



TERMS OF REFERENCE

For

CONSULTANCY SERVICES FOR FURTHER ENHANCING THE SADC-GIP

1. Background

After successful completion of the Sustainable Groundwater Management in SADC Member States Phase 1 project, the SADC-GMI is now implementing phase 2 of the same project, under the strategic guidance of the SADC Secretariat. The 4-year phase 2 project is financed by the Multi Donor Trust Fund Cooperation in International Waters in Africa (CIWA), in collaboration with the Global Environment Facility (GEF), through the World Bank, and comprises of the following key components:

Component 1: Capacity building for sustainable groundwater management

Component 2: Knowledge development, dissemination, and advocacy

Component 3: Building resilient livelihoods, and inclusive groundwater management

Component 2 of the phase 2 project foresees the support to Member States in conducting groundwater studies, preparing monitoring plans, and compiling groundwater data to produce groundwater assessments. From 2017 to date the SADC-GMI has been implementing activities aimed at improving the functionalities of the SADC-GIP.

1.2 Evolution of the SADC-GIP

In a quest to harmonize groundwater data across the SADC region, the SADC-GMI established a portal, the SADC Groundwater Information Portal, (SADC-GIP) through which hydrogeological data is being managed and availed to stakeholders. The SADC-GIP which was developed as an on-line data and information system, currently contains all the results from the SADC Hydrogeological Mapping Project of 2010. The system was designed to provide easy access to this information for stakeholders. In 2017–2019 the SADC-GMI commissioned a project, “Capacity Building for Groundwater Data Collection and Management in SADC Member States (SADC-GW-DataCoM project)”, which identified data storage and sharing as one of the short comings in SADC Member States. The SADC-GW-DataCoM projected recommended the following in relation to the SADC-GIP.

- The SADC-GMI should actively engage in connecting with the organisations that can provide some groundwater data i.e., aggregating multiple datasets and harmonizing the data and continuously searching the web and literature for new (regional) datasets which become available.
- The SADC-GIP should focus on regional (supra-national) and transboundary data and information.
- The SADC-GIP should consider connecting to other (ground) water data sharing platforms acting at different levels: local, national or subnational, continental and global. The SADC-GIP should connect with these platforms in order to exchange data and allow the users to move from one portal to another, depending on their needs
- The SADC-GIP could be connected to the currently existing River Basin Organisations' portals (e.g., <http://gis.orasecom.org/>) in order to exchange data.
- SADC-GMI could initially support these L/RBOs with the SADC-GIP and their experience in groundwater data management.

As a follow up to the (SADC-GW-DataCoM project) and in line with its mandate of developing and maintaining an ICT platform for knowledge sharing the SADC-GMI intends to improve the SADC-GIP by linking it to National Groundwater Databases, groundwater databases held by River Basin Organisations (RBOs) and databases held by other Stakeholders, with the objective of making the SADC-GIP a one stop platform for groundwater data in the SADC region. Consequently, a follow up project, "Expansion of the SADC Groundwater Information Portal (SADC-GIP)" was commissioned in 2020, under this project the SADC-GIP was migrated to a Geocode Platform. Geocode is a web-based application and platform for developing geospatial information systems (GIS) and for deploying spatial data infrastructures (SDI). It is designed to be extended and modified and can be integrated into existing platforms.

The strategic vision of the SADC-GMI is for the SADC-GIP to provide more services to stakeholders, through for example, in-cooperating time series data, ability to generate graphs, maps and where data is missing apply big data analytics and machine learning to generate useful information for stakeholders.

These terms of reference are therefore for a consultancy to update the data stored in the SADC-GIP and enhance its functionalities.

2. Objective of the Assignment

The key objective of this assignment is to update the data stored in the SADC-GIP and enhance its functionalities.

Tasks

To achieve the objectives of this assignment, the successful firm of consultants will undertake the following core tasks:

- Engage Young Professionals to facilitate collection of data in the respective Member States.

- Develop and workshop a framework and tool for data collection from the Member States.
- Develop a functionality to capture time series data into the GIP.
- Engage Member States, River Basin Organisations, and other key stakeholders to identify strategic National and Transboundary Aquifers for implementing pilot activities.
- Pilot implementation and application of big data analytics and machine learning functions into the SADC-GIP for selected strategic aquifers. The objective being to extract useful information in light of the expected data limitations.
- Make recommendations for the sustainability of data capture into the SADC-GIP e.g., human resources, capacity building, financial resources amongst others.

SADC-GMI envisages to utilise the outcome of this assignment to build its brand as the Centre of Excellence for groundwater development and management in the SADC region and beyond by making the SADC-GIP a one stop portal for groundwater data and information.

3. Key Outputs

The consultant is responsible for production of the following key outputs. The assignment is packaged into phases for ease of implementation.

Phase 1 – Data collection and development of time series capabilities.

- One Project inception report within 4 weeks of commencing the assignment.
- Develop a Terms of Reference for the Young Professionals, in-consultation with the SADC-GMI within 6 weeks of starting the assignment.
- Within 8 weeks of commencing the assignment develop a framework/ tool for data collection from the Member States.
- Within 12 weeks develop and report on a conceptualization of integrating a time series functionality into the SADC- GIP.
- Within 16 weeks of commencing the assignment conduct a consultation workshop on the framework/tool for data collection and conceptualization of integrating a time series functionality into the SADC- GIP with the Member States. **The consultant to submit a workshop report.**
- Within 20 weeks commence data collection from the member states, data to be collected to include, drilling data (borehole data), water level data, water quality data etc.
- Provide monthly reports on the data collection, capturing process and development of a time series functionality to the project manager.
- Within 50 weeks of commencement of the assignment provide a report detailing the data captured into the SADC-GIP, deliver a SADC-GIP with the additional data and the time series functionality for the SADC-GIP.

Phase 2 – Identification of strategic aquifers and piloting big data analytics and machine learning in strategic aquifers.

- Within 58 weeks of commencement of the assignment engage Member States, River Basin Organisations, and other key stakeholders to identify strategic National and Transboundary Aquifers. This task is to be supported/ accompanied by a literature review. The consultant will submit a report detailing the methodology employed in identifying the Strategic aquifers including the stakeholder engagement process.
- Within 62 weeks develop a concept note of the integration of Big Data analytics and machine learning in the SADC- GIP- targeted outputs include, generation of graphs, maps e.g., water level difference maps between agreed times, early warning applications etc. The objective being to extract useful information in light of the expected data limitations.
- Within 70 weeks, workshop the Big and Machine learning concept with the Member States and Stakeholders.
- Within 100 weeks report on the implementation of big data analytics and machine learning in the pilot aquifers and demonstrate the outputs.

Phase 3 – Sustainability of data collection and reporting beyond this project

- Within 104 weeks of commencing the assignment engage Member States and stakeholders on implementing framework/tool for continued data capture in the strategic aquifers beyond this project **(this must take the form of a report back workshop)**.
- Within 108 weeks submit a final project report detailing recommendations on continued data capture (with time series functionality) and generation of information from the SADC-GIP.

4. Eligibility

The Consulting firm will have proven experience in hydrogeology, environmental monitoring (groundwater), developing agile systems and development of databases. The Consulting firm should also have experience in systems integration and Big Data analytics and machine learning.

5. Team Composition

The consulting firm's team should comprise of the following key experts as a minimum:

K1-Team Leader. (50 Man days)

At least a Master's degree in a relevant water related discipline and 15 years' experience working in the groundwater field. At least 10 years should have been in the field of groundwater management and development, GIS applications. Demonstrated team leadership on at least 3 similar research projects, 1 of which should have been in the SADC region either at Member State, regional level or River Basin Organisations (RBOs). Proven proficiency with engagement of multi-country transboundary water course stakeholder institutions and issues. Familiarity with the ICT and software applications envisaged in this assignment is a definite plus. Ability to perform trend analysis and forecast to document status of water resources and predict future conditions. The Team Leader should be fluent in English. Professional proficiency in the other SADC Languages (French and Portuguese) is desirable.

K2 -Data Science Expert. (100 Man days)

A post graduate qualification/demonstrated knowledge of data science, artificial Intelligence applications in hydrogeology, and groundwater monitoring, generation of reports, ability to use programming languages such as Python to construct machine learning models. Knowledge of the Geonode platform on which the SADC-GIP is built is desirable. Ability to perform trend analysis and forecast to document status of water resources and predict future conditions. Five (5) years' experience in data science is required. Preference will be given to experts with exposure to data science applications in natural resources /water applications.

K3 - Hydrogeologist. (80 Man days)

At least a Master's degree in hydrogeology/geohydrology or related discipline and 10 years working experience in the groundwater field, 5 of which should have been in the SADC region. Knowledge of key issues pertaining to the management of groundwater resources in national and transboundary aquifers the SADC region. In-depth understanding of designing national groundwater databases data analysis and reporting. Ability to perform trend analysis and forecast to document status of water resources and predict future conditions. Familiarity with the ICT and software applications envisaged in this assignment is a definite plus. The expert should be highly capable of developing and implementing capacity building initiatives. Multi-country experience is desirable. Fluency in English is mandatory, while working knowledge of French and Portuguese is highly desirable.

K4 – GIS expert (80 Man days).

Bachelor's degree in computer science, geographical information systems, geography or related discipline. At least 10 years of documented experience with GIS software, portal configuration, development, and operation; Working knowledge in configuring and administering geodatabase architecture on platforms; Experience configuring and securing relational databases, Web Maps and Web Apps; Experience with geospatial integration projects; Previous experience installing and administering GIS software;

Experience with troubleshooting of GIS services. Knowledge of Spatial Data Infrastructures

The Consultant may deploy additional experts and support staff in order to deliver the outputs within the time period allocated.

Schedule and Duration of Assignment

This is a once-off assignment without any obligation for follow-up work and it is intended to be implemented for an estimated duration of 24 months from contract signature with an estimated aggregate level of effort of 310 man-days for key experts only.

The Consultant 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.

6. Liaison and Logistics

On a day-to-day basis, the consultant will liaise with the SADC-GMI through the Senior Groundwater Specialist and GIS expert with ultimate accountability to the Executive Director of SADC-GMI.

Logistics pertaining to international air and road travel and cross-border travel are the responsibility of the consultant. However, if required, SADC-GMI can arrange necessary letters of support to facilitate the authorities issuing access to the Member States. The Consultants will meet the costs for lodging, car hire, visas and necessary cross border charges. These should therefore be included in the Consultant's technical and financial proposal. The SADC-GMI utilises the United Nations per diem rates obtained from:

<http://www.ph.undp.org/content/philippines/en/home/operations/undp-un-dsa-rates.html>

or alternatively

<http://apps.who.int/bfi/tsy/PerDiem.aspx>

Where the concerned city/town is not listed, rates for 'Elsewhere' in the concerned country are applicable.

7. Date for the submission of Expression of Interest

Interested and qualifying consulting firms are required to submit expression of interest Proposals to SADC-GMI on or before 17 June 2022 electronically to: procurement@sadc-gmi.org