Salt water intrusion and groundwater discharge into a coastal lake

(Salgados Lagoon, Algarve, Portugal)

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Abstract

Saltgados Lagoon is a brackish, small and shallow surface water body developed behind a sand dune barrier, in southern coast of Algarve (Portugal), at the mouths of the Espiche River. Formed by saltmarshes, with shrubby halophytes and a reed bed, the large wetland that surrounds the lake is an important wildlife habitat, specially for birds. The development of a large sand bar has led to his almost complete sedimentation and the colonisation by marsh vegetation. Reclamation of this marshes by man during the last century led to a serie of shallow drainage ditches, now colonised by vegetation, and a drainage ridge to the sea, now closed. Probabilities of flooding and opening of a sand ridges for discharge of freshwater to the sea after severe rainstorms is high in this system. However, this lands were rarely directly affected by ocean saline water. River sediments and sands are not removed by tidal scour, because the area may be above high tide level and have a high seasonal water table.

In the last three decades two waste water treatment plants continually discharge into Espiche River, the main inflow of the lagoon, and became the basic component oh the lake water balance (100% of inputs in dry season). The lake became eutrophic, with frequent or even permanent phytoplankton blooms dominated by blue green algae, due to the heavy pollution loads. A new waste water treatment plant is projected and the study of the impact of different final discharge solutions must be studied in order to stablish the best management measures.

In this work we propose a modeling approach to Lagoa dos Salgados, in order to build a tool to support environmental management decision. Based on field data available at the moment and theorical knowlegde a modeling approach is presented to clarify the links between surface water, ground water and ocean water in this coastal lake and to suggest future work. An application will be present to test the best solution of waste water final discharge.