

Chapter 28

Amphibians in Libya: a status report

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Libya is mostly desert, has few water sources and only four amphibian species (all anurans) have been historically reported to occur there, although ancient reports of *Hoplobatrachus occipitalis* have not been confirmed in recent surveys. *Amietophrynus xeros* is confined to the Ghat area in the southwest, *Pelophylax saharicus* is restricted to the north and *Bufoetes boulengeri* is found in various localities within the country. Although no quantitative data have been reported for amphibian population declines, some factors (habitat degradation, drought, and high temperatures contributing to disappearance of some bodies of water) seem to be behind the local decline of amphibian populations in Libya.

Key words: amphibians; conservation; Libya; population decline.

Anfibios en Libia: informe sobre su situación. Libia es mayoritariamente desierto, presenta pocas fuentes de agua y solo cuatro especies de anfibios (todas ellas anuros) se han citado históricamente, aunque las citas antiguas de *Hoplobatrachus occipitalis* no han podido confirmarse en muestreos recientes. *Amietophrynus xeros* está confinado al área de Ghat en el suroeste, *Pelophylax saharicus* se restringe al norte y *Bufoetes boulengeri* aparece en varias localidades dentro del país. Aunque no existen datos cuantitativos de declives de poblaciones de anfibios, algunos factores (degradación de hábitat, sequía, y las elevadas temperaturas que contribuyen a la desaparición de algunas masas de agua) parecen estar detrás de los declives locales de poblaciones de anfibios en Libia.

Key words: anfibios; conservación; declive de poblaciones; Libia.

While most (~95 %) of the human population of Libya resides in the Mediterranean coastal region in the north, widely-scattered oases in the desert area to the south are also inhabited. Because of its vast desert and paucity of water sources Libya has only four documented amphibian species. Libyan amphibians, especially those inhabiting the south, are part of the worldwide declining amphibian phenomenon with one or more species threatened because of drastic changes in habitat (IBRAHIM, 2008). Population declines and / or extinctions throughout the country are difficult to prove, however, because of the effects of

annual variation in climate, normal fluctuation of populations, and lack of historical data.

FROST (2013) listed five species from Libya, but only three could be confirmed recently: (1) *Amietophrynus xeros*, which is very localized and found only near Ghat in the southwestern extreme; (2) *Pelophylax saharicus*, which appears to be confined to the north; and (3) *Bufoetes boulengeri*, which is scattered throughout. Since the work of SCORTECCI (1937), these three species are the only ones reported in field-based studies (SCHNURRENBERGER, 1963; SCHLEICH, 1987; FRYNTA *et al.*, 2000; IBRAHIM & INEICH, 2005; IBRAHIM, 2008).

Few articles have been published on the conservation status of Libyan amphibians. The main objectives of this study are to report on the current status of Libyan amphibians and to define the main causes for decline or extinction, in order to propose conservation measures.

THE AMPHIBIAN FAUNA

Libyans do not discriminate among species and local Arabic names “Dhofda'a” and “*Grana*” (most likely derived from the Italian word “rana”) apply to all anuran taxa; taxonomy follows FROST (2013).

Hoplobatrachus occipitalis (Günther, 1858)

This species was introduced to the Ghat area to control mosquitoes (SCHLEICH *et al.*, 1996). SCORTECCI (1937) reported high abundance of this species in the Ghat area which, in addition to numerous wells, puddles, and small marshes, once formed a continuous oasis with about 20 springs within the city itself. Presently, Ghat is no longer an oasis; with the exception of one spring still at Al-Berkah, most bodies of water have dried up. During a visit to this area in 2006 no remnant water source was observed; the whole area had completely changed because of urban expansion. Intensive search in the Ghat area, particularly at Tunin where about 15 springs and several wells previously existed, produced no evidence of *H. occipitalis*. SALVADOR (1996) and RÖDEL (2000) cited Libya as one of the countries where *H. occipitalis* was present but these reports seem to have been based on ancient literature. Therefore, the records of *H. occipitalis* are questionable and the presence of this species in Libya has not been confirmed

recently. Extirpation of this frog from Ghat may be directly related to the disappearance of water and / or with this species' general inability to cope with habitat variation due, in part, to its relatively large size.

Pelophylax saharicus (Boulenger, 1913)

The Saharan frog has been reported in the northeast, from Barqa, Benghazi, Al-Marj, Shahhat and Al-Jabal Al-Akhdar (WERNER, 1909; GHIGI, 1920; ZAVATTARI, 1922, 1937; CALABRESI, 1923; SCHLEICH, 1987; FRYNTA *et al.*, 2000), and from Tripoli (Ain Sarah) by WERNER (1909). IBRAHIM & INEICH (2005) reported it as common in freshwater springs and rain pools in Badr village (Nalut Province). Individuals were also collected from Ain Al-Khenjari (8 km southeast of Badr) where they were active during part of the year, including sunny winter days. SCORTECCI (1934) cited a juvenile in Ghat, but was unable to find additional specimens despite extensive search. DUBOIS & OHLER (1995) reported the ten specimens deposited in the Museo Civico di Storia Naturale, Milan, as lost. *Pelophylax saharicus* has not been reported from Al-Berkah since Scortecci's initial paper, and was not found there during the present study. JDEIDI (2008) noted a significantly different mating call in specimens from the northeast, suggesting the possibility of cryptic diversity within Libyan *P. saharicus*.

Amietophrynus xeros (Tandy, Tandy, Keith & Duff-Mackay, 1976)

The Savannah toad is highly localized in Libya. IBRAHIM (2008) reported its occurrence in pools of local farms at Tunin and

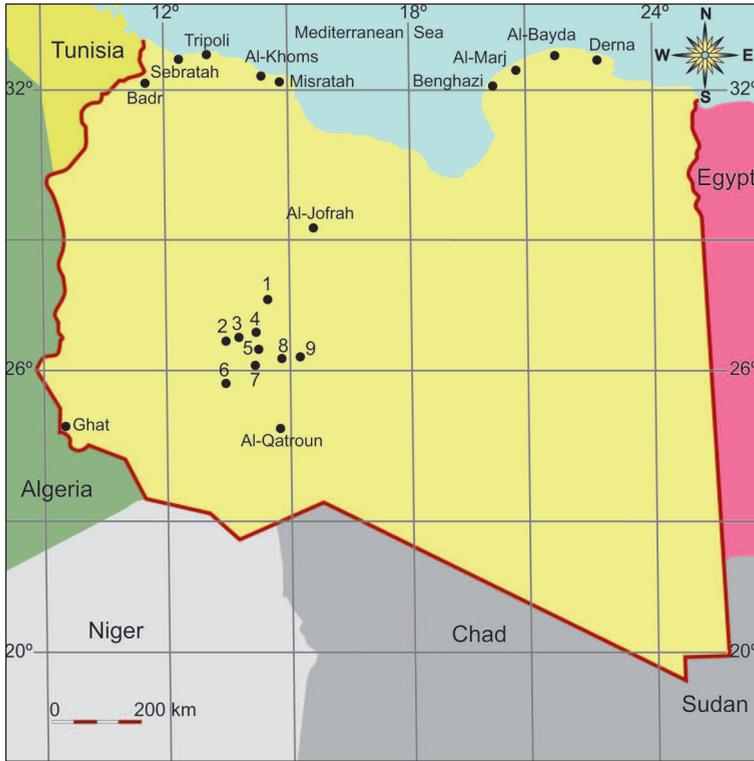


Figure 1: Map of Libya. 1: Brack, 2: Al-Fejj, 3: Qabroon, 4: Sabha, 5: Ghodwah, 6: Morzoq, 7: Taraghen, 8: Om Al-Araneb, 9: Zowailah.

around the water station at Al-Berkah and suggested the Ghat area (Fig. 1) to be the only well-documented locality for the species in Libya. An intensive male chorus was heard in July 2006, and toads were occasionally found in swampy areas with dense vegetation at farms where it was difficult to catch an individual or to trace a toad by its call. Toads were commonly seen in highest densities just after sunset; diurnally, they concealed themselves under the vegetation stratum (up to 30 cm thick) at the bottom of the pool. In addition to intensive nocturnal activity, toads and tadpoles were observed swimming near the surface during the day, some of them close to the edges of the pool.

Bufoles boulengeri (Lataste, 1879)

The Green toad is widespread, especially in the eastern part of the country and along the Mediterranean coastal belt where there is plenty of rainfall and the area is mostly green. This species has been reported from Derna (WERNER, 1909), Al-Marj (ZAVATTARI, 1922), Al-Jabal Al-Akhdar at Al-Bayda (SCHLEICH, 1987) in the northeast and in Benghazi Province (GHIGI, 1920; FRYNTA *et al.*, 2000). Along the coast between Benghazi and Tripoli it has been recorded at Al-Khoms (ANDREUCCI, 1913) and Misratah (BOULENGER, 1914). In the extreme west it has been reported from Tripoli (WERNER, 1909; SCORTECCI, 1935), Sebratah (FRYNTA

et al., 2000), and Badr village (IBRAHIM & INEICH, 2005). In the south, it has been reported from Al-Jofrah (Fig. 1) (ZAVATTARI, 1937), Ain Ed-Dalaam, 5 km west of Sabha (Fig. 1, site 4), Brack oasis (Fig. 1, site 1) (SCHNURRENBERGER, 1963), Al-Fejj (Fig. 1, site 2) and Qabroon (Fig. 1, site 3) (FRYNTA *et al.*, 2000). SCORTECCI (1934, 1935) reported *B. boulengeri* in Taraghen (Fig. 1, site 7), Morzoq (Fig. 1, site 6), Ghodwah (Fig. 1, site 5) and Al-Qatroun. IBRAHIM (2008) found a few individuals on the Taraghen agricultural project grounds and in the university dormitory in Taraghen. Rehabilitation of the previously devastated agricultural project at Taraghen helped some individuals to survive. This toad was also common on green farms consisting of thousands of acres of cultivated vegetables, fruits, and fodder in Om Al-Araneb (Fig. 1, site 8).

THREATS, DECLINE AND CONSERVATION

There are no quantitative data indicating the existence of decline or change in population dynamics of amphibians from Libya. It is clear, however, that degradation of habitat, especially in the south, has affected amphibians in this country. Amphibians in the north are probably not as deeply threatened as in the south because gradual urban expansion is occurring mostly in the extensive green coastal sector, which has a permanent water supply. All previous herpetofaunal studies focusing on the north have reported *B. boulengeri* and *P. saharicus*, the two species currently existing there (e.g. WERNER, 1909; GHIGI, 1913; ZAVATTARI, 1922; CALABRESI, 1923; SCHNURRENBERGER, 1963; SCHLEICH,

1987; FRYNTA *et al.*, 2000; IBRAHIM & INEICH, 2005; IBRAHIM, 2008). In the south the situation is different; amphibians are greatly threatened and already extirpated in some places. The main threat is destruction of wetland breeding sites thought to be caused by long-term climatic and environmental changes and / or a considerable lowering of the water table because of local extraction for agriculture, industry, and urban expansion.

Southern Libya is extremely dry; annual precipitation averages less than 20 mm and inter-annual variability is high (PALLAS, 1980); some areas receive no rainfall for several years at a time and, of course, without rain there is no opportunity for replenishing bodies of water. One of the causes for the disappearance of water in the south, especially in the Ghat area, is scarcity of rainfall. The south is also hot, especially during June, July, and August. In Sabha, for example, air temperature may exceed 50°C in summer. In addition, insolation is extreme and potential evaporation reaches, or exceeds, 4.5 m / year (HUGHES & HUGHES, 1992). Such climatic conditions likely contributed to the disappearance of some bodies of water.

The only amphibian species inhabiting the Ghat area (*A. xeros*) is threatened because it is confined to areas of very limited water sources in Tunin and Al-Berkah. In a similar manner, *B. boulengeri* populations in the Taraghen village that was once an oasis (SCORTECCI, 1934) are now threatened because they have become few in number and occur in places with a notable shortage of water.

Local human activities have also contributed to the reduction of the water table. Currently one must dig a well at least 400 m

deep to extract underground water in Ghat, while in Sabha the necessary depth ranges from 70 to 150 m, and occasionally from 1.5 to 2 km to get clear water (Al-Khair Saleh & Abid Ahmad, personal communication).

In some areas of southern Libya, amphibian habitats may be affected by loss of underground water as a result of the construction of the Great Man Made River, a river 1600 km long that conveys about 6.5 million cubic meters of water per day from southern aquifers to Libyans in the coastal belt. This tremendous use of underground water can result in considerable degradation of land within oases and causes severe damage to the cover of vegetation (WHITE *et al.*, 2003).

Expansion of green fields in Om Al-Araneb and Zowailah (Fig. 1, site 9) has remarkably increased during the past decade. *Bufoetes boulengeri* could hardly find tiny pools for breeding sites in these agricultural projects watered by drip irrigation. The area of cultivated land, however, is still extremely limited compared to the vast area of surrounding desert. The small number of toads reported from agricultural projects in Morzoq and Ghodwah will be threatened if underground water decreases to the point that its extraction becomes too expensive and the necessity for alternative sources arises.

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REFERENCES

- ANDREUCCI, A. (1913). Contributo alla fauna della Tripolitania. *Bollettino della Società Entomologica Italiana* 45: 185-202.
- BOULENGER, G.A. (1914). Contributo allo studio della fauna libica. Materiali raccolti nelle zone di Misurata e Homs, 1912-13, dal dott. Alfredo Andreini, capitano medico. Rettili e Batraci. *Annali del Museo Civico di Storia Naturale "G. Doria e R. Gestro", Genova* 6: 79-80.
- CALABRESI, E. (1923). Missione zoologica del Dr. E. Festa in Cirenaica. *Bollettino dei Musei di Zoologia e Anatomia Comparata della R. Università di Torino* 38: 1-28.
- DUBOIS, A. & OHLER, A. (1995). Frogs of the subgenus *Pelophylax* (Amphibia, Anura, genus *Rana*): a catalogue of available and valid scientific names, with comments on name-bearing types, complete synonymies, proposed common names, and maps showing all type localities. *Zoologica Poloniae* 39: 139-204.
- FROST, D.R. (2013). *Amphibian Species of the World: an Online Reference, v. 5.6*. American Museum of Natural History, New York, USA. Available at <http://research.amnh.org/herpetology/amphibia>. Retrieved on 11/07/2013.
- FRYNTA, D.; KRATOCHVÍL, L.; MORAVEC, J.; BENDA, P.; DANDOVÁ, R.; KAFTAN, M.; KLOSOVÁ, K.; MIKULOVÁ, P.; NOVÁ, P. & SCHWARZOVÁ, L. (2000). Amphibians and reptiles recently recorded in Libya. *Acta Societatis Zoologicae Bohemiae* 64: 17-26.
- GHIGI, A. (1913). Materiali per lo studio della fauna libica. *Memorie della Reale Accademia delle Scienze dell'Istituto di Bologna, Classe di Scienze Fisiche, Sezione delle Scienze Naturali* 6: 251-296.

- GHIGI, A. (1920). Vertebrati di Cirenaica raccolti dal Prof. Alessandro Ghigi nella escursione organizzata dal Touring Club Italiano, 15–24 Aprile 1920. *Memorie della Reale Accademia delle Scienze dell'Istituto di Bologna, Classe di Scienze Fisiche, Sezione delle Scienze Naturali* 7: 195-212.
- HUGHES, R.H. & HUGHES, J.S. (1992). *A Directory of African Wetlands*. IUCN, UNEP, and WCMC, Gland, Switzerland, Nairobi, Kenya, and Cambridge, United Kingdom.
- IBRAHIM, A. (2008). Contribution to the herpetology of southern Libya. *Acta Herpetologica* 3: 35-49.
- IBRAHIM, A. & INEICH, I. (2005). Additional records to the herpetofauna of Nalut Province, Libya. *African Herp News* 38: 2-9.
- JDEIDI, T.B. (2008). Structure and variation of *Rana saharicus* mating calls in Libya, *In The Sixth World Congress of Herpetology*. Manaus, Brasil. Available at <http://www.intronet.com.br/clientes/rep/index2.php?var=viewAbstract&id=65>. Retrieved on 12/09/2013.
- PALLAS, P. (1980). Water resources in the Socialist People's Libyan Arab Jamahiriya, *In* M.J. Salem & M.T. Busrewil (eds.) *The Geology of Libya. Second Symposium on the Geology of Libya. Faculty of Science, University of Al-Fateh, Tripoli, Lybia, September 16-21, 1978*. Academic Press, London, United Kingdom, pp. 539-591.
- RÖDEL, M.O. (2000). *Herpetofauna of West Africa, Vol. I. Amphibians of the West African Savanna*. Edition Chimaira, Frankfurt, Germany.
- SALVADOR, A. (1996). Amphibians of north-west Africa. *Smithsonian Herpetological Information Service* 109: 1-43.
- SCHLEICH, H. (1987). Contribution to the herpetology of Kouf national park and adjacent area. *Spinixia* 10: 37-80.
- SCHLEICH, H.; KÄSTLE, W. & KABISCH, K. (1996). *Amphibians and Reptiles of North Africa*. Koeltz Scientific Publishers, Koenigstein, Germany.
- SCHNURRENBERGER, H. (1963). Fishes, amphibians, and reptiles of two Libyan oases. *Herpetologica* 18:270-273.
- SCORTECCI, G. (1934). Cenni sui risultati di una campagna di ricerche zoologiche nel Fezzan. *Natura, Rivista di Scienze Naturali* 25: 93-103.
- SCORTECCI, G. (1935). Cenni sugli anfibi della Tripolitania. *Atti Secondo Congresso di Studi Coloniali, Firenze* 13: 159-165.
- SCORTECCI, G. (1937). Il Sahara Italiano. 1. Il Fezzan e Oasi di Gat. La fauna del Fezzan. *Reale Società Geografica Italiana, Roma* 15: 211-239.
- WERNER, F. (1909). Reptilien, Batrachier und Fische von Tripolis und Barka. *Zoologische Jahrbücher (Systematik)* 27: 595-646.
- WHITE, K.; BROOKS, N. P. J.; DRAKE, N. A.; CHARLTON, M. & MCLAREN, S. J. (2003). Monitoring vegetation change in desert oases by remote sensing; a case study in the Libyan Fazzan. *Libyan Studies* 34: 153-166.
- ZAVATTARI, E. (1922). Vertebrati di Cirenaica raccolti dal generale medico prof. Francesco Testi. *Atti della Società dei Naturalisti e Matematici di Modena* 8: 13-22.
- ZAVATTARI, E. (1937). I Vertebrati della Libia, *In Festschrift zum 60 Geburtstag von Professor Dr. Embrik Strand, vol. 2*. University of Latvia, Riga (Izdevniecība "Latvija"), pp. 526-532.