments, researchers might use them as models to examine environmental changes or as bioindicators to evaluate the health of ecosystems (Gascon *et al.*, 2007; Khattab, *et al.*, 2021; Saber *et al.*, 2017; Gadel-Rab, *et al.*, 2018; Mahmoud, *et al.*, 2022; Said, *et al.*, 2022; Saber, *et al.*, 2019; Said, *et al.*, 2016 and Noura *et al.*, 2021). Many factors have contributed to the reduction of amphibian species, with habitat change being the main cause of the decline in population. Climate change and UV radiation exposure come in second and third, respectively, to pollution. Additionally, illnesses like chytridiomycosis, which affects the skin in both larval and adult stages, and worm infections are major contributors to the loss of amphibian populations (Collins & Storfer 2003; Gascon *et al.*, 2007; Hopkins 2007 and Gower *et al.*, 2017).

The present work focuses on ecological studies, distribution and status of the diversity of amphibian species of the Jazan region, Saudi Arabia in detail as one of the natural resources of the area.

## MATERIALS AND METHODS

### Study Area:

The region of Jazan located in the South-Western part of Saudi Arabia between longitudes 42° & 43° .80' and latitudes 16° & 17° and is bounded on the South and east by the Republic of Yemen, Asir area in the North and the Red Sea in the West Fig. (1). The region is distinguished with its ideally situated on the southern Red Sea coast with a coastline of almost 300 km, and its towering green mountains in the Eastern region. The region is followed by several islands in the Red Sea, the most important and largest one is the island of Farasan. The estimated area of the Jazan region is about 40000 km<sup>2</sup> and this means that it represents 6 % of the area of the Kingdom of Saudi Arabia. Jazan Province includes about 5,000 villages and cities. Its major city is Jazan city. There are other cities like Sabya, Abu Arish, Farasan, Al-darb, and Samtah (Fig. 1).



**Fig. (1)** Map of Saudi Arabia and enlarged part of Jazan region showing the location of the study area. (The map was originally generated using ArcGIS software version 10.8.1).

### **Climate and Topography of the Study Area:**

The average temperature in January is about 23°C and in August about 33 C°, and the average relative humidity in January is 74%, 66% in August and 68% over the whole year. Rainfall in winter, spring and autumn, the rate of fall is more than 600 mm 3 /y and more in the mountain areas. The rainfall on the coast of Jazan has a rate of more than 300 mm3 /y. As for the mountain regions in Jazan, the temperature degree is moderate in summer and so cold in winter and cool air almost throughout the year in mountainous areas and rainfall all through the year. The topography of Jazan is varied and distinguished. We find mountains, valleys, rocky and sandy deserts, semidesert, and cultivated lands. The distinguished climate and topography of Jazan make it include different habitats that are suitable for approximately all species of amphibia.

### **Sampling Methods:**

Figure (2), the sample Amphibians were collected in their suitable habitat by hand or hand-net. Amphibian distribution was determined by visiting wetland sites from summer through fall and continued during the rainy season in the year 2021–2023. The most favourable time for collection is between March and July when environmental conditions are most suitable for animals to be found. This study covered many possible amphibian habitats (18 sites) from the Jazan region as these sites include wetlands in different places (Table 1). Some ecological data were recorded such as microhabitat, date, time of the day and weather during the site visit. Also, notes were made on the most salient diagnostic features of each species including colour, body measurements, shape, and morphology together with remarks on its behaviour, biology and ecology. Date, locality, and coordinates: Latitude, longitude and altitude have been recorded by the Global Positioning System (GPS) (Table 1). Time of day and other ecological information were recorded. Individuals were identified using standard keys (Leviton *et al.*, 1992; Schleich *et al.*, 1996). Based on the available information, the status of each amphibian species in the area is estimated according to the International Union for Conservation of Nature (IUCN), IUCN (2024).



**Fig. 2:** Some Habitats of the Jazan region and Methods of collection of amphibian species from the study area.

**Table 1.** Co-ordinates: Latitude, longitude and altitude, of the studies area by a GPS.

No	Location	Co-ordinates		
		Altitude (meter)	Latitude	Longitude
Site (1)	Sabya	60 m	17° 09' 18" N	42° 37' 36" E
Site (2)	Abu- Arish	65 m	16° 58' 08" N	42° 49' 57" E
Site (3)	Frasan	10 m	16° 42' 21" N	41° 59' 00" E
Site (4)	Al-Aradha	200 m	17° 1' 0" N	43° 9' 0" E
Site (5)	Ahad Almasarha	55 m	16° 42' 34" N	42° 57' 18" E
Site (6)	Al-Darb	100 m	17° 4' 3' 20" N	42° 15' 15" E
Site (7)	Al-Haredah	60 m	17° 47' 18" N	41° 57' 17" E
Site (8)	Zahban	17 m	16° 47' 19" N	41° 37' 19" E
Site (9)	Al-Khobar	306 m	16° 47' 18" N	43° 13' 18" E
Site (10)	Sad Malaky	180 m	17° 2' 57" N	42° 57' 27" E
Site (11)	Bish	183 m	16° 35' 50" N	42° 56' 38" E
Site (12)	Wadi Jory	472 m	17° 39' 58" N	42° 39' 31" E
Site (13)	Wadi Lajjab (Al- Reth)	390 m	18° 32' 44" N	42° 61' 11" E
Site (14)	Al -Hakwo	190 m	16° 37' 7" N	43° 7' 52" E
Site (15)	Wadi kholb	90 m	16° 37' 36" N	42° 43' 35" E
Site (16)	Samtah	50 m	16° 35' 50" N	42° 56' 38" E
Site (17)	Al rad	220 m	17° 28' 12" N	42° 58' 35" E
Site (18)	Al Mawsim	50 m	16° 37' 7" N	43° 7' 52" E

## RESULTS

### Species Composition:

**Class: Amphibia**

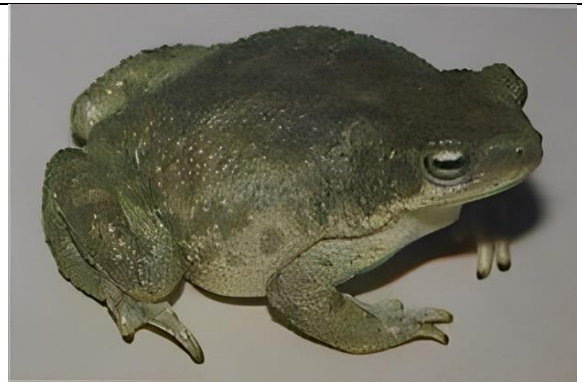
**Order: Anura**

Five species of tailless amphibians (Anura) were recorded in the study area, which includes three families: family Bufonidae; includes three species, the Arabian Toad *Sclerophrys arabica*, Tihama Toad *Sclerophrys tihamica* and *Duttaphrynus dhufarensis* Dhofar Toad; Family Ranidae, represented by one species, *Pelophylax ridibundus* the Marsh Frog and finally Family Dicroglossidae, represented by one species, *Euphlyctis ehrenbergii* the Skipper Frog. The abundance of amphibians in Jazan depends on the amount of rain and habitat diversity in the region (Table 2).

**Table (2):** Species Composition and Status of Amphibian Fauna of Jazan.

Order	Family	Species	Status	Locality (Sites)
Anura	Bufonidae	<i>Sclerophrys arabica</i>	LC*	Found in all sites
		<i>Sclerophrys tihamica</i>	LC	1,3,4,6,7,8,10,17
		<i>Duttaphrynus dhufarensis</i>	LC	1,2,3,4,5,9,10,11,13,18
	Ranidae	<i>Pelophylax ridibundus</i>	LC	2,4,9,11,13
	Dicroglossidae	<i>Euphlyctis ehrenbergii</i>	LC	2,3,4,9,10,12,13,14,15,16,17
1	3	5		

\*A least-concern (LC), species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) IUCN, (2024)

**Family (1): Bufonidae***Sclerophrys arabica* (Heyden, 182) Fig(3)**Common Name:** The Arabian Toad.**Distribution:** Europe, North Africa, eastward to Mongolia and Tibet.**Distribution in Saudia Arabia:** Makka to Asir, Tabuk, Almajma, Ain Alfalj,(Balletto et al.1985); In the highlands of western Arabia, oasis of Alflaj (Shatti & Gasperetti 1994); Asir (Masood and Asiry 2012); Jazan, Najran, Abha, Asir, Turbah, Taif, Makkah (Alqahtani & Al Johany 2018); Ha'al (Alshammari & Ibrahim 2018); Al-Hayr, Alfalj, Unayzah, ArRass, AlMajma, Riyadh (Al Johany et al. 2014); Tabuk (Aloufi and Amr 2015); Madina Munnawara (Aloufi et al. 2021); Jazan (Hamdi and Fathy 2021);**Habitat and Ecology:** An opportunistic, mesophilous species, is found in almost all environments of the peninsula where water is available (Balletto, et al., 1985). It lives in wadis, gravel areas, gardens and date groves, and is active both by day and night. The breeding season of this species follows the rain. Two breeding seasons have been recorded in Yemen and Saudi Arabia, one in September-October and the other in June-July (Balletto, et al., 1985).**Status and Conservation Needs:** Widespread. Classified as Least Concern by IUCN (2024).**Fig. 3: *Sclerophrys arabica* (Heyden, 1827)****Fig. 4: *Duttaphrynus dhufarensis* (Parker, 1931)***Duttaphrynus dhufarensis* (Parker, 1931) Fig. (4)**Common Name:** Dhofar toad.**Arabic Name:** Dhofar toad.**Range:** *Duttaphrynus dhufarensis* is limited to peripheral Arabia, ranging from western Saudi Arabia (Mecca) south to Yemen and thence east to northern Oman.**Distribution in Saudia Arabia:** Makkah to Jazan, Farasan, Alhair and Riyadh (Arnold 1980; Balletto et al. 1985; Shatti & Gasperetti 1994); Jazan, Abha, North Asir, Makka (Alqahtani & Al Johany 2018); Asir (Masood and Asiry 2012); Hail (Alshammari & Ibrahim 2018); Thadiq, Alfalj, Ain Al-Oyainah (Al Johany et al. 2014); Ibex Reserve (Almutairi, 2004).**Habitat and Ecology:** Its natural habitats are subtropical or tropical dry shrubland, rivers, intermittent rivers, freshwater springs, rural gardens, urban areas, ponds, and irrigated land. Nocturnal except during the mating period.**Status and Conservation Needs:** Common and widespread. Classified as Least Concern by IUCN (2024).



*Sclerophrys tihamica* (Balletto and Cherchi, 1973) Fig. (5)**Common Name:** Balletto's Toad.**Arabic Name:** Tohama toad.**Distribution:** Saudi Arabia, Yemen.**Distribution in Saudia Arabia:** Coastal southwest (Arnold 1980); Along Tihama strip from Jazan to near Al Lith (Balletto et al. 1985, Alqahtani & Al Johany 2018); Asir (Masood and Asiry 2012); Jazan to Al Lith (Shatti & Gasperetti 1994); Jazan (Al-Shehri and Al-Saleh 2013, Hamdi and Fathy 2021).**Habitat and Ecology:** It can be found in arid vegetation (except in riparian vegetation close to wadis) and wherever there are available water sources. It breeds in still or slow-moving water. It is common in arable land close to wadis.**Status and Conservation Needs:** Common and widespread. Classified as Least Concern by IUCN (2024).**Fig. 5:** *Sclerophrys tihamica* (Balletto and Cherchi, 1973)**Fig. 6:** *Pelophylax ridibundus* (Pallas, 1771)**Family (2): Ranidae***Pelophylax ridibundus* (Pallas, 1771). Fig. (6)**Common Name:** Lake Frog.**Distribution:** North Africa, central and southern Europe into west Asia.**Distribution in Saudia Arabia:** Asir, northeast including Hufuf (Arnold 1980); AL- Qatif, Al-Hassa, Asir (Balletto et al.1985); Asir and eastern area (Briggs 1985); Asir (Masood and Asiry 2012); Asir, Abha, north Al Baha (Al Qahtani & Al Johany 2018); Ha'al (Alshammari & Ibrahim 2018); Riyadh, Unaza, Almajma, Al-Kharj, Al-Hayr (Al Johany et al. 2014), Eastern Region, (Al-Osaimi, 2016).**Habitat:** Freshwater ponds and canals. It was found in brackish marshes with dense emergent vegetation.**Ecology:** Crepuscular. It feeds on insects and small invertebrates.**Status:** Lower Risk (least concern It is classified as Least Concern by IUCN (2024).**Family (3): Dicroglossidae:**

The common name of the family is (fork-tongued frogs).

The Dicroglossidae were previously considered to be a subfamily in the family Ranidae, but their position as a family is now well-established.

*Euphlyctis ehrenbergii* (Peters, 1862) Fig. (7)**Common Name:** dufda'at al-Rasheek.**Distribution:** This species is restricted to areas of permanent and temporary water in the

Red Sea coastal regions of Yemen and Saudi Arabia. It has an altitudinal range of sea level to 2,400 m.

**Distribution in Saudia Arabia:** Southwest (Arnold 1980, Balletto et al.1985); Al-Hijaz, Asir (Shatti & Gasperetti 1994); Asir (Masood and Asiry 2012); Jazan, Najran, Al-Baha, Abha, Turbah, Taif (Al Qahtani & Al Johany 2018); Madina Munnawara (Aloufi *et al.*,2021); Tabuk (Aloufi and Amr 2015)

**Habitat:** It is a highly aquatic species, found in temporary and permanent water bodies. It is also present in irrigated areas. Eggs are laid in the water. The species may aestivate during the dry season.

**Ecology:** Crepuscular. It feeds on insects and small invertebrates.

**Status:** Lower Risk, it is classified as Least Concern by IUCN (2024).

**Biology:** Several authors reported the insectivorous diet of this species (Corkill, 1932; Schleich *et al.*, 1996). *Platyceps rhodorhachis* was found to feed on this blind snake (Mulder, 2002).

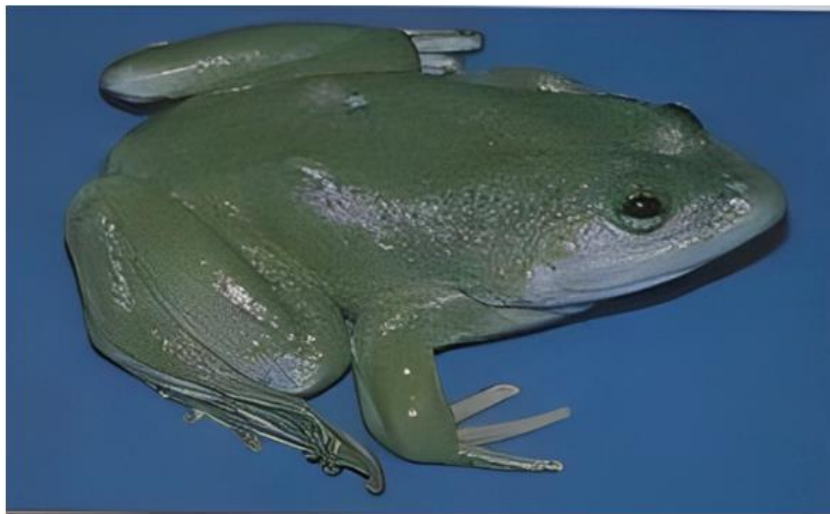


Fig. (7): *Euphlyctis ehrenbergii* (Peters, 1862) from (Leviton, et al.,1992)

## DISCUSSION

There are some studies about the diversity of amphibians in the Jazan region, Saudi Arabia, but these studies are not enough to provide certain information about the life of these species., such as geographical distribution and dispersions. In this study, the main part of the work depended on field study and continued visits to the study area.

There are seven species of amphibians that live in Saudi Arabia, four of them are endemic to Saudi Arabia (*Duttaphrynus arabicus*, *D. dhufarensis*, *Sclerophrys tihamicus*, *Euphlyctus ehrenbergii*) and three of which occur elsewhere in the Palaearctic region; *Bufo viridis*, *Hyla savignyi*, *Pelophylax ridibudus* (Abuzinada *et al.*, 2004 studies conducted on the amphibians of Saudi Arabia such as (Balletto et al. 1985; Schatti and Gasperetti 1994; Al-Qahtani 2011; Masood and Asiry 2012 and Al-Qahtani and Al-Johany 2018).

The present study recorded Five species of tailless amphibians (Anura), which include three families: Family Bufonidae; includes three species, Tihama Toad *Sclerophrys tihamica*; Arabian Toad *Sclerophrys arabica*, and Dhofar Toad *Duttaphrynus dhufarensis*, Family Ranidae, represented by one species, *Pelophylax ridibundus* and finally Family Dicroglossidae, represented by species, *Euphlyctis ehrenbergii* the Skipper Frog. The abundance of amphibians in Jazan depends on the amount of rain and habitat diversity in the region.

It was found that the family Bufonidae is the most widespread and abundant in the study area, as it is represented by three species of amphibians, which are the Arabian Toad *Sclerophrys arabica*, the Dhofar Toad *Duttaphrynus dhufarensis*, and the Tihama Toad *Sclerophrys tihamica*. After that is the family Ranidae, represented by one species, which is the Pond Frog *Pelophylax ridibundus*, and finally family Dicroglossidae (forked-tongued Frog), represented by one species, which is the Skipper Frog *Euphlyctis ehrenbergii*. The same results confirm with (Balletto et al. 1985; Al-Qahtani, 2011; Masood and Asiry 2012; Al-Qahtani and Al-Johany, 2018 and Hamdi& Fathy,2021).

It was observed that two species of amphibians have not been recorded in the present study, although they were recorded between the seven species of amphibians in the Kingdom of Saudi Arabia. They are: *Bufotes viridis* Family Bufonidae and *Hyla savignyi*. Family Hylidae.

Hamdi& Fathy (2021) in their study of the Jazan region, three species of Amphibia belonging to the family Bufonidae were recorded; include (*Duttaphrynus dhufarensis*, *Sclerophrys arabica* and *Sclerophrys tihamica*). The Pervious study (Hamdi& Fathy, 2021) revealed that *Sclerophrys tihamica* is an abundant species while the other two species are rare in the study area, but the current study confirmed that *Sclerophrys arabica* is more abundant than *Sclerophrys tihamica*.

The distribution of species is affected by the fluctuations in climate and weather (Wilson and Willis, 1975; Ford, 1982) and this is due to a complex interaction of factors including the movement of areas of low and high pressure in the atmosphere which influences cloud cover, rainfall and temperature. A long-lived organism may experience a considerable variation in temperature, drought length and wind speed during its life cycle disrupted by "freak" weather conditions (Hussein and Darwish, 2001).

The Arabian toad (*Sclerophrys arabica*) is a species that is widely distributed throughout the study area and Saudi Arabia. This study focuses on this species, and the results show that it is both (Al-Johany *et al.*, 2014; Aloufi and Amr, 2015; Al-Qahtani and Al-Johany, 2018; Alshammari and Ibrahim, 2018; Aloufi *et al.*, 2021). For instance, the Arabian toad, *Sclerophrys arabica*, was the most common of the seven amphibian species found in Al-Qahtani and Al-Johany's (2018) research region. As to the findings of Alshammari and Ibrahim (2018), the Arabian toad was found to be more widely distributed in Hail Province than the Dhofar toad (*Duttaphrynus dhufarensis*). In contrast to the Arabian toad *Sclerophrys arabica*, the Dhofar toad *Duttaphrynus dhufarensis* was more widely distributed in the central region in the Saudi Arabia, according to (Al-Johany *et al.*, 2014).

The amphibian species that was recorded at the greatest number of sites visited in the current study was the Arabian toad (*Sclerophrys arabica*). This outcome adds important information to the Saudi Arabian amphibian distribution map. It also shows how adaptable the Arabian Toad (*Sclerophrys arabica*) is to a wide range of environmental factors. According to Alshammari and Ibrahim (2018), the Arabian Toad (*Sclerophrys arabica*) seems to be well suited to living in both desert and semi-arid environments. In Saudi Arabia, it has been observed in a variety of environments, including farms, spring streams, seasonal ponds, and dam reservoirs. This study only found it in spring streams; dams, rainy ponds, and treated wastewater ponds did not record it. In Tabuk Province, Al-Jawdah (2019) also discovered Arabian toads in spring streams, but not in dams, rainfall ponds, or treated wastewater ponds. Additionally, farms in the Tabuk Province had been reported to have the species (Aloufi and Amr, 2015; Al-Jawdah, 2019). Al-Qahtani and Al-Johany (2018) report that the Arabian toad has been found in a variety of habitats in the Southwestern region, including farms, dams, seasonal ponds, and valley streams. Al-Johany *et al.*, (2014) report that the species was found on farms in the central region. Alshammari and Ibrahim (2018) observed the Arabian toad in farms, seasonal ponds, and dam reservoirs but did not find it in permanent streams in Hail Province, northern Saudi Arabia. According to (Soorae *et al.*,

2013 and Al-Johany *et al.*, 2014), the Arabian toad appears to have benefited overall from the growth of artificial wetlands, which may convert unsuitable habitats into appropriate habitats

Red Sea shorelines and highland areas are home to the common Arabian Toad (Schätti and Gasperetti, 1994). According to studies (Farag and Banaja, 1980; Balletto *et al.*, 1985; Schätti and Gasperetti, 1994; Al-Johany *et al.*, 2014; Al-Qahtani and Al-Johany, 2018; Alshammari and Ibrahim, 2018; Aloufi *et al.*, 2021)., the Arabian Toad exhibits a high degree of adaptability to life in habitats with a variety of conditions and characteristics.

**Finally:**

Field studies, especially in environments with limited natural resources, like deserts, can provide significant and essential knowledge about wildlife in many habitats. This study presents important information about the existence and distribution of amphibians in the Jazan region of Saudi Arabia. Further investigation and information are necessary to reduce threats that could affect the observed amphibians and their habitats. There are not enough studies about the ecosystems of Saudi Arabia, and it is not sufficiently surveyed; therefore, it needs great efforts to complete this deficiency and create adequate data on local wildlife. Amphibians have an important role in any ecosystem, they represent a vital indicator of environmental health, reflect changes in ecosystems, contribute to pest control and maintain biodiversity in Saudi Arabia.

Amphibian populations in Saudi Arabia are endangered by many threats like pollution, invasive species, and habitat loss. Recognition of the amphibian's significance is essential for putting effective conservation strategies for the ecosystem of Saudi Arabia. Amphibians play a vital role in ecosystems in that they act as both predator and prey, they serve as food webs and as bioindicators reflecting the environmental changes. Despite this amphibian still face threats such as habitat loss and pollution, emphasizing the need for conservation plans to ensure the well-being of these wonderful creatures.

Amphibians in Saudi Arabia play crucial roles in biodiversity and ecological balance, they are considered sensitive indicators of environmental health and reflect the well-being of the overall ecosystem.

**Declarations:**

**Ethical Approval:** The Jazan University approved all animal treatments, which followed the Canadian Committee for Care's guidelines.

**Competing interests:** The authors declare there were no competing interests.

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## ARABIC SUMMARY

## دراسات بيئية على التنوع الحيوي لفونة البرمائيات في منطقة جازان "المملكة العربية السعودية"

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أجريت هذه الدراسة في منطقة جازان في الجزء الجنوبي الغربي من المملكة العربية السعودية، ويحدها من الجنوب والشرق الجمهورية اليمنية ومنطقة عسير شمالاً والبحر الأحمر غرباً. تم وصف العوامل المناخية والمكونات الحية في تلك البيئة. تعتبر منطقة الدراسة واحدة من أغنى مناطق المملكة العربية السعودية بالتنوع الحيواني، حيث أن المنطقة تتميز بوجود مجموعة كبيرة من الحيوانات البرية التي تنتمي إلى عائلات حيوانية مختلفة. وفي هذا العمل تمت دراسة التنوع الحيوي لفونة البرمائيات في المنطقة.

**النتائج:** تم حصر وتسجيل خمسة أنواع من رتبة البرمائيات غير الذيلية (Anura)، تنتمي إليها ثلاث فصائل وهي فصيلة العلاجيم Bufonidae وسجل منها (3) أنواع وهي علجوم تهامة *Sclerophrys tihamica* وعلجوم ظفار *Duttaphrynus dhufarensis* والعلجوم العربي *Sclerophrys arabica*. وفصيلة الضفادع الحقيقية Ranidae ويمثلها نوع واحد هو ضفدع المستنقعات *Pelophylax ridibundus* وفصيلة الضفادع متشعبة اللسان Dicroglossidae ويمثلها نوع واحد هو الضفدع الرشيق *Euphlyctis ehrenbergii*. لم يتم تسجيل أو مشاهدة العلجوم الأخضر *Bufo viridis* وهو من فصيلة العلاجيم Bufonidae. كذلك الضفدع الشجرى *Hyla savignyi* وهو من فصيلة الضفادع الشجرية Hylidae في مناطق الدراسة.

وجد أن عائلة العلاجيم Bufonidae هي الأكثر انتشاراً ووفرة في منطقة الدراسة حيث تمثلت بثلاث أنواع من البرمائيات وهي العلجوم العربي وعلجوم ظفار وعلجوم تهامة. بعدها مباشرة عائلة الضفادع الحقيقية Ranidae وتمثلت بنوع واحد وهو ضفدع المستنقعات وأخيراً عائلة الضفادع متشعبة اللسان Dicroglossidae حيث تمثلت بنوع واحد من البرمائيات وهو الضفدع الرشيق. تساهم كمية الأمطار الموسمية التي تهطل على منطقة جازان، وتنوع الموائل بها، في وفرة البرمائيات نسبياً في المنطقة.

هذا العمل تم اقتراحه لإلقاء الضوء على التنوع الحيوي لفونة البرمائيات في منطقة جازان كجزء هام من النظام البيئي يجب المحافظة عليه. وحيث أنه لا توجد دراسات كافية على الأنواع الحيوانية الموجودة في المنطقة، جاءت هذه الدراسة للتعرف على التنوع الأحيائي، ولتحديد التركيب النوعي لمجتمعات البرمائيات في الأنظمة البيئية المختلفة كمؤشرات للتنوع الحيوي في منطقة الدراسة وكذلك جاءت لاقتراح بعض الخطط والأساليب لتحديد مدى وفرة هذه الأنواع وطرق الحافظ عليها.

الكلمات المفتاحية: التنوع الحيوي ، البيئة ، التوزيع الجغرافي ، المهددات ، طرق الحفاظ ، البرمائيات ، اللاذئليات ، العلاجيم ، الضفادع الحقيقية ، الضفادع متشعبة اللسان ، جازان ، المملكة العربية السعودية