



Terms of Reference For

Determining dependency and vulnerability of groundwater in Megacities (Kinshasa, Johannesburg, Luanda)

ZA-SADC-GMI-418179-CS-CQS

1. Background

Southern Africa is home to about thirty (30) transboundary aquifers (TBAs) and numerous national strategic aquifers that support the primary water needs and livelihoods of a significant portion of the region's population. Because of climate change, reliance on groundwater has increased. Although there is a fair understanding of the strategic aquifers, increased data collection will enhance the capacity of institutions to sustainably manage groundwater resources. Furthermore, developing groundwater-specific data-sharing protocols among riparian states contributes to the integrated management of shared aquifers. There is a unique opportunity to establish groundwater monitoring networks and strengthen institutional frameworks for shared water management.

SADC-GMI, a subsidiary of the SADC Secretariat, is established as a Section 21 Not-for-Profit Company under South African law. The vision of the SADC-GMI is to ensure the equitable and sustainable use and protection of groundwater and be a Centre of Excellence in groundwater management and management of groundwater-dependent ecosystems in the region. The role of the SADC-GMI is to:

- Promote sustainable groundwater management and provide solutions to groundwater challenges in the SADC region through building capacity, providing training, advancing research, supporting infrastructure development, and enabling dialogue and exchange of groundwater information
- Conduct and support the SADC Member States in groundwater research, and serve as a focal interlocutor with national, regional, and international groundwater initiatives.
- Promote the sustainable conjunctive use of surface and groundwater.

Groundwater Dependency and Vulnerability in the Megacities of Luanda, Kinshasa and Johannesburg

In the Southern African Development Community (SADC) region, several megacities face significant issues related to groundwater dependency and vulnerability due to their size, rapid urbanization, and environmental factors. To start with, rapid population growth and urban expansion strain water resources, leading to increased groundwater demand. Moreover, the impacts of climate change lead to changing precipitation patterns, temperature increases, and sea-level rise which affect groundwater recharge rates and quality.

Inadequate governance, regulatory frameworks, and institutional capacity hinder effective groundwater management, while urban pollution from industrial activities, agriculture, and inadequate sanitation facilities poses significant threats to groundwater quality. Addressing these challenges requires integrated water resource management strategies, including sustainable groundwater use practices, improved monitoring, investment in infrastructure, and effective governance to ensure resilience against future water scarcity and environmental degradation in these megacities of the SADC region.



With the urban sprawl in Megacities, inadequate enforcement of regulations and improper management of groundwater resources can exacerbate vulnerabilities.

These TORs pertain to generating an understanding of the Dependency and Vulnerabilities in the selected Megacities in the SADC region.

2. Objective of the Assignment:

The overall objective of this assignment is to Determine the dependency and vulnerability of groundwater in the Megacities of Johannesburg, Kinshasa and Luanda

3. Scope of work and specific tasks of the consultant

Groundwater Dependency and Vulnerability in the Megacities of Luanda, Kinshasa and Johannesburg

The following major tasks are to be implemented collaboratively with governmental agencies, research institutions, NGOs, and local/city authorities to ensure comprehensive and effective management of groundwater resources in the Megacities of Johannesburg, Kinshasa and Luanda.

- a. Conducting a kick-off meeting with the SADC-GMI staff to clarify and understand the assignment, covering the detailed scope of work and specific tasks.
- b. Conduct site visits and stakeholder consultations for data collection and issue identification.
- c. Producing an inception report detailing the various tasks with important milestones, a table of contents of the proposed guidelines and a list of the stakeholders to be consulted in conducting the assignment.
- d. Undertaking a desktop study of the dependency and vulnerability of groundwater in the selected Megacities.
- e. Conduct a comprehensive assessment of groundwater availability, recharge rates, and aquifer characteristics in each city to understand the quantity and quality of available groundwater resources to assess dependency and potential risks.
- f. Analyze current and projected water demand trends, considering population growth, industrial activities, and agricultural needs to determine the extent of groundwater dependency and identify sectors contributing most to groundwater demand. The Consultant shall also consider potential climate change impacts on future groundwater demand, that could be due to increased temperatures and evaporation, or reduced surface water availability.
- g. Conduct a high-level assessment to predict likely changes in groundwater recharge, flow patterns, and other possible impacts of climate change to assess vulnerability to changes in precipitation patterns, temperature, drought events, and other potential impacts on groundwater availability.
- h. Map vulnerable areas prone to groundwater depletion, contamination, and saltwater intrusion to identify areas at highest risk and priority interventions to mitigate vulnerabilities, such as land use planning and groundwater protection measures.
- i. Evaluate risks to human health and ecosystems from pollutants and identify sources for targeted remediation efforts by implementing a high-level groundwater quality monitoring program to assess contamination levels, pollutant sources, and trends over time.

- j. Identify barriers to sustainable groundwater management and opportunities for policy interventions and stakeholder engagement by conducting socioeconomic assessments to understand the social, economic, and institutional factors influencing groundwater management and governance.
- k. Develop an integrated water resource management strategy that incorporates sustainable groundwater use practices, conjunctive management, water conservation measures, and adaptive management approaches to ensure holistic management of water resources, balancing competing demands while safeguarding groundwater sustainability and resilience to future challenges.
- l. Conduct a workshop with SADC-GMI staff, respective Megacity stakeholders, RBOs, riparian states and interested parties to discuss the deliverables.
- m. Hold monthly progress review meetings with the SADC-GMI and selected stakeholders from the project sites

4. Key Deliverables and Outputs

The stated deadlines require the following deliverables:

Deliverable No.	Deliverable/Output	Deadline Due Date
1	Minutes of kick-off meeting with SADC-GMI staff	2 weeks
2	Inception report detailing the various tasks to be undertaken with important milestones	6 weeks
3	Technical Report on groundwater dependency in each of the 3 Megacities	14 weeks
4	Technical Report on groundwater vulnerability in each of the 3 Megacities	18 weeks
5	3 Draft conjunctive management strategic action plan developed for each one of the 3 Megacities	30 weeks
6	Validation Workshops held for the 3 conjunctive management strategic action plans in the respective cities and 3 Workshop Reports produced	48 weeks
7	3 Final conjunctive management strategic action plans developed for each one of the 3 Megacities	52 weeks

NB: Completion deadlines stated above are the end dates and the Consultancy firm can deliver outputs incrementally before the deadline date. The Consultancy firm shall therefore define and provide a schedule of interim incremental deliverables and a breakdown of the associated Professional fees per completed and approved deliverable to enable the Client to make payments as and when interim deliverables are submitted and approved. E.g., if 5 outputs are to be delivered by week 10, the Consultant may deliver 1 output every 2 weeks and subsequently claim payment after completing each output.

5. Eligibility

- i. This assignment targets a firm with a track record of more than 10 years of proven experience conducting similar urban water dependency and vulnerability assessments in sub-Saharan Africa.
- ii. Demonstrate at least 5 years of experience in the groundwater sector within the SADC region.
- iii. The successful applicant must demonstrate experience in at least three projects undertaking detailed work in similar urban water resources assessment and planning in the SADC region.



6. Team Composition

The minimum qualifications, skills and experience for key experts, whose CVs are to be evaluated as part of the assessment of proposals, are as defined below. The Services are expected to be performed, mostly virtually, with occasional travel to the SADC Member States to convene workshops and gather data as needed.

Team composition with the estimate of key experts' Levels of Effort (LOE) is as follows:

Key Expert 1: Principal Researcher - Team Leader (estimated 80 workdays)

The key expert must have at least a master's degree in Hydrogeology and 15 years of experience working in groundwater. At least 5 years should have been in groundwater governance research and development. Demonstrated team leadership on at least 3 similar research projects, 1 of which should have been in the SADC region in an urban context at the Member State level. The expert must have proven proficiency with the conjunctive water resources management concept and engagement of public sector stakeholder institutions and issues. The Team Leader should be fluent in English. Professional proficiency in the other SADC Languages (French and Portuguese) is an advantage.

Key Expert 2: Hydrogeologist (Estimated 90 days)

At least a Master's degree in hydrogeology or geosciences with a bias to water sciences and 10 years of working experience in the groundwater field, 5 of which should have been in SADC. The hydrogeologist should know key issues pertaining to managing groundwater resources in national and transboundary aquifers in the SADC region, including recharge, pollution and impacts of climate change and droughts. They should have participated in at least 2 projects where similar skills required for this assignment were applied. Demonstrated skills in applying and interpreting groundwater modelling and water quality models, including using related software and demonstrated expertise in developing conceptual and numerical groundwater models. The national hydrogeologist should be fluent in English. Professional proficiency in Portuguese is desirable.

Key Expert 3- Hydrologist (Estimated 60 Days)

At least a Bachelor's degree in an engineering discipline (Civil/Water), Hydrology or similar. 10 years' experience in hydrological modelling of large river basins, working in areas with scarce data, knowledge of groundwater surface water interactions and GIS and Remote sensing applications in Groundwater studies. Should have experience of at least two projects of a similar magnitude in Southern Africa. Fluency in English is mandatory, and working knowledge of French and Portuguese is desirable



Key Expert 4: Water quality expert (estimated 40 workdays)

The water quality expert must have at least a master's degree in Hydrogeology (or any relevant field) and 10 years of experience working in groundwater. At least 5 years should be spent in groundwater quality monitoring. They must have demonstrated experience in implementing at least 3 similar projects, 1 of which should have been done in the SADC region at the Member State or regional level. The expert must have proven understanding of the conjunctive water resources management concept and engagement of multi-country transboundary watercourse stakeholder institutions and issues. They must be fluent in English. Professional proficiency in the other SADC Languages (French and Portuguese) is an advantage.

Key Expert 5: Institutional and governance expert (Estimated 40 days)

Should ideally possess at least a master's degree in international development, institutional development, development studies or similar with at least 10 years in institutional assessment and organisational development in the public sector/national government ministries, departments and agencies, and private sector. Urban water resources assessment, planning and development is mandatory. Familiarity with country specific contexts is essential, particularly in the groundwater sector, through participation in at least 2 institutional assessment and development projects implemented in the SADC region. Experience with national and transboundary water courses, governance structures and institutional strengthening is required.

Key Expert 6 – Environmental Expert (Estimated 30 Days)

The successful candidate, who should be a SADC citizen having at least a degree in biological sciences with experience working in Groundwater Dependent Ecosystems (GDEs), will have knowledge of key issues about the management of groundwater resources in national and transboundary aquifers of the SADC region, specific knowledge of ecology with in-depth understanding of the impacts of groundwater, climate change, groundwater-surface water interactions and e-flows on Groundwater Dependent Ecosystems, understanding of Modelling of water resources in an interdisciplinary setting, should have 2 years of experience in ecology working in areas with scarce data, knowledge of groundwater-surface water interactions and baseflow calculations, e-flows, and Groundwater Dependent Ecosystems. Fluency in English is mandatory, and working knowledge of Portuguese is desirable

Key Expert 7 - Gender Equality and Social Inclusion (GESI) Specialist (Estimated 30 Days)

The successful candidate, who should be a SADC citizen having least a bachelor's degree in social sciences, will have knowledge of key issues about the management of groundwater resources in national and transboundary aquifers of the SADC region.

Specific knowledge of GESI issues and how they relate to groundwater use, climate change and GDE ecosystem services within the urban context is essential. Experience working on water resources issues in an interdisciplinary setting. Should have 2 years of experience in GESI work focusing on national water issues

Fluency in English is mandatory, and working knowledge of Portuguese is desirable



Non-Key/Other Expert Staff

The consultancy firm shall select and hire other experts and support staff as required according to the deemed requirement to deliver the Services. The hiring of a Young Professional based in each respective City to assist with data collection and stakeholder liaison is recommended. CVs for such other experts should not be submitted in the Technical Proposal. Although hiring other expert staff will not be subject to the prior review of the Client, such staff shall otherwise meet professional standards and possess adequate experience to conduct their work safely and professionally.

NB: The Consultancy firm shall include in their submission a refined proposal for the deployment of the key experts and any non-key experts deemed necessary to timely deliver the objectives of the assignment.

7. Schedule and Duration of Assignment

This is a once-off assignment without any obligation for follow-up work and is expected to run for eighteen (18) months with an estimated aggregate level of effort of 370 person-days for key experts only, all-inclusive of field, travel and office work.

The Consultancy firm shall include in their submission a proposal for the deployment of the key experts and any non-key experts and support staff deemed necessary to timely deliver the objectives of the assignment.

8. Liaison and Logistics

On a day-to-day basis, the consultant will liaise with the SADC-GMI through a Project Manager designated by the Executive Director of SADC-GMI.

Logistics pertaining to international air and road travel and cross-border travel are the responsibility of the consultancy firm. However, if required, SADC-GMI can arrange and directly pay the costs for lodging, car hire, road and air travel as necessary. If also required, SADC-GMI can also issue letters of support to facilitate the authorities issuing necessary access to the Member States. The Consultants will meet visa and necessary cross border charges. These should therefore be included in the Consultant's technical and financial proposal.

9. Data, services & Facilities to be provided by the Client

The Client will facilitate for letters of introduction to SADC Member States and avail documents as well as data during the desk review phase. The Consultants will be expected to work from their respective offices. All costs resulting from the execution of this assignment will be incorporated in the Consultant financial proposal.



10. Contract Management and Other Information

This is a lump sum contract since the scope of is well defined and the contract amount is fixed, and all payments will be linked to the contractual milestones. The Client will provide the Consultant with data and information to facilitate execution of the assignment including introduction letters to relevant stakeholders.

11. Submission date

Bidders must submit Expressions of Interest (EOI) by e-mail to procurement@sadc-gmi.org by 12:00 noon (RSA Time) on or before 06 September 2024.