KUNENE RIVER

The Namibian Skeleton Coast National Park and Angolan Iona National Park are separated by the only perennial river in the study area: the Kunene River or Rio Cunene, whose valley forms a linear oasis in the arid environment.

The Kunene is approximately 1,050 km long, with a catchment of 106,500 km^2, of which ± 92,400 km^2 lies in Angola and 14,216 km^2 in Namibia (Paterson, 2007; Midgely 1966; Morant, 1996; Greenwood, 1999; Strohbach, 2008). On average, about 5.5 km^3 water flows down the Kunene annually (Robertson et al., 2012) at a maximum discharge rate of about 1,000 m^3/s and transporting around 9 million tons of sediment (Garzanti et al., 2017).

Namibia has a hydropower scheme in the Kunene River near Ruacana and has considered the installation of another hydropower scheme at Epupa, further downstream. The hydropower scheme would require the flooding of a large part of the Kunene valley. Impact assessments were performed and the Epupa site was compared with a site near the Baynes Mountains (Corbett, 1999). The dam was never established. The river is impounded in six places upstream of Ruacana.

Figure 1: the permanently flowing Kunene River halts the extensive Kunene Dune Field's northward migration abruptly.

KUNENE RIVER MOUTH

The Kunene River Mouth (KRM), also known as the Kunene Deltaic Complex, covers an area of ± 4,130 m^2. The river spreads out into braided channels between sand bars (some vegetated), with a periodically flooded lagoon and mudflats inland of a 2.5 km long linear sand spit on the southern bank and shorter one on the northern bank, that partially block access to the Atlantic Ocean (Paterson, 2007; Greenwood 1999). A study by Simmons et al. (1993) found that the lagoon was 2.36 km long and 1.60 km wide, and its water up to 10°C warmer than the sea. The tidal range is around 1.4 m. Tidal influence – discernible up to 4 km upstream (NACOMA, 2009) – is mainly by backing up river water during high tide. At high tide, the lagoon is

flooded up to 70 cm deep. At low tide, only 10 % (at low river flow) to 50 % (at high river flow) of the lagoon is under water, exposing sand and mudflats (Simmons et al., 1993).

The KRM lacks estuarine benthic fauna, marine and estuarine plankton, and marine fish species (Carter & Bickerton 1996; Morant & Carter 1996), which indicates that it, acts as a river mouth rather than an estuary, according to the classification of Whitfield (2001). The system is fluvially dominated, with very little evidence of intrusion of seawater at low-flow periods (Carter 1996), as long as a permanent minimum flow of ± 20 m^3/s is maintained (NAMANG 1997). Simmons et al. (1993) found that the salinity of water just inside the mouth during peak flow (April) was about 10 times as much as 4 km upstream, but still predominantly fresh. Low flow resulted in a fourfold increase in salinity at that same place, but still only a 10^{th} of that of seawater.

Satellite imagery reveals a 100 km^2 plume of warm, nutrient-rich river water extending NNW into the Atlantic Ocean at the time of peak flow. (Simmons et al., 1993). As the fresh water plume from the river mixes with seawater, it creates estuarine conditions in the coastal waters just north of the river mouth. The northward-moving longshore current ensures that fresh river water has no noticeable influence on the marine environment south of the mouth.

Sediment deposited within the mouth is of aeolian origin, from dunes encroaching from the south along the lower stretches of the river, as well as sand blown inland from beaches south of the river mouth. The mouth is never completely closed (Robertson et al., 2012). Simmons et al. (1993) found that the opening varied between 30 and 80 m at low and high flows, respectively, and mentioned that the opening was more than a kilometre wide in 1975. They also discovered a 275 m northward and 150 m westward migration of the southern sand bar between 1975 and 1992. This points to the highly dynamic nature of sediment deposition and river mouth morphology.

Figure 2: The ± 3 km wide mouth of the permanent Kunene River is partially blocked by sandbars. These are cleared periodically by floods from good rains in the Angolan Highlands (e.g. April/May 2018). The river spreads out in a small delta. The wetland is high in biodiversity.

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