Challenges in Groundwater Resource Management in Coastal Aquifers of East Africa: Investigations and Lessons Learnt in the Comoros Islands, Kenya and Tanzania

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Abstract

Study region

Coastal areas of Kenya (Kilifi County), Tanzania (Kilwa district) and Comoros (Ngazidja island), East Africa.

Study focus

Research aimed to understand the physical and societal drivers of groundwater accessibility and identify critical aspects of groundwater access and knowledge gaps that require further monitoring and research. Interdisciplinary societal, environmental and hydrogeological investigations were consistently undertaken in the three areas considered as exemplars of the diversity of the coastal fringes of the wider region. This paper focuses on the hydrogeological outcomes of the research, framed within the principal socio-environmental issues identified.

New hydrological insights

Results confirm the fundamental importance of coastal groundwater resources for the development of the region and the urgent need to match groundwater development with demographic and economic growth. Hydrogeological knowledge is fragmented, groundwater lacks a long-term monitoring infrastructure and information transfer from stakeholders to users is limited. Current trends in demography, climate, sea-level and land-use are further threatening freshwater availability. Despite possessing high-productivity aquifers, water quality from wells and boreholes is generally impacted by saltwater intrusion. Shallow large-diameter wells, following the traditional model of these areas, consistently prove to be less saline and more durable than deeper small-diameter boreholes. However, promoting the use of large numbers of shallow wells poses a significant challenge for governance, requiring coherent management of the resource at local and national scales and the engagement of local communities.

Keywords

Groundwater
Coastal aquifer
Eastern Africa
Environmental change
Governance
Community engagement