Recent advances with the integrated hydrological model of the Stampriet Transboundary Aquifer System (STAS)

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Marc Leblanc[1], Irene Kinoti[1], Sarah Tweed[2], Damien O'Grady[3], Maciek Lubczynski[4], Albert Olioso[5], Gaspard Magniny[1], Clement Fraysse[1], Majola Kwazikwakhe[6], Sivashni Naicker[6], Piet Kenabatho[7], Bertram Swartz[8], Koen Verbist[9]

The STAS is a very large transboundary aquifer system (100 000 km2) shared between Botswana, Namibia, and South Africa. It provides the only water resource in this otherwise arid region. As part of the GGRETA project, the UNESCO and local stakeholders have been promoting the development of a groundwater model for the assessment and the sustainable management of this shared resource. In this communication, we retrace recent progress and lessons learnt from this modelling endeavor. First, a detailed hydro stratigraphic study allowed us to refine the geometry of the STAS and in particular the position of its boundaries. This study also highlighted links between the STAS and the neighboring Central Kalahari Basin. To the south, a large complex of salt pans was identified as the regional outlet for the basin (Hakskeen, Koppieskraal, Uitsak pans). Second, although the isotope data for the basin were compiled in phase 1 of the GGRETA project, they have, to date, never been used as information for the STAS numerical model. Integration of environmental tracer data allowed the identification of key hydrological recharge, discharge, and aquifer exchange processes. In particular, the hydro chemical and isotopic synthesis highlighted the importance of surface and groundwater interaction, even in this arid environment. In turn, this led us to select an integrated hydrological model capable of simulating interaction between land surface (UZF) and groundwater (MODFLOW). A feasibility study showed there would be great benefits moving from a stand-alone model, which requires manual updating, to a state-of-the-art modelling platform that can be shared by all stakeholders and updated automatically with remote sensing data.

1 Avignon University, UMR EMMAH, Hydrogeology group, Avignon University. France
2 UMR G-EAU, IRD, Montpellier. France
3 James Cook University, Cairns. Australia
4 ITC, University of Twente. The Netherlands
5 UMR EMMAH, DREAM group, INRAE, Avignon. France
6 Department of Water and Sanitation. South Africa
7 University of Botswana, Gaborone. Botswana
8 Ministry of Agriculture, Water and Land Reform, Department of Water Affairs, Windhoek. Namibia
9 UNESCO IHP, Harare. Zimbabwe