International Water Management Institute

Project Brief
Transboundary Water Management in Southern Africa

Joint Strategic Action Plan for the **Ramotswa Transboundary Aquifer Area**

The importance of transboundary water cooperation and the prevalence of shared aquifers demands coordinated planning and joint action. Cooperative development and management of shared waters is widely recognized for its role in enhancing water security and increasing resilience (Sadoff and Grey 2005). Protocols under the United Nations and the Southern African Development Community (SADC) call for cooperation on transboundary waters (UN 2014; SADC 2000). In addition, Target 6.5 under Goal 6 of the United Nations Sustainable Development Goals (SDGs) specifically highlights the importance of transboundary cooperation for ensuring availability and sustainable management of water and sanitation for all (IAEG-SDGs 2016). These frameworks guide the joint assessment of shared water resources and the negotiation of transboundary strategic action plans that outline actions to take forward. The vast majority of transboundary strategic action plans in the world have been developed for international surface waters (i.e., lakes, rivers, coastal areas), with less than ten focusing on transboundary groundwater bodies. The Joint Strategic Action Plan (JSAP) for the Ramotswa aquifer is the first strategic action plan developed for a transboundary aquifer in SADC.

Botswana-South Africa JSAP discussions, December 2016 *(photo:* Karen G. Villholth).

Key messages

- **There is substantial scope for joint management of the Ramotswa aquifer, a transboundary aquifer shared by South Africa and Botswana.** Building on the history of transboundary cooperation on shared river basins (e.g., on the Limpopo River Basin) in SADC, the JSAP was developed as a negotiated action plan to address key issues related to the Ramotswa aquifer.
- **JSAP actions were diverse in scope.** JSAP actions were categorized into one of three components: (i) managing water for sustainable use, availability and access; (ii) enhancing institutions and capacity; and (iii) expanding research and knowledge. More than 100 actions were identified, of which one-third can be implemented at low cost (less than USD 250,000) in the short term (less than 2 years). More than half of the actions are transboundary in nature.
- **Improved national management of the resource is critical - alongside emerging transboundary efforts.** Several actions within the JSAP are nationally oriented and may be streamlined into government action plans. This highlights the need for both (i) improved unilateral oversight and action over shared watercourses, and (ii) coordinated bilateral actions that address transboundary and shared issues in the system.
- **Improved monitoring and institutional development emerged as critical elements of ongoing joint management of the RTBAA.** Data collection and management, compatibility of data between countries, and procedures for sharing data emerged as key enablers of joint management. In addition, transboundary aquifer management is new to the institutional environment in many regions. Actions generated in the JSAP highlight the need to embed and institutionalize emerging transboundary management under a transboundary river basin organization - in this case the Limpopo Watercourse Commission (LIMCOM).

The Ramotswa dolomitic aquifer is a vital source of water for people and ecosystems in SADC. The aquifer is located on the border between South Africa and Botswana, and it is important for the upper part of the Limpopo River Basin, which is shared by Botswana, Mozambique, South Africa and Zimbabwe. The Ramotswa aquifer makes important contributions to water security in the Gaborone Dam catchment and supplies water to communities on both sides of the border, primarily for domestic use and small-scale agriculture. The Ramotswa Transboundary Aquifer Area (RTBAA) encompasses a region beyond the strict boundary of the aquifer to include the surface waters that interact directly with the aquifer.

Methods: Developing the Ramotswa Joint Strategic Action Plan

The JSAP utilized stakeholder consultations to determine an aspirational vision and specific objectives, targets and actions. The term 'Strategic Action Plan' in transboundary water management refers to a negotiated policy document that identifies policy and institutional reforms and investments required to address water and environmental issues. The purpose of the Ramotswa JSAP (IWMI 2019) is to provide a framework for joint management of the RTBAA between the governments of Botswana and South Africa as they address key challenges and leverage opportunities for sustainable development and use of the aquifer. A series of joint workshops and national consultations with the governments and other relevant stakeholders were conducted from November 2016 to November 2018 to develop the JSAP, moving through the following five stages:

1. Conceptualizing the JSAP vision and framework
2. Identifying and considering objectives, targets and actions
3. Reviewing the compatibility of actions within existing institutional frameworks
4. Classifying and prioritizing actions; estimating cost and feasibility
5. Articulating recommendations for next steps

Key findings

Development of the joint vision and framework considered the aspirations of stakeholders in both Botswana and South Africa. The joint vision and framework were developed in separate national consultations with each country. In Botswana, the vision statement was "to achieve cooperative and sustainable groundwater use and protection in order to guarantee future use and contribute to sustainable socioeconomic development." The vision statement articulated in South Africa was "to improve understanding and management of the aquifer area to achieve water security, ensuring sustainable socioeconomic development and environmental needs." These visions and the accompanying components were synthesized into a joint vision and three-component framework (Figure 1).

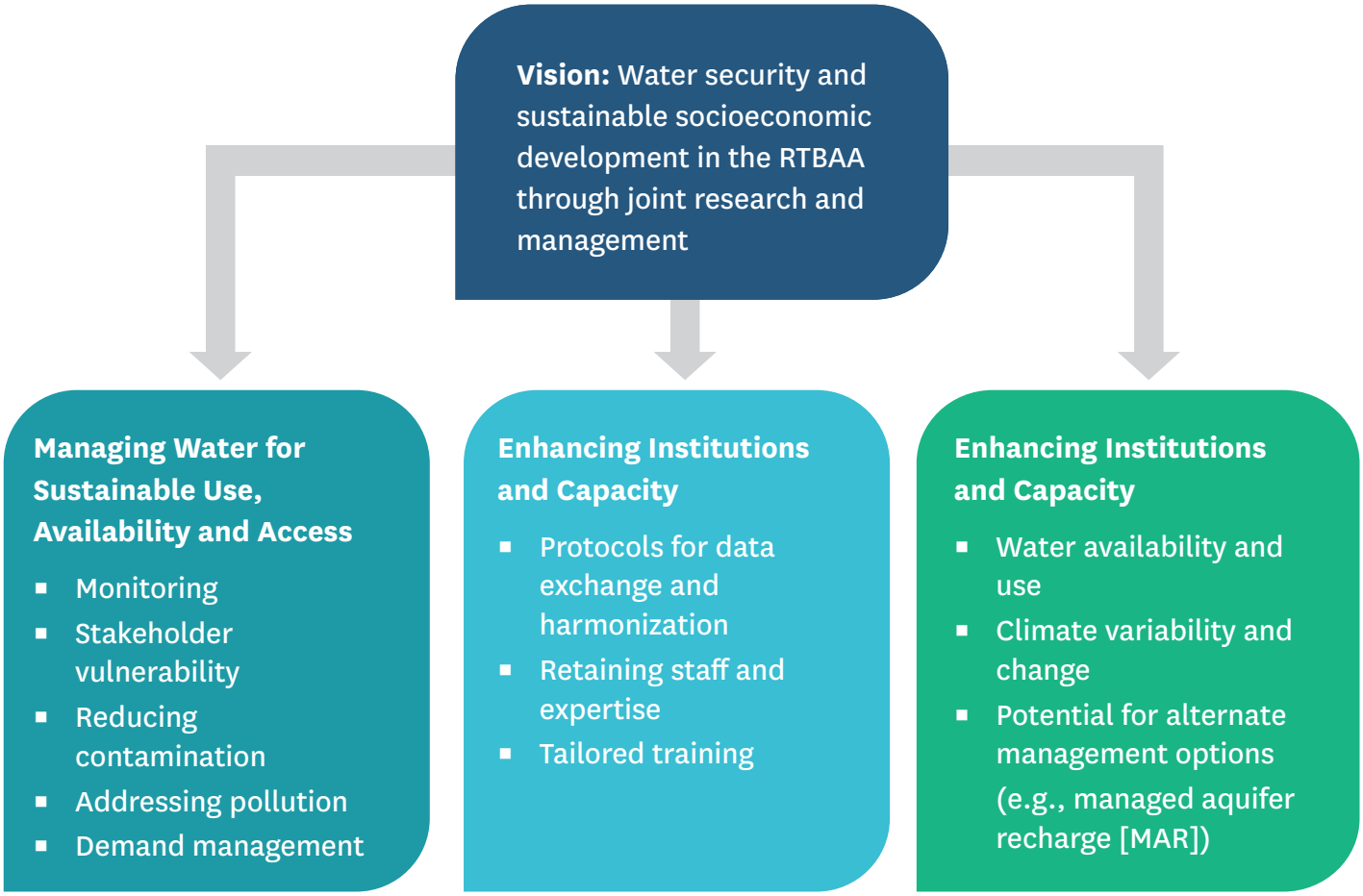

Figure 1. Joint vision and framework for the RTBAA.

Objectives, targets and actions were used to define activities that contribute to achieving the vision and addressing key issues in the RTBAA. JSAP actions were identified by articulating a set of objectives, targets and actions under each of the three components shown in Figure 1. This resulted in an initial list of over 100 actions that fall under a range of targets. The objectives articulate broad, overarching categories for coordination, while the targets provide more specific aims that contribute to addressing the objective. The actions provide concrete implementation steps to achieve each target (Table 1).

Table 1. Objectives and targets for the three components under the JSAP framework.

	Objectives	Targets
Managing water for sustainable use, availability and access	Monitoring	▪ Effective monitoring at the municipal and local levels ▪ Develop a georeferenced inventory of boreholes and a common information system ▪ Close monitoring of recharge zones for sustainable management ▪ Close monitoring of sanitation impacts and wastewater effluent
	Water allocation	▪ Understand current and potential needs and uses of the RTBAA ▪ Develop water provision schemes for low-income syndicates ▪ Define water licensing and water rights for the RTBAA
	Contamination control	▪ Increased public/stakeholder awareness of contamination control ▪ Protocols in place for the prevention of contamination from pit latrines ▪ Explore alternatives to conventional pit latrines ▪ Land use management that is sensitive to groundwater contamination
Enhancing institutions and capacity	Institutional harmonization	▪ Internal harmonization within country government departments ▪ Agreements over focused transboundary issues ▪ Implementation and capacity enhancement
	Agreements over focused transboundary issues	▪ Agreement establishing Joint Management Structure (operational committee) ▪ Creation of a Memorandum of Understanding for groundwater monitoring
	Implementation and capacity enhancement	▪ Strengthen capacity to include groundwater in relevant management structures ▪ Develop an implementation plan ▪ Define key roles and responsibilities for stakeholder institutions related to municipalities ▪ Identify ways to mobilize financial and human resources
	Tailored training	▪ Implement training and monitoring schemes to ensure continuity of institutional memory ▪ Establish processes for knowledge exchange between public, private and research spheres
Expanding research and knowledge	Monitoring	▪ Assessment of water demand and abstraction ▪ Assessment of water quality ▪ Assessment of climate variability and change ▪ Investigate institutional and socioeconomic aspects of monitoring
	Researching alternative management options	▪ Focused recharge assessment to assess the possibility of Managed Aquifer Recharge (MAR) ▪ Research to consider options for water sources for MAR ▪ Cost-benefit analysis to assess practicality of MAR ▪ Investigate different institutional options
	Harmonizing data	▪ Address sustainability of Ramotswa Information Management System (RIMS) for data sharing ▪ Integrated analysis
	Raising awareness	▪ Water demand management ▪ Early warning information system ▪ Raising awareness of the importance of groundwater, its limits, and the need for protecting and saving the resource

Actions for *managing water for sustainable use, availability and access* focused on monitoring, water allocation and contamination control. A range of targets under each of these broad themes addresses specific topics related to each of the objectives, including institutional and legislative actions, investments, and further research and study. Emerging themes include the need to better understand recharge dynamics and migration of contaminants from sanitation zones to the water resource.

Actions for *enhancing institutions and capacity* focused on institutional harmonization, agreements over focused transboundary issues, implementation and capacity enhancement, and tailored training. A range of targets under each of these objectives focuses on policies and management structures, including commitments between both countries for ongoing cooperation in management of the aquifer. Emerging themes include the need to establish formal commitments among actors in the highest levels of government to clarify the specifics of cooperation (e.g., stakeholder roles and responsibilities), and to establish clear processes for streamlining information sharing and other collaborative activities.

Actions for *expanding research and knowledge* focused on monitoring, researching alternative management options, harmonizing data and raising awareness. A range of targets under each objective addresses the need for assessments and analyses on various topics, and awareness raising within government departments and among the general public. Emerging themes include the need to continue expanding specific characteristics of the water system, and to expand the type of water management efforts conducted in the water system (e.g., early warning systems).

An analysis of legal and institutional frameworks was conducted to investigate whether existing institutions would support or constrain implementation of JSAP actions. Three steps were followed: (i) existing codification of water resource cooperation at various scales relevant to the RTBAA was analyzed; (ii) national laws and policies of Botswana and South Africa were identified and reviewed for commonalities that may promote joint action; and (iii) actions from the JSAP were analyzed for alignment with existing institutions at all scales. The analysis showed that the broad vision and framework of the Ramotswa JSAP are aligned with overarching international and regional goals, as well as national and subnational institutions.

Stakeholders prioritized actions according to those they felt were critical. Prioritization of actions was a major topic during the joint workshops held in the latter stages of development of the JSAP (September 2018 and April 2019). The prioritized actions are summarized in Table 2. During discussions at a joint workshop in September 2018, two priority actions were selected and elaborated: (i) institutionalizing joint groundwater management between Botswana and South Africa, and (ii) implementing joint data and monitoring systems (Box 1).

Site visit to Mogobane Dam in Botswana, April 2019 (*photo*: Anita Lazurko).

Table 2. Prioritized actions.

Priority actions	Short term, low cost and transboundary
Managing water for sustainable use, availability and access	
Awareness raising and communication with local management	✓
Review of existing bylaws and monitoring systems to assess compatibility and revisions needed	✓
Prioritize specific parameters to monitor	✓
Borehole monitoring: water levels, abstractions and quality	✓
Review the legal process of borehole drilling	✓
Conduct stakeholder analysis of the needs and priorities, including identifying the people most reliant on groundwater and those who are most impacted by the lack of sufficient access to or quality of the resource	✓
Review (and amend, if necessary) existing bylaws for water rights and licensing, including borehole drilling (distinction between municipality and community/individual boreholes)	
Enhancing institutions and capacity	
Entering into transboundary dialogue to assess the similarities and differences in monitoring and research practices	
Formalize reporting process (prior notification) around plans, and foster interaction in planning process, between countries	
Agree on joint monitoring practices for harmonized data collection that eliminates data gaps	✓
Creation of possible funding mechanisms for the actions under each component	
Joint investments for combined/collaborative groundwater monitoring practices	
At municipality level, provide a short training to familiarize non-specialists on the basics of groundwater	✓
Needs assessment for institutions in relation to fulfilling their mandate, identifying constraints to implementation and developing recommendations	✓
Establish the role of municipalities to create awareness at community level	✓
Assign mentors to junior employees in departments across the water sector	✓
Attach junior staff to projects in departments across the water sector	
Expanding research and knowledge	
Assessment using measurements of water abstraction, level and quality	✓
Identify gaps in existing data collection to set up new monitoring activities	
Assess institutional arrangements for monitoring, including roles and responsibilities	✓
Investigate socioeconomic implications of water access challenges	
Development of monitoring program	
Identify data gaps on RIMS and locate missing data for uploading	
Public awareness for addressing myths and misunderstandings, including the (i) value of groundwater/trust in relation to its hidden nature: (ii) value of wastewater reuse, and (iii) value of research and new technologies	✓
Integration with the outreach team within the SADC region	✓

Box 1. Two proposed priority projects emerging from the Ramotswa JSAP.

Two action areas emerged as major priorities for stakeholders from Botswana and South Africa. These action areas were developed into project concept notes that were included in the JSAP.

Cooperation for resilience in Ramotswa: A joint subcommittee for transboundary groundwater management. The objective of this proposed project is focused on the creation of a committee for joint management of the RTBAA, which can also serve as a Groundwater Committee for other shared aquifers between South Africa and Botswana. The committee could be established under the Botswana-South Africa Joint Permanent Technical Committee, following a similar structure to the existing Water Quality and Aquatic Weeds Committee. It could eventually migrate to the Limpopo Watercourse Commission (LIMCOM) framework. Design of the project could include a central focus on: (i) establishing and sustaining the committee for a period of 3 years, (ii) building capacity in the committee for the first 2 years, and (iii) setting up and executing migration of the committee to LIMCOM during the third year.

Understanding the resource in Ramotswa: Data and information for resilient groundwater cooperation. The objective of this proposed project is to undertake joint data collection, monitoring and interpretation in the RTBAA, and to utilize shared data to conduct priority studies and assessments. The project design envisions three components: (i) establishing a plan and process for ongoing joint monitoring; (ii) installation of data loggers and flow meters to enable monitoring of the aquifer and Ngotwane River, in the context of a newly formed groundwater management committee; and (iii) conducting priority studies and assessments based on newly collected data.

Ramotswa workshop in Gaborone, Botswana, in April 2019 (*photo*: Anita Lazurko).

Conclusion

The development of the Ramotswa JSAP has set an example for joint aquifer planning in the Limpopo Basin and SADC. Efforts to enhance joint management of the shared aquifer are ongoing, and embedding the Ramotswa JSAP within regional frameworks, such as the LIMCOM, is critical to sustain and facilitate implementation of the JSAP. Experiences from the Ramotswa JSAP development process provide important lessons for future transboundary aquifer management efforts in SADC. The importance of data collection and management, compatibility of data between countries, and procedures for sharing data, for example, all emerged as key enablers of joint aquifer planning and management. Further, the constructive JSAP experiences in the RTBAA point to transboundary river basin organizations as key platforms to support joint groundwater management.

References

IAEG-SDGs (Inter-Agency and Expert Group on SDG Indicators). 2016. Final list of proposed Sustainable Development Goal indicators. Annex IV in *Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators*. E/CN.3/2016/2/Rev.1. Available at https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf (accessed on June 19, 2019).

IWMI (International Water Management Institute). 2019. *Joint Strategic Action Plan for the Ramotswa Transboundary Aquifer Area*. Supported by the United States Agency for International Development (USAID). Pretoria, South Africa: International Water Management Institute (IWMI). A draft version of the report is available at http://conjunctivecoperation.iwmi.org/wp-content/uploads/sites/38/2019/02/DraftSAP.pdf

SADC (Southern African Development Community). 2000. *Revised protocol on shared watercourses in the Southern African Development Community. Available at* https://www.sadc.int/files/3413/6698/6218/Revised_Protocol_on_Shared_Watercourses_-_2000_-_English.pdf (accessed on June 19, 2019).

Sadoff, C.W.; Grey, D. 2005. Cooperation on international rivers: A continuum for securing and sharing benefits. *Water International* 30(4): 420-427. https://doi.org/10.1080/02508060508691886

UN (United Nations). 2014. *Convention on the law of the non-navigational uses of international watercourses*. Adopted by the General Assembly of the United Nations on May 21, 1997. Entered into force on August 17, 2014. Available at http://legal.un.org/ilc/texts/instruments/english/ conventions/8_3_1997.pdf (accessed on June 19, 2019).

Project

This work was undertaken in the context of and supported by the *Potential Role of the Transboundary Ramotswa Aquifer-2* project, funded by the United States Agency for International Development (USAID) under the terms of Award No. AID-674-IO-17-00003, and the CGIAR Research Program on Water, Land and Ecosystems (WLE). The USAID-funded project entitled *Conjunctive Surface-Groundwater Management of SADC's Shared Waters: Generating Principles through Fit-for-purpose Practice* also supported the development of this brief. For more information about the project, visit http://conjunctivecooperation.iwmi.org/systems/ramotswa-ngotwanesystem/

Acknowledgements

This work was supported by the United States Agency for International Development (USAID) and was implemented with colleagues at the International Water Management Institute (IWMI), International Groundwater Resources Assessment Centre (IGRAC), Department of Water and Sanitation in Botswana, and the Department of Water and Sanitation in South Africa.

Contacts

Anita Lazurko, Consultant, IWMI, Pretoria, South Africa (anitalazurko@gmail.com)

Jonathan Lautze, Research Group Leader - Integrated Management of Basins and Aquifers, IWMI, Pretoria, South Africa (j.lautze@cgiar.org)

Karen G. Villholth, Principal Researcher and Coordinator - Groundwater, IWMI, Pretoria, South Africa (k.villholth@cgiar.org)

IWMI
International Water Management Institute

CGIAR
IWMI is a CGIAR Research Center

The International Water Management Institute (IWMI) is a non-profit, research-for-development organization that works with governments, civil society and the private sector to solve water problems in developing countries and scale up solutions. Through partnership, IWMI combines research on the sustainable use of water and land resources, knowledge services and products with capacity strengthening, dialogue and policy analysis to support implementation of water management solutions for agriculture, ecosystems, climate change and inclusive economic growth. Headquartered in Colombo, Sri Lanka, IWMI is a CGIAR Research Center and leads the CGIAR Research Program on Water, Land and Ecosystems (WLE).

International Water Management Institute (IWMI)

Headquarters
127 Sunil Mawatha, Pelawatte,
Battaramulla, Sri Lanka

Mailing address:
P. O. Box 2075, Colombo, Sri Lanka
Tel: +94 11 2880000
Fax: +94 11 2786854
Email: iwmi@cgiar.org
www.iwmi.org

Published: April 2020