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Modern environment characterization of interdunal lakes in Inhambane province (SE Mozambique) as an analogue to understand past environmental changes

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To better understand Quaternary environmental changes in Southeastern Mozambique and their role in human evolution, it is first necessary to characterize the modern environment of this area and the environmental drivers on their evolution. For this reason, an international and interdisciplinary team interpreted the Inhambane Province's geology, hydrographic and tectonic maps and open-access satellite imagery and derived products (for morphometric analysis and landscape interpretation). Inhambane province is in a coastal plain composed of a Pleistocene dune system, within which many lakes can be found. Additionally, a comprehensive review of the existing research for the region was conducted, to choose the most suitable lakes from which to collect sediment records for paleoenvironmental reconstructions. The team carried out fieldwork during the summer of 2019 in four of the selected interdunal lakes (Muangue, Nyalonzelwe, Nhambutse and Chivanene). During fieldwork the vegetation cover and the land uses were carefully described, and the lakes water column parameters were measured. Additionally, in the two lakes that presented the longest sedimentological records (Muangue and Nyalonzelwe), an unmanned aerial vehicle (UAV) survey was carried out to create high resolution maps and elevation models of the lakes and their surroundings. UAV flights were carried out at 25 and 60 m height, with a front and side overlap between 60 to 70 %, using georeferenced Ground control points (GCPs). The lakes' areas vary between 0.4 (Muangue) to 0.8 km² (Chivanene). The longest sedimentological records were found in lakes with a water level 5 m above the Mean Sea Level (MSL) and surrounded by higher dunes (between 31 and 121 m elevation in relation to MSL). Most of the lake margins are used for agriculture, livestock and housing and some have fish farming. Regarding vegetation, between 16 families and 27 species were identified around Nhambutse and 27 families and 43 species around Muangue. The lakes' maximum depths vary between 1

(Nhambutse) and 4.6 meters (Muangue). All lakes are freshwater except Nyalonzelwe, which is brackish. On average, surface water pH varies between 7.2 (Chivanene) and 9.12 (Nyalonzelwe). Surface water temperature varies between 25.03 (Nhambutse) and 26.6 ° C (Chivanene). All the collected data highlight the diversity of interdunal lake environments in the Inhambane Province, and how these environments may impact the sedimentological record. This work was supported by project PTDC/HAR-ARQ/28148/2017, funded by the Portuguese Foundation for Science and Technology.