Geophysical Research Abstracts
Vol. 20, EGU2018-14472, 2018
EGU General Assembly 2018

Interactions of groundwater, agriculture and society in coastal arid regions under limited resources availability

Jens Grundmann, Ayisha Al-Khatri, and Niels Schütze
TU Dresden, Institute of Hydrology and Meteorology, Dresden, Germany (jens.grundmann@tu-dresden.de)

Coastal aquifers in arid and semiarid regions are particularly at risk due to intrusion of saline marine water. Since groundwater is predominantly used in irrigated agriculture, its excessive pumping intensify the intrusion process. Using this increasingly saline water for irrigation, leads to a destruction of valuable agricultural resources and the economic basis of farmers and their communities. One example is the Al-Batinah coastal plain in northern Oman where irrigated agriculture is practiced by lots of small scaled farms in different distances from the sea.
The limitation of resources (water and soil) in coastal arid regions requires a societal adaptation and change in behaviour as well as the development of appropriate management strategies for a transition towards stable and sustainable future hydrosystem states. Besides a description of the system dynamics and the consequences of adaptation on the resources availability, the contribution combines results of an empirical survey with stakeholders and physically based modelling of the groundwater-agriculture hydrosystem and its interactions with farmer's behaviour and adaptation. This includes an analysis of stakeholders' (farmers and decision makers) behaviour and opinions regarding several management interventions aiming on water demand and water resources management as well as the thinking of decision makers how farmers will behave. In this context, the technical counter measures to manage the saltwater intrusion by simulating different groundwater pumping strategies and scenarios are evaluated from the economic and social point of view. Furthermore, the impact of the spatial variability of the aquifer's hydrogeology is highlighted. The study is exemplarily investigated for the south Batinah region in the Sultanate of Oman, which is affected by saltwater intrusion into a coastal aquifer system due to excessive groundwater withdrawal for irrigated agriculture.