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Potential impacts of damming the Juba Valley, western Somalia: Insights from geomorphology and alluvial history

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In 1988 plans were well advanced to dam the Juba River in western Somalia. The aims of the Baardheere Dam Project were to generate hydroelectric power for the capital Mogadishu, and to provide water for irrigation in the Juba Valley. A reconnaissance survey on foot along 500 km of the river upstream of the proposed dam site at Baardheere and detailed geomorphic mapping from air photos provided a basis for reconstructing the late Quaternary alluvial history of the river and for assessing the potential impact of the proposed dam.

The Juba River rises in the Ethiopian Highlands and is the only river in Somalia that flows to the sea. Its history reflects climatic events in Ethiopia, where the Rift Valley lakes were very low during the LGM (21 ± 2 ka), and high for about 5, 000 years before and after then. Cave deposits in Somalia indicate wetter conditions at 13, 10, 7.5 and 1.5 ka. Alluvial terraces in the Juba Valley range in age from late Pleistocene to late Holocene but only attain a few metres above the present floodplain. This is because the dry tributary valleys contain limestone caves and fissures that divert any high flows from the parent river underground, a process not known when the project was first approved. The oldest preserved terrace was cemented by calcrete by 40 ka. Alluvial gravels were deposited at the outlet of dry tributary valleys during times of episodic high-energy flow between 26 ka and 28 ka. Finely laminated shelly sands accumulated at 10 ka to form the 5 m terrace. The 2 m terrace was laid down 3.2 ka ago as a slackwater deposit.

The lack of high-level alluvial terraces raises doubts over plans to dam the river, since rapid leakage would occur from side valleys and the reservoir would not attain the height needed to generate hydroelectric power. It would submerge all existing arable land along the river. Finally, the presence in the late Holocene alluvium of the sub-fossil gastropods Bulinus truncatus and Biomphalaria pfeifferi, which are the two main vectors of schistosomiasis in northeast Africa, suggests that this parasitic disease could become endemic across the valley. Any future plans to manage the Juba River need to take proper account of alluvial history and geomorphic processes.