Regional scale optimisation of land and water resources

Project number: NL6
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Short description:

Soil salinity is a major threat for low-land irrigated agriculture and natural vegetations in semi-arid regions. An additional adverse effect, i.e., sodication (alkalisation), may occur upon salinisation and may be poorly reversible. Hence, the necessary leaching implies that either or both groundwater and/or surface water will also be salinised. This may not pose a local problem, but at a river basin scale, this certainly is a problem as both groundwater and river water will be salinised in the downstream direction.

The main objectives of the project are (1) to develop a methodological framework for the assessment of salinity hazards as a function of water use and drainage both at the field and at the river basin scale; (2) to predict the salinity hazards for a range of environmental conditions and feasible management decisions; (3) and to optimise crop yield, economic gain, and to minimise the degree or extent of salinisation by using inverse modelling.

Goal achieved so far:

We have developed a simple rootzone model comprising of a cation exchange complex, soil solution complex, inputs/losses at soil surface, and losses at the rootzone base by using numerical modelling and analytical comparisons. The work has been accepted and published in Agricultural Water Management Journal. We have also developed a conceptual model for groundwater salt uptake by vegetation to assess the salinity hazards under different groundwater depths and climates by using the water balance and salt balance approach. The article is in preparation. We will extend the conceptual model to incorporate the stochastic sodicity development under different groundwater depths and climates.