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A contribution to the reptiles of the Kunene River Mouth area

PL Cunningham¹, L Maartens², M Prickett³

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¹ pckkwrc@yahoo.co.uk

² lima@iway.na

³ maike.prickett@gmail.com

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Abstract

Knowledge of the herpetofauna associated with the Kunene River mouth area is incomplete with few published records. During a field visit in January 2018, eight species previously not known to occur in the area were identified, increasing the known reptile species richness to 18 species. Of these at least three species (possibly four if FitzSimon's burrowing skink is included) are endemic with the Kunene racer listed as indeterminate (rare?) and vulnerable, underscoring the importance of the general Kunene River mouth area for reptiles. The area remains unique and all developments, especially if located in the sensitive areas, should be approached with caution.

Keywords: Kunene River mouth; Namibia; reptiles; Skeleton Coast

Introduction

There is a general paucity of information regarding the herpetofauna associated with the Kunene River mouth as this area has, until recently, been notoriously remote, and located within the inhospitable Skeleton Coast National Park. Few reptiles are associated with the Namibian coastal saline areas (Cunningham & Jankowitz 2010) while relatively few reptiles (only eight species – water monitor, crocodile, four species of freshwater terrapins and two species of snakes [*Colubridae*]) are associated and/or dependent on wetlands in Namibia (Griffin & Channing 1991). The overall reptile diversity and endemism in the general Kunene River mouth area is estimated at between 31-40 species and 13-16 species respectively (Mendelsohn et al. 2002). Griffin (1998) presents figures of between 11-20 and 1-2 for endemic lizards and snakes from the area. The Skeleton Coast Park, including the Kunene River mouth area, has an estimated 77 species in total (Griffin 1998). However, published records of reptiles from the actual Kunene River mouth area are limited to Griffin and Channing (1991), Simmons et al. (1993), Anderson et al. (2001) and Paterson (2007) who confirm at least four, six, seven and two species respectively – with a total species richness of 10 species. While the focus in the past has mainly been on the importance of the Kunene River estuary for avifauna, this paper contributes to the knowledge of the reptiles of this immensely important habitat in an otherwise marginal environment.

Methods

Study Site

The general Kunene River mouth area falls within the Northern Namib (Giess 1971) or Northern Desert and the vegetation structure is classified as sparse grasslands (Mendelsohn et al. 2002). The area is extremely barren with the perennial Kunene River and associated vegetated delta area, on the border between Angola and Namibia, the only true lifeline in the general area. The area is dominated by sand dunes with the average annual rainfall of between 50 and 100mm and a high coefficient of variation (80-90%), although the coastal areas typically receive much less. Average annual temperatures are mild, between 20 and 22°C, with fog an important source of moisture, especially during the winter months. Average plant production is extremely low with variation in green vegetation biomass viewed as very low (0-5%) (Mendelsohn et al. 2002). The area is dominated by southerly winds and offshore the cold Benguela Current has an upwelling cell – Kunene Cell – which results in nutrient-rich waters rich in fish and other marine resources (Mendelsohn et al. 2002).

The Kunene River has a flow of about 5.5 km³ of water each year and a mouth of about 3 km in width, although often with an extensive sand bar across its mouth depending on the river flow and rainfall in the highlands of Angola, while the wetland area is approximately 500 ha in size and shared by Angola and Namibia (Robertson et al. 2012).

The Kunene River is viewed as a site of special ecological importance in Namibia due to the presence of sea turtles and migrant shorebirds while the entire coastline is also important due to its biotic richness – e.g. arachnids, birds and lichens (Curtis & Barnard 1998). The general area is regarded as "low" in overall (all terrestrial species) diversity while the overall terrestrial endemism on the other hand is "average to high" (Mendelsohn et al. 2002).

Human activities are limited in the area and currently include the Northern Namibia Development Company (Pty) Ltd (NNDC) camp site (staff accommodation), main plant, engineering and logistics facilities and landing strip (See Figure 1). The footprint of these facilities is small and all temporary in nature with minimal impact on the Kunene River as most of the facilities, except for the camp site, are located away from the river.

Data Collection

A comprehensive literature review (i.e. desktop study) regarding the reptiles that could potentially occur in the general Kunene River mouth area was conducted (Penrith 1971, Broadley 1983, Buys & Buys 1983, Griffin & Channing 1991, Marais

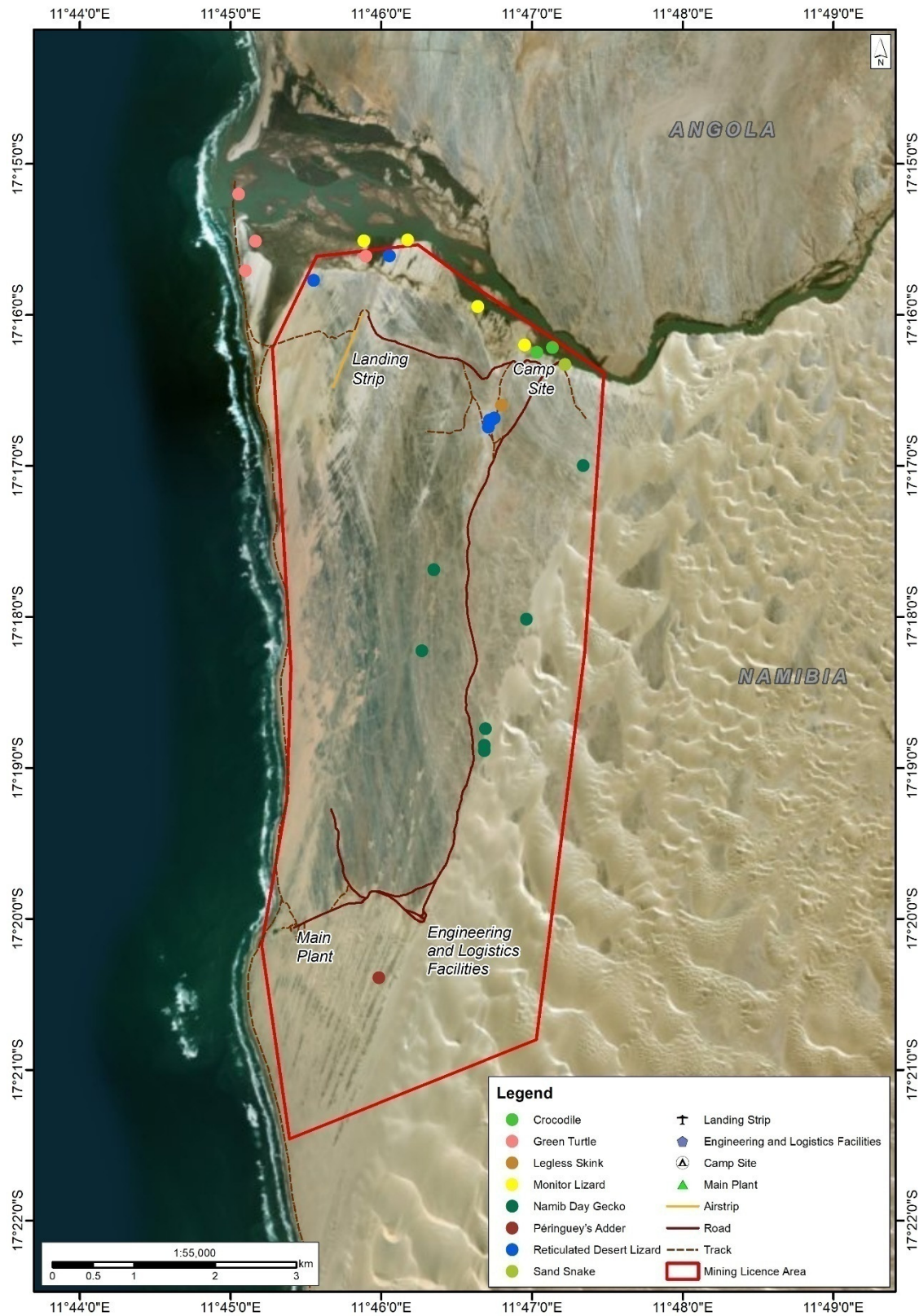


Figure 1: Location of confirmed reptile sightings within the proposed Northern Namibia Development Company (Pty) Ltd mining licence area

1992, Simmons et al. 1993, Branch 1998, Boycott & Bourquin 2000, Anderson et al. 2001, Bauer et al. 2001, Griffin 2003, 2004, Cunningham 2006, Alexander & Marais 2007, Paterson 2007, Tolley & Burger 2007, Branch 2008, Alderton 2009, Bates et al. 2014, Cunningham & Jankowitz 2010, Ceriaco et al. 2016, Lyet et al. 2016, IUCN 2018, Hebbard n.d.).

This was followed by a rapid site visit (fieldwork) between 15 and 18 January 2018. The fieldwork was not limited to reptiles only, so no structured approach was followed, but rather an opportunistic search for reptiles in likely hiding places in a variety of habitats. This was conducted on foot over approximately 5-6 hours per day, which included diurnal and nocturnal searches. Nocturnal searches were conducted using a Sun King portable solar light. Reptiles observed were either caught by hand or by using an active capture technique called 'reptile noosing' where an extendable fishing rod was fitted with a soft thread noose, positioned over the head of an unsuspecting individual and pulled tight. This technique does not result in the death or injury of the caught specimen. Species caught were identified *in situ*, photographed and released unharmed at the point of capture.

Furthermore, we include personal communications with knowledgeable NNDC staff who have spent much time in the area. Their sightings were included where supported by photographs and/or video footage. Video footage of the Cunene racer was also independently verified by Aaron Bauer.

RESULTS AND DISCUSSION

Literature Review

Approximately 261 species of reptiles are known or expected to occur in Namibia, thus supporting approximately 30% of the continent's species diversity, of which at least 22% or 55 species are classified as endemic. Furthermore, the occurrence of reptiles of "conservation concern" includes about 67% of Namibian reptiles (Griffin 1998).

According to the literature review at least 45 species of reptiles are expected to occur in the general area with 17 species being endemic – i.e. 37.8% endemic (Table 1). The 45 species expected to occur in the general Kunene River mouth area consist of at least three turtles and one terrapin; nine snakes; 16 lizards; one monitor lizard; one agama; one chameleon; 12 gecko and one crocodile. Geckos (12 species with eight species being endemic [66.7%] and two species classified as rare) and lizards (16 species with five species being endemic [31.3%] and one species classified as rare) are the most important groups of reptiles expected to occur in the general area. Griffin (1998) confirms the importance of the gecko fauna in Namibia, while Namibia with approximately 129 species of lizards (Lacertilia) has one of the continent's richest lizard fauna. A survey conducted in the neighbouring Namibe Province in Angola during 2013 resulted in 37 reptile taxa, including three undescribed species and two new country records (Ceriaco et al. 2016), although this survey did not include the Kunene River mouth area.

According to the Namibian conservation status, five species expected to occur in the area (Nile soft-shelled terrapin, chimba skink, Cunene racer, long-headed tropical house gecko and San Steyn's thick-toed gecko) are classified as rare; three species as protected game; four species as indeterminate; one species as insufficiently known and seven species as peripheral. The IUCN (2018) classifies eight species with some form of conservation status (including least concern – LC) from the general area of which one species is classified as endangered (green turtle) (Figure 2), four species as vulnerable (leatherback turtle, olive ridley turtle, Nile soft-shelled terrapin and Cunene racer) and three species as least concern. However, most reptiles have not yet been assessed for the IUCN Red List. Furthermore, Bates et al. (2014) classifies one species each as critically endangered (web-footed gecko), endangered (leatherback turtle), vulnerable (Nile crocodile), near threatened (green turtle) and data deficient (olive ridley turtle), while eight species are listed by CITES as either Appendix One or Appendix Two species (See Table 1).



Figure 2: Green turtle carapace found amongst reeds in the Kunene River mouth estuary.

Table 1: Reptile diversity expected (Branch 1998) and confirmed during the fieldwork (√); personal communications with Northern Namibia Development Company (Pty) Ltd staff (√*) and published records from other studies conducted in the area.

Species: Scientific name	Species: Common name	This study	Griffin & Channing (1991)	Simmons et al. (1993)	Anderson et al. (2001)	Paterson (2007)	Namibian conservation and legal status	International status		
								Bates et al. (2014)	IUCN (2018)	CITES
TURTLES AND TERRAPINS										
<i>Dermochelys coriacea</i>	Leatherback Turtle	√*					Peripheral	E	V	C1
<i>Chelonia mydas</i>	Green Turtle	√	√	√	√	√	Peripheral	NT	E	C1
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle						Indeterminate; Peripheral	DD	V	C1
<i>Trionyx triunguis</i>	Nile Soft-shelled Terrapin	√*	√	√	√	√	Indeterminate (rare?); Peripheral		V	
SNAKES										
Pythons										
<i>Python natalensis</i>	Southern African Python	√*		√			Vulnerable; Peripheral; Protected Game			C2
Typical Snakes										
<i>Boaedon capensis (Lamprophis fuliginosus)</i>	Brown House Snake						Secure			
<i>Psammophis trigrammus</i>	Western Sand Snake						Endemic; Secure			
<i>Psammophis notostictus</i>	Karoo Sand Snake			√			Secure			
<i>Psammophis leightoni namibensis</i>	Namib Sand Snake	√					Secure			
<i>Coluber zebrina</i>	Cunene Racer	√*					Endemic; Indeterminate (rare?)		V	
<i>Bitis arietans</i>	Puff Adder	√*					Secure			
<i>Bitis caudalis</i>	Horned Adder				√		Secure			
<i>Bitis peringueyi</i>	Péringuey's Adder	√					Endemic; Secure		LC	
LIZARDS										
Skinks										
<i>Typhlacontias johnsonii</i>	Johnson's Burrowing Skink	?					Secure			
<i>Typhlacontias puntatissimus</i>	Speckled Burrowing Skink						Secure			
<i>Typhlacontias brevipes</i>	FitzSimon's Burrowing Skink	?					Endemic; Secure			
<i>Trachylepis chimbana</i>	Chimba Skink						Rare?			
<i>Trachylepis hoeschi</i>	Hoesch's Skink						Endemic; Secure			
<i>Trachylepis laevis</i>	Angolan Blue-tailed Skink						Secure			
<i>Trachylepis sulcata ansorgii</i>	Western Rock Skink				√		Secure			
<i>Trachylepis variegata variegata</i>	Variiegated Skink						Secure			
Old World Lizards										
<i>Meroles anchietae</i>	Shovel-snouted Lizard	√*					Secure			
<i>Meroles reticulatus</i>	Reticulated Desert Lizard	√			√		Endemic; Secure			
<i>Nucras intertexta</i>	Spotted Sandveld Lizard						Secure			

<i>Pedioplanis breviceps</i>	Short-headed Sand Lizard					Endemic; Secure			
<i>Pedioplanis benguellensis</i>	Angolan Sand Lizard					Secure			
Desert Plated Lizards									
<i>Gerrhosaurus (Angolosaurus) skoogi</i>	Desert Plated Lizard					Endemic; Secure			LC
Plated Lizards									
<i>Gerrhosaurus nigrolineatus</i>	Black-lined Plated Lizard					Secure			
Girdled Lizards									
<i>Cordylus machadoi</i>	Machodoe's Girdled Lizard					Insufficiently known			C2
Monitors									
<i>Varanus niloticus</i>	Nile or Water Monitor	√	√	√		Vulnerable; Peripheral; Protected Game			C2
Agama									
<i>Agama planiceps</i>	Namibian Rock Agama					Endemic; Secure			
Chameleons									
<i>Chamaeleo namaquensis</i>	Namaqua Chameleon					Secure			C2
Geckos									
<i>Hemidactylus longicephalus</i>	Long Headed Tropical House Gecko					Rare			
<i>Pachydactylus caraculicus</i>	Angolan Banded Thick-toed Gecko					Secure			
<i>Pachydactylus fitzsimonsi</i>	FitzSimon's Thick-toed Gecko					Endemic; Secure			
<i>Pachydactylus oreophilus</i>	Kaokoveld Thick-toed Gecko					Secure			
<i>Pachydactylus turneri</i>	Turner's Thick-toed Gecko					Secure			
<i>Pachydactylus scherzi</i>	Schertz's Thick-toed Gecko					Endemic; Secure			
<i>Pachydactylus scutatus</i>	Large-scaled Thick-toed Gecko					Endemic; Secure			
<i>Pachydactylus sansteyni</i>	San Steyn's Thick-toed Gecko					Endemic; Indeterminate (rare?)			
<i>Pachydactylus (Palmato gecko) rangei</i>	Web-footed Gecko					Endemic; Secure			CE
<i>Pachydactylus vanzyli</i>	Kaoko Web-footed Gecko					Endemic; Secure			
<i>Rhoptropus afer</i>	Common Namib Day Gecko	√				Endemic; Secure			
<i>Rhoptropus biporosus</i>	Kaokoveld Namib Day Gecko				√	Endemic; Secure			
Crocodiles									
<i>Crocodylus niloticus</i>	Nile Crocodile	√	√	√	√	Peripheral; Protected Game	V	LC	C2

Namibian conservation and legal status according to the Nature Conservation Ordinance No 4 of 1975 (Griffin 2003)

Endemic – includes Southern African Status (Branch 1998)

Bates et al. (2014): CE – Critically Endangered; E – Endangered; V – Vulnerable; NT – Near Threatened; DD – Data Deficient

IUCN (2018): E – Endangered; V – Vulnerable; LC – Least Concern [All other species not yet assessed]

CITES: CITES Appendix 1 or 2 species

? – tracks observed but could not be linked to species

Although the three turtles (leatherback, green and olive ridley) are not classified under the Nature Conservation Ordinance of 1975 they are protected under the Sea Fisheries Regulations of 2001 (Griffin 2003). Leatherback turtle occurs along the entire coast while only two carapaces have been located for olive ridley turtle along the northern Skeleton Coast. It is not known if green turtle breeds along the Namibia coast, but it is known to occur in the Kunene River mouth estuary (Griffin 2003). Nile soft-shelled terrapin was first discovered during a survey between September and October 1969 at Foz do Cunene (Penrith 1971) with the Kunene River mouth viewed as the southernmost range of the species in Africa (Penrith 1971, Griffin & Channing 1991, Branch 1998). Other aquatic species that may occur in the area, although not yet confirmed, include the helmeted terrapin (Griffin & Channing 1991), yellow-bellied sea snake (Branch 1998), loggerhead turtle and hawksbill turtle (Griffin 2003).

Crocodiles are viewed as peripherally endangered due to diminishing habitat and human encroachment and estimated to be in the vicinity of 806 individuals (all size classes – direct count abundance = 562 individuals) along the 352km of the Namibian Kunene River (i.e. a bountiful 2.29 crocodiles/km). The Kunene River mouth area has an estimated nine individuals (range: 4-22 individuals) within the 1-3 m size class and three individuals (range: 2-5 individuals) within the 3 m+ size class (this within an 8km river segment surveyed from the mouth inland) (Lyet et al. 2016).

The little known and endemic Cunene racer (only three records from the Opuwo and Khorixas Districts in northern Namibia – Bauer et al. 2001, Griffin 2003), Southern African python and the endemic Péringuey's Adder (Figure 3) are viewed as the most important snakes potentially occurring in the general area. Southern African Python is known from the Kunene River mouth area while Péringuey's adder occurs in the sandy coastal/inland vegetated dune hummock areas. Furthermore, Anderson et al. (2001) include desert plated lizard from Möwe Bay and web-footed gecko from Rocky Point, albeit further to the south. Although Anderson et al. (2001) indicate that several Kaokoveld Namib day gecko individuals were observed near the Kunene River mouth, Griffin (2003) indicates that they only occur in the Pro-Namib between the Brandberg and southern Opuwo, indicating a possible confusion with the ubiquitous rupicolous common Namib day gecko (pers. obs.).



Figure 3: *Bitis peringueyi* (Péringuey's adder) located between *Salsola* spp. inland dune hummocks.

Fieldwork

During the fieldwork seven species were observed while another seven species were confirmed using Northern Namibia Development Company (Pty) Ltd staff personal records – i.e. 14 species in total – from the general Kunene River mouth area. Of these at least three species (possibly four if FitzSimon's burrowing skink is included – See Table 1) are endemic with the Cunene racer furthermore listed as indeterminate (rare?) and vulnerable by Griffin (2003) and the IUCN (2018), respectively. The most important species from a conservation status perspective are the turtles (leatherback and green), Nile soft-shelled terrapin, Southern African python, Péringuey's adder and the little-known Cunene racer. While Nile soft-shelled terrapin is known to breed in the area, breeding has not been confirmed for green turtle although expected. Southern African Python and Péringuey's adder have a widespread distribution throughout Namibia while Cunene racer, previously only known from a few sites further to the east, was identified from very shaky video footage. (Although the footage was scanty, the overall appearance and behaviour was not that of a zebra snake; the observer, J. van Rooyen, being familiar with the latter species, was also convinced it was something other than a zebra snake, a species not yet documented as occurring in the area although no barriers exist to exclude it from the area). The holotype for Cunene racer is from the Ruacana area with another two specimens confirmed from the Kamanjab and Warmquelle areas further south (Bauer et al. 2001). Although currently viewed as a Namibian endemic (Griffin 2003), this species is also expected, although not yet confirmed, to occur in Angola (Bauer et al. 2001) since the Kunene River is not viewed as a geographic barrier. Our sighting is thus approximately 260 km to the west of the type locality, consequently increasing the known range of this species further westwards. Tracks of either Johnson's burrowing skink or FitzSimon's burrowing skink (Figure 4) were observed, but could not be linked (i.e. confirmed) to the species (See Figures 5&6 as examples of reticulated desert lizard and Nile monitor from the area and Figure 1 for the species location map).



Figure 4: Tell-tale burrowing skink (Johnson's or FitzSimon's) tracks within inland *Salsola* spp. dune hummocks.



Figure 5: Reticulated desert lizard was found on sandy substrate in the area.



Figure 6: Nile monitor tracks were common in wet areas along the Kunene River.



Figure 7: Namib day gecko was found in rocky gravel plain areas.

Of the 14 species confirmed, eight species had not previously been documented from the general area and include the leatherback turtle, Namib sand snake, Cunene racer, puff adder, Péringuey's adder, unidentified burrowing skink, shovel-snouted lizard and common Namib day gecko (Figure 7) - i.e. increasing the known reptile species richness to 18 species.

More species potentially occur in the area as perennial rivers are not viewed as zoogeographic barriers to reptiles or known to occur further east along the Kunene River and potentially could be in the vicinity – e.g. Angolan banded thick-toed gecko (known from Swartboois Drift) – although not yet confirmed from the area (Haacke 1970).

Conclusion

The very high percentage of unique and/or endemic species underscores the importance of the general Kunene River mouth area for reptiles. Very little is known regarding the three turtles (leatherback, green and olive ridley) and the Nile soft-shelled terrapin. All except olive ridley turtle have been recorded here and are expected to breed in the area. Although these species are not exclusively associated with this area, the importance of the Kunene River mouth area for these species is not well understood and requires further research.

According to the literature review, the most important reptiles, excluding the three turtles and Nile soft-shelled terrapin, are the Southern African python, Cunene racer and Péringuey's adder, the dune-dwelling endemic, herbivorous desert plated lizard, the rare long-headed tropical house gecko, various endemic and range restricted thick-toed geckos and the endemic and range restricted Kaoko web-footed gecko. Except for the Nile soft-shelled terrapin, which has its southernmost distribution at the Kunene River mouth, none of the other important reptiles is exclusively associated with the area.

However, the area remains unique and all developments, especially in the sensitive areas, should be approached with caution. According to Griffin (1998) emergency grazing and large-scale mineral extraction in critical habitats are some of the biggest problems facing reptiles in Namibia. Simmons et al. (1993) sums it up best: "its small size; extreme isolation; high avian species richness and unusual herpetofauna make it a unique and important coastal wetland".

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