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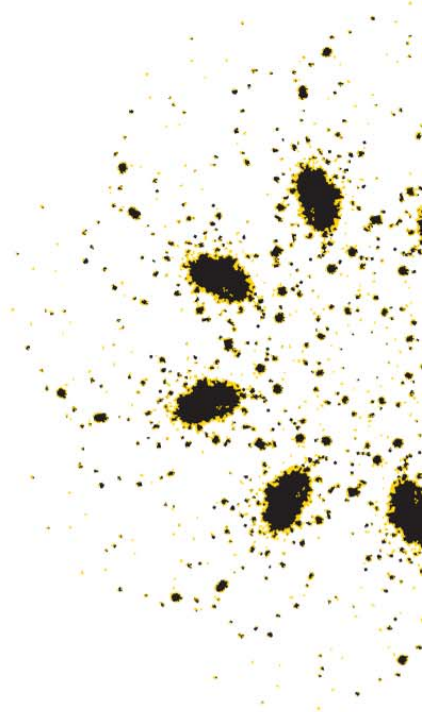

SALINITY AND RELATIVE SEA LEVEL RISE IN HEUNINGNES RIVER SOUTH AFRICA

A FIELD BASED DELFT3D STUDY

Salt water intrusion at the mouth of a river is a natural phenomenon. At high tide sea water will enter the river, and at low tide this motion is reversed. This dynamic equilibrium of salt movement is likely to change due to effects of relative sea level rise (RSLR), increasing salinity in many rivers.
Heuningnes River in South Africa is an area with great biodiversity. In 1986 it was put on the list of 'Wetlands of International Importance' (RAMSAR). In addition Heuningnes river flows through valuable agricultural lands. An increase in salinity would affect both nature and farming in the area.

In an effort to determine the effects of RSLR in Heuningnes river an extensive field campaign was launched. Data was collected describing bathymetry, water levels, salinity levels and discharge. This data was subsequently used to set up a Delft3D model.

Model results show a 2.2 ppt peak increase in salinity in the middle of the river as a result of an anticipated 0.52 meter RSLR. This is associated with a 0.4 km upstream migration of the salinity profile. A more extreme scenario based on the maximum water level observed between 2010 en 2015 (scenario '+0.52max') was also simulated, showing a 5.6 ppt increase and a 1.93 km upstream migration (Figure 1). In line with literature findings, the model shows discharge to be of relatively large influence.

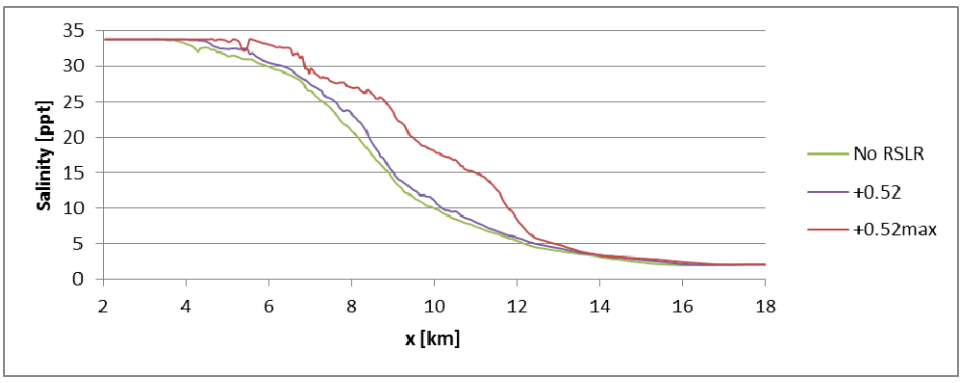

Figure 1: Salinity profile for the current situation (No RSLR) and two RSLR scenarios while moving from the river mouth (x = 0) to upstream

Results indicate an increase in salinity for Heuningnes river the coming century. Effects of this increased salinity should be taken into account when formulating future estuary management planning.

Figure 2: Heuningnes River mouth, Western Cape Province, South Africa

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