

Amphibians in Smara?

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RESUMEN: Smara es una ciudad del interior del Sahara Atlántico situada junto al cauce de la Saquia Al Hamra. Esta importante cuenca, por el atemperamiento de las condiciones climáticas, constituye un corredor para las especies de herpetos presentes en la franja costera, que se adentran más de 100 km en el continente hiperárido. El listado de reptiles citados en Smara es bastante completo, aunque no ocurre así con los anfibios, de los cuales no hay registros publicados. Se presentan aquí observaciones de dos especies de anfibios, *Bufoles boulengeri* y *Pelophylax saharicus* en el entorno de Smara, a gran distancia de las localidades previamente conocidas.

Smara is the largest urban settlement in the interior of the Atlantic Sahara and it is the third largest city in the region. It is situated in the medium-high stretch of the Saquia Al Hamra, the largest water basin in this territory. Its relatively northern location, the presence of paved roads and its importance as resupplying centre in a vast uninhabited area, has made it a frequented and relatively well studied location in terms of its herpetological community, compared to more remote areas.

The climate of Smara, according to the different classifications of Emberger, Martonne or Bagnouls-Gaussen is described as hyper-arid (Moktari *et al.*, 2013). Rainfall does not exceed 100 mm on average per year, usually appears during the colder months (September to March) and it is irregular within and among years. As a consequence of high evaporation and/or permeability of the soil –which are predominantly sandy–, the duration of surface water is brief. Therefore, the climate is not very favourable for the presence of amphibians, which may

struggle to complete the reproductive cycle. Contamination by faecal discharges or frequenting of livestock is also common in the sporadic sheets of water that are formed. Consequently, amphibians are very scarce and hard to locate in this type of environment (Geniez *et al.*, 2004). In addition, it is difficult to move around these areas, even on paved roads, during or after periods of heavy rain when these animals can be active and more easily observed.

The distribution of the species included in works published until the mid 2000's (Bons & Geniez, 1996, Geniez *et al.*, 2004), suggest that most Saharan reptiles are present in Smara and its surroundings and, to a lesser extent, along the two traditional access roads: the N14 road, which connects Smara to El Aaiun, and the R101, which connects Smara to Tan Tan.

Recent literature compilations have updated the distribution of amphibians and reptiles in the territories under Moroccan administration (Martínez *et al.*, 2019) and amphibians throughout North Africa (Escoriza & Ben Hassine,

2019), with special emphasis on the Maghreb. In both of these references, the authors collected their own chorological information and included many other partial works that have appeared in recent years, bringing a considerable advance to the knowledge on the distribution and biogeography of the Saharan herps (e.g. Beukema *et al.*, 2013; Brito *et al.*, 2011; Mediani *et al.*, 2013 and 2015; Qnimba *et al.*, 2013; Crochet *et al.*, 2015; Sánchez-Vialas & Aznar-González de Rueda, 2016).

However, it is remarkable that new localities for amphibians in the interior area of the Sahara are not reported, with the exception of the Zemmour region, where the previous doubtful presence of *Pelophylax saharicus* (Geniez *et al.*, 2004) is allegedly confirmed (Martínez *et al.*, 2019). Furthermore, the coarsely detailed maps provided (Escoriza & Ben Hassine, 2019, Martínez *et al.*, 2019), as well as their reduced scale and the absence of a grid in which to pinpoint the locations, suggests that no amphibian species has been recorded in Smara's surroundings until now.

Locations for two species of amphibians, *Bufoetes boulengeri* and *P. saharicus*, are described in this note in the area around Smara, in Saquia Al Hamra, during different surveys conducted between April 2012 and October 2015 (Figure 1). These observations are over 100 km away from the nearest known locality (García-París & López-Jurado, 1990, Geniez *et al.*, 1992).

Observations of *B. boulengeri* are located on the southern bank of the Saquia, about 12 km in a straight line from the town of Smara, in Sidi Ahmed Laaroussi, with scattered human population (10x10 km UTM squares: 29R KK16, 29R KK17, 29R KK26; 138-151 masl), in an environment of sandy substrate and small scattered taljas (*Acacia* sp.). All the specimens were found trapped in five different cisterns or matfiyas: in the decanting chambers, dead by drying (three specimens), hidden among sediments and rubbish (five specimens), or within the cisterns themselves, where larvae (>100), immature specimens (eight) and adults (six, two of them in amplexus) have been found.

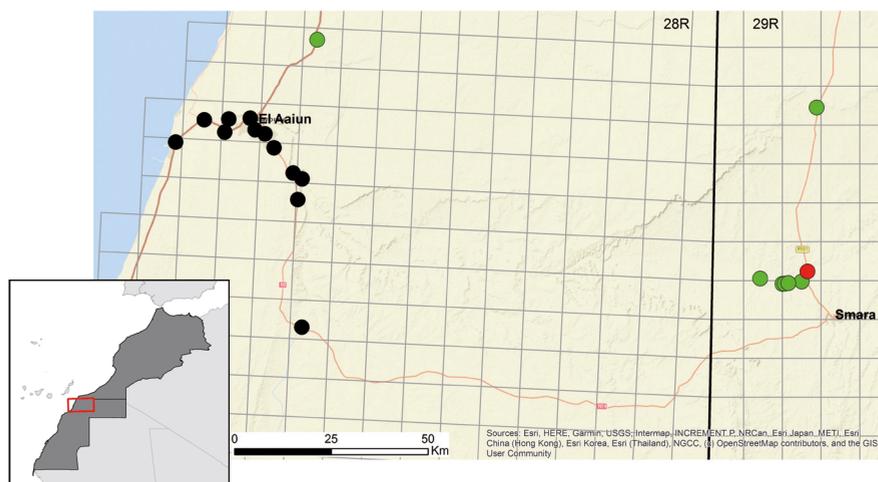


Figure 1: Locations of amphibians in Saquia Al Hamra basin. Black dots show locations from literature of *Bufoetes boulengeri* and/or *Pelophylax saharicus*. Green dots show new localities of *B. boulengeri*. Red dot indicates new record of *P. saharicus*.

Figura 1: Localidades de anfibios en la cuenca de la Saquia Al Hamra. Los círculos negros representan localidades bibliográficas de *Bufoetes boulengeri* y/o *Pelophylax saharicus*. Los círculos verdes muestran nuevas localidades de *B. boulengeri*. El círculo rojo indica una nueva cita de *P. saharicus*.



Figure 2: Artificial pond in Saquia Al Hamra. Detail: Juvenile *Pelophylax saharicus* in the banks.

Figura 2: Encharcamiento en la Saquia Al Hamra con ejemplares juveniles de *Pelophylax saharicus* en la orilla.

Most of these observations were made on 27th March 2013, except for two isolated specimens on different dates: 27th October 2013, and 14th September 2015.

Additionally, two new and more distant locations for this species are provided, consisting of specimens also trapped in cisterns:

- 1) 30th April 2012. Khang Tuinfid, halfway between Smara and Abteh (roadway R101). UTM 10x10 km 29R KL21; 355 masl: One dead adult specimen trapped next to a pregnant female *Stenodactylus mauritanicus*.
- 2) 2nd November 2012. North-west of El Ayoun, by the N1 roadway. UTM 10x10 km 28R FR92; 49 masl: Two dead adult specimens.

Pelophylax saharicus was found in the riverbed of Saquia Al Hamra, in an artificial pond deepened with heavy machinery. It is approximately 230x85 m in size (Figure 2), with loamy soil and surrounded by *Tamarix* sp. It is located next to the R101 roadway (UTM: 29R KK27; 143 masl). At least 20 small specimens were observed on the banks of this water build-up, and the calls of several adult males were heard.

The observation of individuals of different ages and, above all, reproductive activity in both species shows that these are well-established populations, with a significant number of individuals. These are probably natural populations that have gone unnoticed until now. The Saquia Al Hamra has been used as a corridor by different terrestrial endemisms of the Atlantic coast (*Acanthodactylus aureus*, *Chalcides sphenopsiformis* and *Tarentola chazaliae*) to reach far inland (Geniez *et al.*, 2004, Sánchez-Vialas & Aznar-González de Rueda, 2016). Although *B. boulengeri* and *P. saharicus* are species of Mediterranean origin, they have adapted well to wetlands in arid areas (Geniez *et al.*, 2004). Alternatively, the origin of these individuals could be related to a passive and not very old introduction, since the large puddles that are formed after rainy episodes are often drained in the area with self-pumped tankers, in order to fill up private tanks for domestic, agricultural and livestock use (L. García-Cardenete, personal observation). In these cases, it is easy to capture individuals

unintentionally –especially larvae and eggs– and translocate them subsequently.

The use of cisterns for reproduction by *B. boulengeri* is a documented threat (García-Cardenete *et al.*, 2014): leaving these structures is difficult not only for adult specimens, but also for recently metamorphosed individuals, especially if the water level is low, as frequently is. Being the water reservoirs with the longest hydroperiod, matfayas offer the possibility for amphibian reproduction in arid environments: their success, although not confirmed in the matfayas of Sidi Ahmed Laaroussi, it is quite probable. For *P. sahari-cus*, which is more water-dependent, some-

thing similar could happen, as already proved in other arid areas further north: cisterns near semi-permanent wadis attract a high number of specimens and act as a deadly refuge when riverbeds dry up: Tigit, Msied or Tilemsoum (unpublished data). Measures to alleviate this effect have already been described and evaluated (Pleguezuelos *et al.*, 2016).

Future sampling campaigns are needed to assess the population size and conservation status of both species, given their isolation and the threats they face (Geniez *et al.*, 2004, Reques *et al.*, 2013, García-Cardenete *et al.*, 2014), as well as the possible origin and expansion of their hitherto known distributional range.

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