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A review on the current status of *Pelusios castanoides intergularis* Bour 1983 on La Digue, Seychelles

Dr. Sascha Pawlowski, Dipl. Biol.
Certified Ecotoxicologist (GDCh, SETAC GLB), Jahnstr. 26, 68623 Lampertheim, GERMANY [*spawlows@gmx.de*]

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Josianna Rose
Flycatcher Special Reserve, La Passe, La Digue, SEYCHELLES

Abstract: The indigenous freshwater turtles *Pelusios castanoides intergularis* Bour, 1983 was observed in its habitat on La Digue island, Seychelles from 2004 to 2014. Observations usually took place from late November to early December. Adult specimens were more or less regularly found at the river Mare Soupape and occasionally also at the Grand Anse river. Finding of adults turtles was strongly correlated with the presence of sufficient water bodies and thus during high water levels, individuals were found rather easily. In addition to adults, juveniles and hatchlings were also found associated with the Mare Soupape river, indicating that a viable population still exists on the western side of the island.

Introduction

The population of the freshwater turtles inhabiting the granite islands of Seychelles has faced a rapid decline during the past few decades (Gerlach 2000). Habitat destruction as well as population fragmentation and aging of populations were considered to be the major drivers of this decline (Gerlach 2008a). Conservation activities and population monitoring became important during the past 10 years (Gerlach 2002, 2008b, Gerlach & Canning 2001, Pawlowski 2010, 2013b, Pawlowski & Krämer 2006, 2010). Furthermore, there is current debate on the endemic status of the existing freshwater turtles on the granite Seychelles islands. Whereas *Pelusios sechellensis* (Siebenrock, 1906) and *Pelusios subniger parietalis* Bour, 1983 have been reported to be remnants of formerly introduced species, namely *Pelusios castaneus* (Schweigger, 1812) and *Pelusios subniger subniger* (Bonnaterre, 1789), the status of the last species *Pelusios castanoides intergularis* Bour, 1983 remains unclear (Fritz, et al. 2012, Stuckas, et al. 2013). Despite this discussions, the area of pristine rivers and existing undisturbed marshland has clearly decreased significantly over the past decades, due to drainage and urbanisation. These wetland areas are not only habitat to the freshwater turtles, but also habitat and food resources for many other endemic animals in Seychelles such as the various dragonflies, the Seychelles swiftlet *Aerodramus elaphrus* (Oberholser, 1906), Seychelles paradise flycatcher *Tersiphone corvina* Newton, 1867 or the Seychelles sheath-tailed bat *Coleura seychellensis* Peters, 1868 (Gerlach 2007, 2011, Hill & Currie 2007, Pawlowski & Krämer 2009). In fact, the focus on the conservation status of individual species may be extended to the habitat where many of the critically endangered species used to live in (Pawlowski

& Rose 2014). The river Mare Soupape on La Digue and its tributaries is amongst the most important ones on this island. The island still contains significant numbers of the freshwater turtle *Pelusios castanoides intergularis*. From 2004 to 2014 the population status of this freshwater turtle species was observed and the results are summarised in this work.

Material and Methods

From late November to early December regular excursions were carried out during the years from 2004 until 2014. The number of observation days ranged from 1 to 6 days per year. Main rivers and streams as well as ditches and ponds were visually checked for the appearance of freshwater turtles, namely *Pelusios castanoides intergularis*. Furthermore, turtles accidentally found on streets by tourists or island residents were brought to the headquarters of the Flycatcher Special Reserve throughout the year. Additionally, the water level of the water bodies within the habitats and weather conditions were assessed semi-quantitatively.

Observations in the habitat

The water levels in the habitat of the freshwater turtles varied during the various years, showing medium to high levels during the early years of observations, very low levels in 2012 and again medium to high levels from 2013 to 2014 (Fig. 1-4).

Fig. 1. Water levels at the Mare Soupape (upstream) during the various times of observations: a) 2008; b) 2010; c) 2012; d) 2014

a

b

c

d

Fig. 2. Water levels at the Mare Soupape (downstream) during the various times of observations: a) 2007; b) 2008; c) 2010; d) 2012

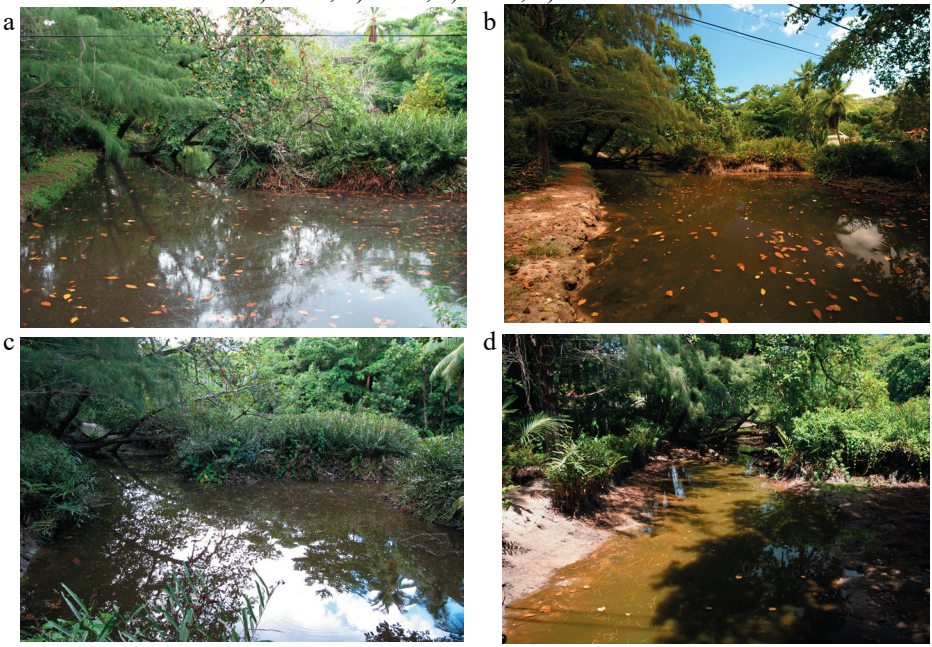

Fig. 3. Water levels at the Grand Anse (downstream) during the various times of observations: a) 2007; b) 2013; c) 2008; d) 2013

Fig. 4. Water levels at the Grand Anse (upstream) during the various times of observations: a) 2008; b) 2010; c) 2014

a

b

c

Table 1. Overview of observed *Pelusios castanoides intergularis* on La Digue between 2004 and 2014

Year	Days	West side (Mare Soupape)			East side (Grand Anse, Anse Petite)			Comments
		A	J	H	A	J	H	
2004	1	≥4	0	0	0	0	0	Sunny conditions; high water levels
2007	4	6	0	0	1	0	0	Sunny conditions; high water levels
2008	5	≥17	0	0	2	0	0	Medium water levels
2009	0*	0	0	>>1	n. o.	n. o.	n. o.	-
2010	6	3**	0	0	0	0	0	Medium water levels; partial algae bloom
2011	0*	1	0	0	n. o.	n. o.	n. o.	-
2012	1	0	0	0	0	0	0	Late rainy season, low water levels
2013	3	2	1	0	0	0	0	Early rainy season; high water levels
2014	3	5,2	0	2	2	0	0	Early rainy season, high water levels

n.o. - not observed; A - adults; J - juveniles; H - hatchlings;

*specimens found in the area were brought to the headquarters of the Flycatcher Special Reserve;

**one specimen found in captivity (captured in the same year)

The second freshwater turtle species inhabiting La Digue, namely *Pelusios subniger subniger* was not found during own observations in the habitat; however, during draining of one of the rivers (La Passe) for construction purposes, a few specimens captured temporarily (see also Pawlowski & Rose 2014). *Pelusios castanoides intergularis*, which was found at the same site were much higher in numbers (≥ 17, Table 1). All other observations in the habitat referr to *Pelusios castanoides intergularis*.

Overall, the number of *Pelusios castanoides intergularis* found in the various potential habitats were rather low, never exceeding 10 individuals per observation period. However, during years with medium to low water levels (2010 to 2012), the number of turtles observed in the habitat was lower, and close to zero. One male crossing the streets of La Passe was found by tourists and was brought to the headquarters of the Flycatcher Special Reserve (Fig. 5).

During the years 2013 and 2014, in which water levels were rather high during the observation period, adult *Pelusios castanoides intergularis* could be found rather easily in both the Mare Soupape and Grand Anse rivers (Fig. 6, 7). A semiadult turtle was found in 2011 (Fig. 8). In addition to the observation of adults and subadult specimens, even hatchlings were found occasionally by passengers crossing open areas in 2009 and 2014. In addition to findings by third parties, both a single hatchling and a single juvenile was found by own observations in the area of the Mare Soupape in 2013 and 2014 (Fig. 9). Turtles were found active within the habitats either in the morning at about 8-10 am or in the late afternoon between 5 and 6 pm.

Fig. 5. Adult male *Pelusios castanoides intergularis* (Mare Soupape 2010).

Fig. 6. Two adult *Pelusios castanoides intergularis* at Mare Soupape (upstream, 2014)

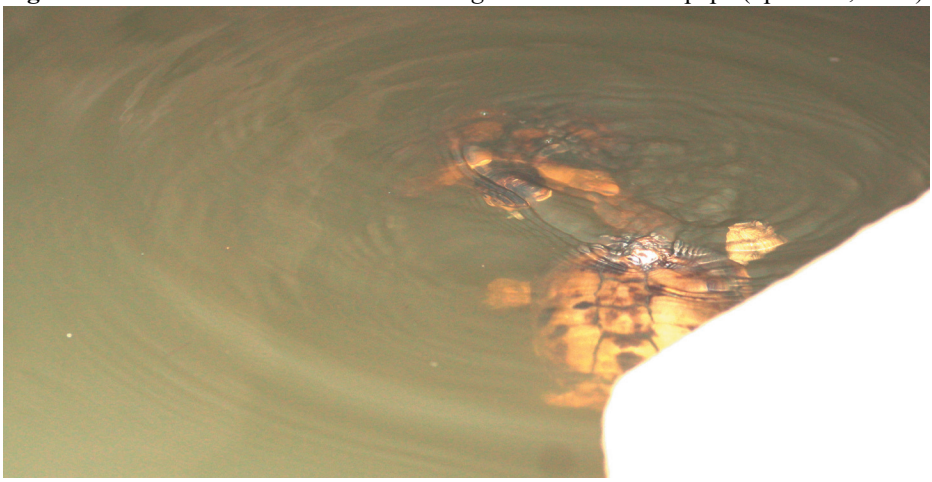

Fig. 7. A pair of adult *Pelusios castanoides intergularis* from Mare Soupape (downstream; 2014)

Discussion and conclusion

Although the observation periods during the various years was limited to a few days per year and thus was considered as rather short, at least a few adult individuals of *Peluios castanoides intergularis* was found at the Mare Soupape or the Grand Anse river. Finding the turtles in the habitat was much easier once the rainy season when already started as the turtles had emerged from their dry season aestivation period (approx. May to September). This was especially evident in 2014, where the largest number of freshwater turtles could be observed at Mare Soupape, which had high levels of water in the main river section as well as in its tributaries entering the Flycatcher Special Reserve. At the Grand Anse river, restoration of the lower river section resulted in a improvement of the habitat by extending the water body and providing additional potential nesting sites and the very low end of the river. Thus, similar to Mare Soupape, it was quite easy to find individual turtles in this river. Turtle activity was similar to previous observations, showing peak activities in the morning and late afternoon hours (Pawlowski 2010)

Hatchlings and juveniles, which have not been found at the Mare Soupape for many years and were detected only occasionally, indicate that the population at the western side is still reproducing. Previous investigations which failed to show any signs of reproduction at the La Digue population indicated that the population might be too small to be viable (Gerlach 2008a). However, this might not be the case for at least

Fig. 8. Semiadult *Pelusios castanoides intergularis* from the Mare Soupape (2011)

the western side population due to the finding of hatchlings, juveniles and semiadults during the past years. Although the numbers of growing turtles found was rather low, the time span for observations were also short. Therefore, reproductive success might be even higher, especially during periods of extended rainfall, but may not occur in dryer years (Pawlowski 2013a, Walsh 1984). As the observation period was very often limited to the onset of the rainy season, it is likely that more hatchlings may be found even later in the season. Based on the reproductive performance of many other aquatic turtles, it can be assumed that the deposition of clutches may appear about 4 to 6 weeks after completion of the aestivation/hibernation period, which is strongly correlated with the onset of the rainy season (Andreas & Paul 1998, Becker 2002, Grychta 1999, Lambertz & Lambertz 2002, Pawlowski 2015, 2016). The amount of food for both adult and juvenile turtles may be positively correlated with the ammount of suitable freshwater habitats and therefore, again, an increase in rainfall pattern will contribute to the amount of suitable habitat for the turtles.

The number of observation days per year was rather low, and thus does not allow any extrapolation for both yearly and total population; however; based on a significant number of *Pelusios castanoides intergularis* being captured in 2009 during construction activities in only a small river section, it can be assumed that there are even more in the whole river. For instance, hatchlings and juveniles, which spend most of their early life time in camouflage, are extremely hard to find in the habitat. So, recent

Fig. 9. Juvenile *Pelusios castanoides intergularis* from the Mare Soupape (2013)

records of them could be due either to pure accidental finding or to an overall higher abundance. The finding of a juvenile and semiadult *Pelusios castanoides intergularis* furthermore indicated that not only does reproduction still take place on La Digue, but also that hatchlings can survive the first most critical years of life and may even reach maturity. This is considered as very good news for the indigenous population of *Pelusios castanoides intergularis* on this island as despite ongoing controversial systematic discussions, this freshwater turtle is still protected by national law.

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