

## Short Communication

# Rediscovery of relict populations of the Nile crocodile *Crocodylus niloticus* in south-eastern Mauritania, with observations on their natural history

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**Abstract** In 1998 and 1999, relict populations of the Nile crocodile *Crocodylus niloticus* were rediscovered in south-eastern Mauritania, 70 years after the last reports of their existence and 6 years after the IUCN Species Survival Commission listed them as extirpated in that country. Crocodiles were found in four different types of wetlands, herein described. Preliminary observations

on their natural history and their interactions with humans are provided, and the main threats and the prerequisites for their protection are discussed.

**Keywords** *Crocodylus niloticus*, Mauritania, Saharan/Sahelian wetlands.

## Introduction

South-eastern Mauritania is situated in the arid Saharan/Sahelian border zone, where the average total annual rainfall of 150–400 mm is highly variable in both space and time and drought is commonplace. Seasonal rains collect in temporary wetlands, which can last for 2–12 months, depending on the amount of rain. These wetlands have a varied topography, and some provide suitable habitats for the Nile crocodile *Crocodylus niloticus* (Laurenti, 1768). The first records of Saharan and Sahelian crocodiles in this area were in the upper Wadi Mihero (Ouadi Ahrir in French) in the Tassili n'Ajjer, southern Algeria, by Duveyrier (1864) and von Bary in November 1876 (De Bary, 1977). Subsequently, additional records came from other Saharan/Sahelian locations: Oued Harer, a tributary of the Imitrou, also situated in the Tassili n'Ajjer; between Fort Polignac and Djanet, as well as west of Ghat and Guelta Taffagunt, southern Algeria; Archei in the Ennedi Mountains, and south-eastern Tibesti Mountains, Chad (see Joleaud, 1933 and references therein; Bons and Geniez, 1996). Whereas the relict populations of southern Algeria were extirpated in the 1920s (Schleich *et al.*, 1996), the Chadian Ennedi population still persists, although according to George (1999) it consists of just seven individuals.

Earlier records marking the north-western limit of the species' recent distribution range include the following Mauritanian localities: the *gueltas* (rock pools) Tin Ouaadin, Garaoual and Matmata in the Tagant Highlands, the wetlands of Assaba, the environs of M'Bout, and the wetlands of Deudaré near Nema (Pellegrin, 1911a, b; 1913; Monod, 1921; Staudinger, 1929; Spatz, 1930; Joleaud, 1933). The lack of any recent sightings led the Crocodile Specialist Group (CSG) of the IUCN (International Union for the Conservation of Nature) Species Survival Commission to list the Nile crocodile as extirpated in Mauritania in its 1992 Action Plan (Behra, 1994).

However, in 1993 three young French travellers (Seved Robin, Danae Riboud and Eric Marcellin) rediscovered Nile crocodiles in five *gueltas* in the Tagant of Mauritania (at c. 400 m altitude): Matmata, Ederoum, Amzouzeff, Rh Zembou and Laout, and deposited a voucher specimen (a skull from Matmata) in the National Museum of Natural History, Paris (Behra, 1994). During the last 10 years, the GTZ (Gesellschaft für Technische Zusammenarbeit) project GERNEM (Gestion Intégrée des Ressources Naturelles de l'Est Mauritanien) has inventoried 87 wetlands in the Province of Hodh el Gharbi in south-eastern Mauritania, within the framework of developmental aid programmes of the German government. According to the local people 28 of the wetlands still contain crocodiles, in five of which we confirmed sightings in 1998 and 1999 (Plate 1).

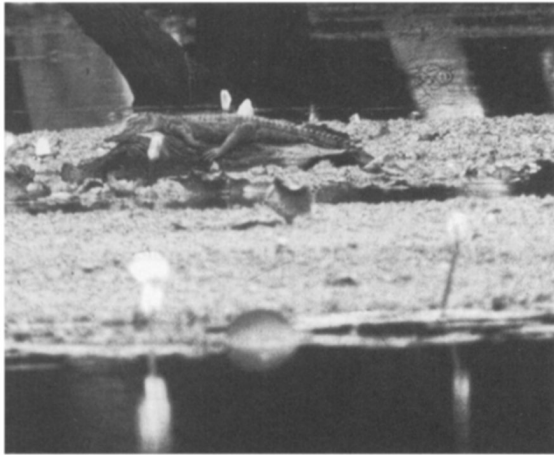
The survival of crocodiles in these wetlands can be ascribed to their isolation as a result of separation from major river systems for several thousand years, and to the disinterest of the local population in hunting them for food or skins. Although some more southerly

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**Plate 1** *Tamourt* 70 km east of Kiffa, southern Mauritania, with a basking subadult Nile crocodile.

populations in Mali have been extirpated as a result of hunting for sale as special charms and cures (C. McCracken, pers. comm.), Mauritanian villagers living near the wetlands believe that if the crocodiles are killed the water will disappear and bad luck befall the village (local inhabitants, pers. comm.). In this context, Joleaud (1933) reported that the inhabitants of the Tagant considered their crocodiles to be 'noble', in contrast to those from Senegal, which they considered to be animals of an 'inferior class'.

### Habitat description and natural history observations

The Nile crocodile has been observed by ourselves and by other project members of GIRNEM in four different wetland types. These are classified as follows, using local terms in Hassaniya (an Arabic dialect): *Tamourt* zone of water accumulation on clay soils, characterized by fringing trees of *Acacia nilotica*; *Gaat* open wetland of the plains, often rich in vegetation and exploited for agriculture; *Guelta* water pool in rocky outcrops (Plate 1), which may be fed by water stored in rock fissures; *Oued* a wadi or ephemeral river bed that flows during the wet season, and in which water may stagnate in deeper parts for several months of the year.

When the wetlands are dry (a variable period of 1–10 months), the Nile crocodile aestivates in holes dug near the wetlands or in rocky caves. Individuals inhabiting a *guelta* are never seen far from a suitable cave or rocky shelter, but as the water recedes other individuals move from their wet season habitat in the plains (up to several kilometers away) to nearby rock shelter outcrops. This movement is usually undertaken at night (local inhabitants, pers. comm), but villagers also reported seeing crocodiles moving across fields during

the day. During the period of aestivation, we observed the crocodiles coming out of their rocky refuges at night and, unless distributed, staying close to the entrances until dawn; movement and hunting activity during this time is minimal. However, on a few occasions during this period we observed fresh tracks indicating movement of several hundred meters. Movements along underground water passages between *gueltas* and caves in rocky areas may also occur, but need to be verified by radiotelemetry.

Most feeding occurs during the wet season while life in and around the wetlands is abundant. The diet seems to include fish, birds, locusts, frogs *Hoplobatrachus occipitalis* and young domestic goat and sheep. Nile monitors *Varanus niloticus* move quickly away from water in the presence of crocodiles, indicating a possible predator-prey relationship (Lenz, 1995). Crocodiles and larger domestic animals, such as cows, drink in close proximity. Several bird species (e.g. *Alopochen aegyptiacus*, *Vanellus spinosus*, *Dendrocygna viduata*) have been seen on the same small dune as the Nile crocodile.

The range of age groups that we observed confirmed reproduction. In June 1999, four individuals of less than 1-year-old were observed at night at the entrance to a small cave. Eggs have apparently been observed by villagers in holes beside wetlands in the month of November. *Varanus niloticus* are known to eat the eggs of the Nile crocodile (Lenz, 1995).

There are no reports of attacks on humans in the area that we studied and, on the whole, Nile crocodiles appear to harmoniously cohabit with the nearby human population. The mystical value attached to the species and the exclusion of crocodile meat from the diet of the Moorish people may explain the survival of these populations. Near Tamchekket we observed children swimming in wetlands known to contain crocodiles, women filling water containers as crocodiles basked nearby, and bricks being made and vegetables grown around crocodile-inhabited water holes.

There are nevertheless areas where the crocodiles are hunted, especially in the south near the border with Mali. In 1993 the three French travellers who rediscovered the Nile crocodile met a crocodile hunter in the southern Tagant (S. Robin, pers. comm.), and villagers have reported groups of Malians coming to several southern Mauritanian sites specifically to hunt Nile crocodiles for sale in Mali. Although Mauritania has a Hunting Code that forbids the hunting of Nile crocodiles, its application in remote areas is not always evident. We found a crocodile carcass in the southern Tagant, that had been beaten to death, but apparently without any purpose.

The Mauritanian economy is based largely on fishing, iron ore and animal husbandry, with 80 per cent of

eastern Mauritania's revenue coming from the latter activity. Agriculture is being encouraged and is receiving foreign aid, but as rainfall is limited, efforts are being made to maximize soil moisture through the construction of dykes and dams. But, as the area under agriculture expands, wetlands are increasingly under threat. In these areas land is being cleared and levelled to improve drainage, fencing is being erected and fertilizers and pesticides are being introduced. These activities will alter the habitat presently occupied by the Nile crocodile and numerous other reptiles (e.g. *Tarentola parvicarinata*, *Agama boueti*, *Agama boulengeri*, *Varanus niloticus*, *Python sebae* and *Geochelone sulcata*), resident Afrotropical and migrant Palearctic birds, and various small mammals.

### Conclusion

Further investigation of these relict populations is needed to determine their distribution throughout Mauritania (i.e. in the Tagant, Assaba, Hodh El Gharbi and Hodh El Chargui), and monitoring is required to collect information on their breeding range, hunting strategies and diet. DNA techniques could usefully be employed to determine any genetic differentiation of the southern Mauritanian populations from those in the Senegal River and other parts of tropical Africa, and from those in the Ennedi Mountains of Chad. Without such data it will be difficult to design measures to protect these Nile crocodile populations from developments that have the potential to wipe out their increasingly scarce habitats.

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### Biographical sketch

Wolfgang Böhme is curator of herpetology and deputy director of the Zoologisches Forschungsinstitut und Museum Alexander Koenig in Bonn, Germany. For his PhD at the University of Kiel, Germany, he studied the systematic relationships of lacertid lizards. The geographical focus of his interest in amphibians and reptiles is on West and Central Africa. Since 1988 Professor Böhme has taught zoology at the University of Bonn.