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Using advanced modeling tools for sound groundwater governance of transboundary aquifers in southern Africa: the Stampriet Transboundary Aquifer System case study

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ABSTRACT

The Stampriet Transboundary Aquifer System (STAS) area extends over about 87000 km², from Central Namibia into Western Botswana and South Africa's Northern Cape Province. Due to the lack of permanent surface water, human activities (mostly related to agriculture) only rely on groundwater and the STAS is particularly vulnerable to overexploitation and pollution. Furthermore, the lack of a proper monitoring network seriously hampers a systematic analysis of the stresses involved.

Within the framework of the "Governance of Groundwater Resources in Transboundary Aquifers" (GGRETA) project, funded by the Swiss Agency for Development and Cooperation (SADC), the Governments of Botswana, Namibia and South Africa, jointly with the UNESCO International Hydrological Programme (UNESCO-IHP), are undertaking an assessment of the quantitative and qualitative status of the STAS. The major scope of the GGRETA project is to support the establishment of a Multi-Country Cooperation Mechanism, the first one in Southern Africa, for management and governance of the STAS.

The outcomes of the GGRETA project consist in tables, thematic maps and databases of relevant data from different regional and national sources. Such results were integrated with previous modeling applications to support the implementation of a hydrogeological numerical model, in the framework of the H2020 FREEWAT project (FREE and open source software tools for WATER resource management, www.freewat.eu; Rossetto et al., 2015). The model is being developed through the application of the FREEWAT platform, a free and open source, GIS-integrated modelling environment which integrates spatially distributed and physically based codes for the simulation of the hydrologic cycle aiming at facilitating water planning and management.

FREEWAT applicability is demonstrated by running 14 case studies and enhancing participatory approach to involve relevant stakeholders in the evidence-based decision making process for water resource management. Among the 14 case studies, the STAS is particularly representative, as it aims at facilitating the link between science based analysis and stakeholder participation for the adoption of sound transboundary management policies. This is done by combining a series of capacity building (e.g., training the trainers) and water diplomacy (e.g., focus groups) modules aimed at ensuring sustainability and regular update of the STAS model.

Stakeholders involved for the STAS case study belong to governative agencies, research institutions and parastate water companies of the three Countries involved. They demonstrated a positive perception about the use of advanced modeling tools for sustainable management of transboundary aquifers, in order to: (i) assess the status of the STAS under different scenarios of exploitation; (ii) evaluate the importance and feasibility of Managed Aquifer Recharge solutions; (iii) identify the areas where more data are needed; (iv) set the stage for a groundwater management plan shared among the three Countries; (v) set up a strategy to be adopted and extended to other transboundary aquifers.

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