

Modelling as a means to promote water diplomacy in Southern Africa: the Stampriet Transboundary Aquifer System case study

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Within the framework of the “Governance of Groundwater Resources in Transboundary Aquifers” (GGRETA) project, funded by the Swiss Agency for Development and Cooperation (SDC), the Governments of Botswana, Namibia and South Africa, jointly with the UNESCO International Hydrological Programme (UNESCO-IHP) are undertaking an assessment of the Stampriet Transboundary Aquifer System (STAS). The importance of the STAS to the region draws from the fact that it is the only permanent and dependable water resource in the area, which covers 87000 km^2 from Central Namibia into Western Botswana and South Africa's Northern Cape Province.

The first phase of the project (2013-2015) focused on an assessment of the STAS which allowed establishing a shared science based understanding of the resource. The activities of the second phase of the project (2016-2018) will consolidate the technical results achieved and the tools developed in the first phase, and will strengthen capacity on groundwater governance at the national and transboundary levels to support the process of establishment of a multi-country cooperation mechanism (MCCM). The establishment of the STAS MCCM would be the first example of a mechanism for the management and governance of a transboundary aquifer in Southern Africa.

The joint development of a numerical model is crucial to foster such cooperation as it provides a baseline for the formulation of sound policies for the governance of the STAS. The model is being developed through the application of the FREEWAT platform (within the H2020 FREEWAT project - FREE and open source software tools for WATER resource management; Rossetto et al., 2015), an open source and public domain GIS-integrated modelling environment for the simulation of the hydrological cycle. The FREEWAT project aims at improving water resource management by simplifying the application of water-related regulations through the use of modeling environments and GIS tools for storage, management and visualization of large spatial datasets; this is demonstrated by running fourteen case studies using the FREEWAT platform. Among these, the STAS is a particularly representative case study aiming at facilitating the link between science based analysis and stakeholder participation aiming at the adoption of sound transboundary management policies.

Due to the scarcity of surface water, water-demanding activities in the study area rely only on groundwater. The first version of the model is developed adapting an existing model of the Namibian part of the aquifer: so far, the groundwater body is discretized using rectangular cells about 40 km^2 wide and a stack of three aquifers divided respectively by three aquitards with variable thicknesses and heterogeneous hydraulic properties. The model setup is then revised integrating outcomes from the GGRETA project and extended until the groundwater body limits. Also, boundary conditions and hydrologic stresses (i.e., rainfall infiltration and abstraction for irrigation purposes) were re-defined according to maps and datasets available from the GGRETA project.

The involvement of the UNESCO-IHP within the FREEWAT Consortium supports the coordination and integration of previous research outcomes (e.g., from the GGRETA project) and the model development to achieve a full characterization of the STAS current and forecast dynamics and possibly highlighting any existing knowledge gaps. This will be further performed through the application of an innovative inclusive participatory approach, combining capacity building modules (e.g., training the trainers) and water diplomacy (e.g., focus groups) in order to ensure sustainability and regular update of the model.

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References

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