# Improvement of an Existing Numerical Model for Seawater Intrusion (Chtouka Aquifer, southwestern Morocco)

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Starttermin: as soon as possible

Link:
https://www.bgr.bund.de/EN/Themen/Wasser/Projekte/laufend/TZ/Marokko/crem_fb_en.html?nn=1546392

**Context**

Seawater intrusion is a worldwide phenomenon naturally occurring in coastal aquifers due to the density difference between seawater and freshwater. However, groundwater pumping can induce a landward movement of the freshwater-saltwater interface, which may lead to an increased salinity of the pumped water.

In Morocco, the Chtouka region is a major producer of fruits and vegetables intended for exportation. This is only possible through irrigated agriculture and a combined use of surface water and groundwater resources. Intense pumping in the Chtouka aquifer is responsible for the observed water table decline, which exacerbates seawater intrusion and threatens freshwater resources. A recent geophysical survey detected seawater intrusion up to 2.5 kilometers inland. In the near future, water demand is expected to increase due to population growth, increased demand for irrigation and climate change. Consequently, seawater intrusion may move further inland.

**Approach, objectives and tasks**

To investigate the behavior of the seawater intrusion in the Chtouka aquifer, a numerical model was developed using the SEAWAT code (within the GMS software). This model builds on previous existing models and incorporates newly acquired data. As of now, the model has only been calibrated under steady state conditions.

The objectives of this master thesis are essentially twofold:

1. Understand the dynamics of the seawater intrusion;
2. Evaluate the impact of different scenarios on the availability of freshwater resources in the future.

To fulfill the objectives, the student will review the existing model and the data available for calibration of the model under transient conditions (modelling period 1968-2020). Based on this review, the student will propose a strategy for calibrating the model under these conditions. Once the model is calibrated, the student will develop future scenarios of water use in collaboration with our local partner (ABHSM – Agence de Bassin Hydraulique du Souss Massa).

**Prerequisites:** Course in Groundwater Modelling, use of GIS

**Thesis language:** English (French desirable for communication with the local partner)