



Using Big Data for Transboundary Water Management in Southern Africa

WISA Conference
Venue: Online

Rationale

The sixth Sustainable Development Goals requires us to improve water security and sanitation, with the understating that water quality and quantity are at the very foundation of life and human development. Decision-making on water security, however, is highly fragmented within national governments, by sector of influence, and across countries, with water diplomacy becoming an important skill to facilitate cooperation especially in transboundary aquifers.

At the centre of this very complex scenario is the question on how to take sound and informed decisions for managing transboundary aquifers. Data collection, management and analytics is critical to ensure informed decisions are taken, relevant projects defined and implemented, on the understanding that water is at the centre of large socio-economic and environmental complex systems in our region. As such, data can no longer be understood as single collection spreadsheet, but as integrated data flows, that may need to be localised to focus relevance. In this respect, the water sector and the computer science sector will need to work together to define the questions in need of a real answer, to develop algorithms and access the data sources required, using Artificial Intelligence to provide us the information we need.

Session focus

The Big Data Analytics and Transboundary Water Management Collaboration for Southern Africa has brought together regional and international partners to investigate the preparedness of our region for big data analytics, when applied to the water sector. In this session, the Collaboration will introduce the tools developed, by way of experimental work by the research teams with IBM Research Africa, to apply Big Data Analytics thinking to the management of the Ramotswa Aquifer (Botswana and South Africa). In the workshop session, the audience will be introduced to the innovation produced by the teams in the production of a Sustainability Framework applicable to dolomitic aquifers, underpinned by a Master Database including the use of AI to address data issues and other Big Data Analytics solutions to balance field data collection with remote sensing.

Expected outcome

The objective of this session revolves around sensitising the water sector on the opportunities offered by introducing Big Data Analytics for improved groundwater management. Hence, the expected outcome is the contribution to a Community of Practice able to inform regional policy in Integrated Transboundary Water Management and provide support to the regional River Basin Organisations.

Proposed Programme

The proposed programme includes sections of Q&A with the audience and live showcasing of tools.

Time	Session	Content	Presenter
10 minutes	The Big Data Analytics and Transboundary Water Collaboration	This is an introduction to the collaboration and its vision.	C. Bocchino
15 minutes	Innovation 1: the Sustainability Framework for a Transboundary Aquifer	This session presents the development of the SF for the Ramotswa transboundary aquifer, discussing its elements and indicators.	Delta – H
15 minutes	Innovation 2: A Master Database for a Transboundary Aquifer	What are the challenges in creating a database for a transboundary water system and how can Big Data Analytics help to overcome them?	Umvoto team
15 minutes	Innovation 3: Merging qualitative and quantitative data and data inference to triangulate data	How does one address the problems of data scarcity and poor accessibility? This session provides the Big Data Analytics solutions to using inferred data and qualitative data to supplement a groundwater database.	University of the Witwatersrand
15 minutes	Innovation 3: Localising Big Data for River Basin decision-making	How does one localise Big Data to suit a river basin? This session looks at the experimental work in two regional transboundary aquifers.	University of the Western Cape
30 minutes	The Infrastructure tool and audience engagement	How do the innovations come together to inform decision making authorities? This session includes a live session to present the tool and engages the audience in drafting the future of the research and its replications.	UWC and Sustainable Water Partnership

Proposer's Information

First Name: Clara

Last Name: Bocchino

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Workshop / Forum Information

Descriptive title:

Transboundary Water Management and Big Data Analytics: engaging governments for a common regional vision

Conference sub-theme (select one)

2. Manage resources for a capable ecology

What is the workshop/forum chosen format?

Ignite style

Is this workshop related to an existing WISA division or branch? If yes, specify which one.

No

How many delegates do you expect to attend this workshop?

Maximum 50

Name of person who will organise this workshop/forum?

Clara Bocchino

Name of organisation who is hosting this workshop/forum?

Big Data Analytics and Transboundary Water Collaboration for Southern Africa

Who are the collaborating organisers or hosts of this event?

USAID, WRC, Department of Science and Innovation, SADC Ground water Management Institute, US Geological Survey, Winrock International & Tetrattech

Do you have funds to enable speakers, facilitators, or students to attend? Detail to be provided.

Only internal staff will be funded, but we may want to fundraise for specific government participants to ensure representation.

What handouts will be distributed during this event ('take home'), if any?

None, we would use email invitations

How much time would you like to request to be allocated to your workshop/forum?

A minimum of 1,5 hours

Would you like to be put in contact with the relevant WISA branch or division if you are not already in contact?

Yes please

Would you like any assistance from the WISA 2020 Organising Committee? If so, please specify what type of assistance.

We would appreciate a list of government representatives attending, so we can select what to invite to the workshop.

Workshop/Forum Details

Title of Workshop/Forum (max 15 words)

Transboundary Water Management and Big Data Analytics: jamming ideas for a regional future

How is the Workshop/Forum connected to the chosen sub-theme (choose from list 1-6 above)

The workshop is connected to all of the themes, because it seeks to brainstorm and guide decision-makers from the region on how can AI and Big Data Analytics improve decision-making for transboundary aquifers in the region on all aspects of water management.

Name the SDG/s which link with this Workshop/Forum.

It really speaks to all SDG, with water be the catalyst for any form of sustainable development, especially in our region. However, it directly links with Goals 3, 6, 9, 11, 13 and 17.

Explain the need and relevance of this workshop (1000 words)

Background

The Collaboration on Big Data Analytics and Transboundary Water Management for Southern Africa was formed in 2017 through historical relations between all of its partners: the South African Department of Science and Technology, the Water Research Commission, the SADC Groundwater Management Institute, the IBM Research Africa Lab, and the United States Agency for International Development. The latter has, in turn, brought into the Collaboration both the United States Geological Survey and the Sustainable Water Partnership, co-managed by Winrock International and Tetrattech (USA).

The Collaboration has three primary objectives, which reflect its experimental and innovative nature:

- To foster multi-agency collaborative funding opportunities;
- To promote innovative thinking and application of Big Data Analytics to the Transboundary Water sector for integrated decision-making;
- To plant the seed for a growing community of pioneers in the use of Big Data Analytics for the study and management of Transboundary Water Aquifers

In the beginning of 2019 The Collaboration has funded 4 regional research projects for a period of 18 months. The selected projects were proposed by teams with demonstrated:

- Experience on transboundary aquifer research;
- Innovative thinking on the use of Data and Data Analytics;
- Cross-country and regional collaborative agreements;
- Interest in the Science-to-Policy role of seed grant projects.

All projects are focussed on the Ramotswa River Aquifer between South Africa and Botswana, and cover four thematic areas, which are building on to each other's progress:

- *Consolidation of data and application of big data tools to enhance national and transboundary data sets in Southern Africa that support decision-making for security of water resources.* This is implemented by: Umvoto Africa, University of Botswana, other global
- *Imagining solutions for extracting further value from existing datasets on surface and groundwater resources in Southern Africa.* This is implemented by: Witwatersrand University, Geological Services of Botswana, DWS
- *Localizing transboundary data sets in Southern African: A case study approach.* This is implemented by: University of the Western Cape, CSIR, L2K2 Consultants

- *Groundwater secure transboundary systems*. This is implemented by: Delta-H Water Systems Modelling and Institute for Groundwater Studies.

Relevance

By the time of the 2020 WISA Conference, most of the projects funded by the Collaboration would be concluding their implementation and developed tools for enhances decision-making. The partners would have been able to draw sufficient learning on the management of a multi-agency funding collaboration and on the experimenting with using Big Data Analytics thinking to the transboundary water sector in the region.

This workshop aims at showcasing the projects and the lessons learnt by the research teams in conducting cross-sectoral research. The audience would be able to engage in discussions with the teams and the Collaboration partners, and share experiences.

For this reason we would like to capitalise on the regional representation of government and decision-makers to host a workshop, by invitation only, in order to present the learning and initiate a discussion with government representatives on critical questions pertaining to cooperation, technology and innovation, and enhanced decision making.

A twin project to the Research Idea Jam, this workshop will be geared towards creating an enabling environment to draft a regional vision that is nested in the SADC Protocol on Transboundary Water courses but can affect all other aspects of regional cooperation for water management.

The workshop facilitator will work with IBM Africa Lab to showcase example of AI use for water management and involve the IBM Garage team in Johannesburg to conduct a facilitated discussion, with the aim of aligning the information gathered in the Academia Idea Jam to government priorities and consolidate the trend on research funding for the period 2021 – 2025 in our region.

Looking the Thematic areas of WISA2020, this workshop will be very relevant to Develop skills and technology innovation and disruptors theme, because it will present the current work with Big Data algorithms for water data management, developed by the Collaboration teams, merging Analytics thinking and Southern African data realities. However, it will be relevant all around because it aims at creating a regional common vision and an enabling environment for research, practice and donors to better work with government. The Idea Jam component is critical and relevant to WISA 2020 because it will consolidate interest around merging AI tools with water management, help create a new Community of Practice possibly linked to the Innovation for Water and Sanitation Division, the International Water Association – Southern Africa Division, the Water Science Division and the Young Water Professionals Division, and enhance government relations and collaboration.

This unique workshop may help shape the way the region thinks about water management and how research and practice can work together to ensure we have the right tools in capable hands.

Describe the target audience.

This workshop is aimed specifically at government agencies and decision makers in the water sector, as well as Academic institutions and International Cooperating Partners. While we seek to maintain a transboundary thrust, in the interest of international collaboration, we are also cognisant of the implications our work can have on the national water systems.

Name of session Facilitator (Chair) and Organisation

Clara Bocchino: Winrock International

List the names and topics/titles (plus time allocation) of each presenter.

Innovations launch and idea jam.

What is the expected outcome of this session and what impact on the water sector do you expect to have? (max 60 words)

To draft the government priorities in the theme of Big Data Analytics and Transboundary Water Management for the next 5 years and initiate new collaborative partnerships with government institutions, through a Community of Practice.