

Restoration of the Lake St Lucia Estuarine mouth for more natural functioning of the system

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Introduction: For 60-odd years, dredge spoil was artificially dumped in the natural course of the uMfolozi River (near the mouth of the St Lucia estuary), by then conservation managers as it was thought that silt exacerbated from the canalisation of the uMfolozi River was the biggest man-induced risk to the 350km² estuarine Lake St. Lucia system in South Africa. The Lake is linked with the ocean with a 15 km long natural channel, called the Narrows, and the uMfolozi River has a mouth close to the Lake estuary (Fig 1).



Fig. 1: Satellite image of the Lake St Lucia system

The health of the Lake St Lucia ecosystem is directly linked to the livelihoods of people in the area. The contribution to fisheries of the Lake St Lucia system is also significant. Of the 155 fish species have been recorded in the St Lucia estuarine system 71 species use St Lucia as a nursery area and at least 24 of these are important in marine line fisheries. During closed-mouth conditions from 2002 to 2012, there was virtually no exchange of fish between the estuary and the marine environment which resulted in collapse of the Thukela Bank prawn fishery and commercial line fisheries.

In 2013, a multi-disciplinary research team was appointed by iSimangaliso Wetland Park to concretise solutions towards resolving the acute hydrological problems facing the Lake St Lucia system. While silt is an issue, the science identified that the critical issue is fresh water and the uMfolozi River's ability to act as the powerhouse that drives the natural process of the mouth [1].

Methods: The study investigated the St Lucia Lake water mass, salinity and sediment transport balance by using 1D and 2D hydrodynamic models. Long term simulations were carried out to evaluate the

current and possible future scenarios with climate change and land use changes, as well as possible mitigation measures.

Results: One of the key conclusions from the hydrodynamic modelling was that the dredged spoil dump which blocked the flow between the St Lucia estuary mouth and the uMfolozi River should be removed (Fig 2). This will enable permanent linkage between the uMfolozi River and the St Lucia Estuary, with expected mostly permanent open mouth conditions.



Fig. 2: The white area on the image (above left) indicates the area of dredge spoil to be removed, while the image on the right shows the sediment removal almost complete at the end of May 2017.

Discussion: With support from the GEF and World Bank, iSimangaliso spent USD 7 million on the Lake St Lucia restoration project during 2016 to 2017. The mouth restoration work is very significant and enabled iSimangaliso to reverse some of the negative impacts of decades of dumping dredge spoil in that area and facilitate the more natural functioning of Lake St Lucia Estuary. Initially with a closed mouth from the drought and as the first part of the restoration work was underway, there was a sediment accumulation phase. Once the rehabilitated system enters a period with more rainfall, floods and tidal flushing associated with an open mouth will result in a net loss of silt from the estuary.

The authors wish to thank the iSimangaliso Wetland Park their permission to publish this paper.

References: [1] Basson, G.R. Analysis of alternatives to determine the most feasible solution to the hydrological issues of the Lake st Lucia estuarine system - Hydraulics, Salinity and Sedimentation. ISimangaliso. 2015.