



SADC Framework for Groundwater Data Collection and Management

Executive Summary

April 2019

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EXECUTIVE SUMMARY

Southern Africa has at least 70 percent of its population dependent on groundwater as the primary source for drinking, domestic use, and support for livelihood activities. Applications of groundwater are broad and important for urban water supply, irrigation, watering livestock, and for industrial use. It also provides base flow to rivers and supports ecosystems.

The demand for water is expected to rise due to growing population, changing lifestyle-patterns and climate. If well managed, groundwater in southern Africa is a resource which, could ensure long-term water supply to meet the increasing demands brought by the anticipated climate variability. There are more transboundary aquifers in southern Africa than there are transboundary river basins.

While groundwater is an abundant resource in the region, its potential remains subdued by limited amount of data on aspects of availability, quality, quantity and abstraction. The limited capacity to predict hydrogeological behaviour and water resource development in sufficient detail over long periods of time affects extents to which groundwater as a resource is appreciated and therefore managed. Proper and adequate groundwater data collection and data management, is therefore crucial for effective groundwater management.

The assessment carried out by the International Groundwater Resources Assessment Centre and the Institute for Groundwater Studies of the University of the Free State in 2017/2018, on the state of groundwater data collection and data management in SADC, confirms challenges the region is currently facing. The constraints include limited human resources, equipment and financial capacity appropriate for collection, analysis, management, retrieval, and sharing of data; inconsistency in data collection and routine quality control; data storage in different formats and difficulty in data access, use or interpretation.

It is observed that while policies, strategies and technical guidelines on groundwater data collection are available in the SADC Region, there is need to connect the policies with the existing technical guidelines which are not being effectively utilised due to lack of clear direction on how to use them. There is no appropriate organisational and planning framework for use of the technical guidelines to implement the existing policies and strategies on water resources that include groundwater. Thus, the SADC Framework for Groundwater Data Collection and Data Management serves as an instrument to drive implementation of policies and strategies making use of the existing technical guidelines.

The Framework is targeted at officials who have a coordinating role in groundwater data collection and data management. These are usually senior level professionals who coordinate field technicians as well as interact with managers and directors of departments.

The overall objective of the Framework is to **provide organisational and planning structures for collection and management of groundwater data in strategic, innovative and cost-effective ways**. Specific objectives are to:

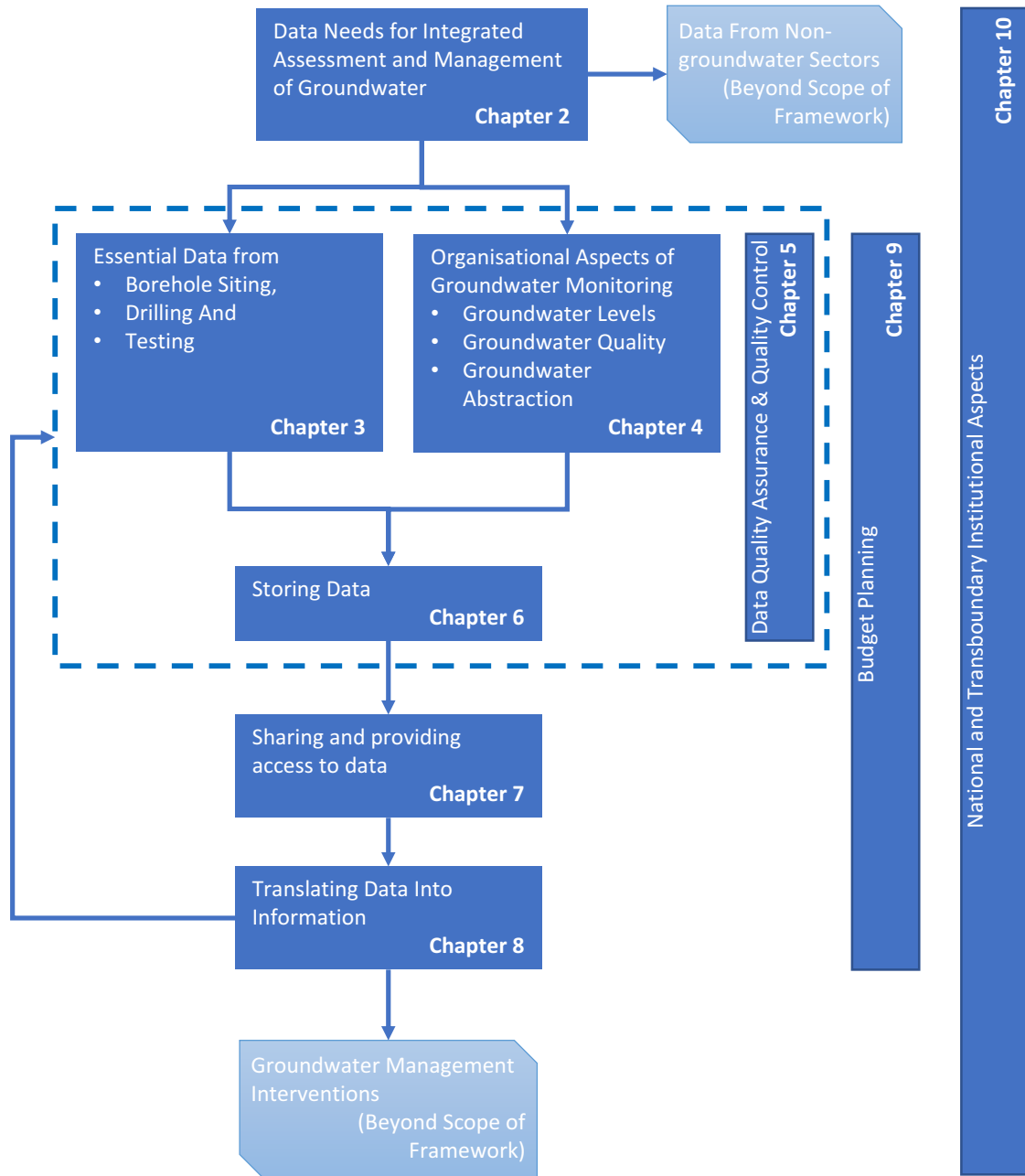
- **Assist SADC Member States which are currently facing difficulties in groundwater data collection and data management to develop adequate procedures at national level that match their financial and human capacity and level of development; and**
- **Enhance transboundary and regional cooperation through harmonisation of practices across Member States in terms of data collection and management and facilitate data exchange.**

The Framework addresses various aspects of groundwater data collection and data management, such as borehole siting, and drilling, groundwater monitoring, field data collection, databases, and data sharing and reporting.

The Framework assists in implementing priority actions in the work programme for groundwater in the SADC Regional Strategic Action Plan for Integrated Water Resources Management

(RSAP IV, 2016–2020). Institutional and technical capacity to implement national strategies can be strengthened using the Framework for guidance. The Framework will also facilitate cooperation in the management of shared aquifers in the region, towards implementation of the Revised SADC Protocol on Shared Watercourses and river basin agreements across the region.

The Framework is divided into 10 chapters as shown in the figure below.



Chapter 1 provides the **rationale of the Framework**; positioning the Framework in relation to regional processes, and the specific **target group**.

Chapter 2 provides insights in the **data needs for integrated assessment and management of groundwater**. The data needs go beyond groundwater, and cover data from other sectors such as agriculture that use or potentially pollute groundwater, and data from meteorological and ecological sectors that provide information needed to understand the hydrogeological system.

It underscores the importance of reliable and up-to-date groundwater data as the only way to develop a good conceptual understanding of aquifer systems and the dynamics or trends in groundwater resource development. Key to the chapter is the need for groundwater departments and other sectors to cooperate and exchange relevant data and information required for integrated groundwater resource assessments and the development of integrated policies.

Chapter 3 deals with the importance of collecting essential **data from borehole siting drilling and testing** to be able to develop a conceptual understanding of aquifer systems and to successfully develop and sustainably manage groundwater abstractions. The chapter provides focus on the essential data that need to be properly recorded during the drilling and construction phase, and be stored in more widely compatible formats in structured databases for future use.

Groundwater departments need to initiate activities to encourage and/or compel stakeholders to submit the essential data from drilling, testing and siting of boreholes. Capacity building in environmental law enforcement should include (enforcement of) collection of essential groundwater data.

Chapter 4 deals with the **organisation and planning aspects of groundwater monitoring**. Monitoring of groundwater levels, quality and abstraction is essential to understand trends in resource development and to define effective management interventions. The chapter highlights that for **cost-effective monitoring**, the right choices on methods (manual and data loggers), regular maintenance, re-evaluation and optimisation of the networks are required. It notes that **groundwater monitoring is not just a technical exercise**, it requires organisation and planning at various levels within the organisations. This includes allocating capacity and budgets for incidental investments and recurring costs for data collection and maintenance. The chapter presents the potential of **community-based groundwater data collection** as a cost-effective measure, with the added benefit that it can trigger community participation in groundwater management.

Chapter 5 focusses on the importance of **data quality assurance and quality control (QA/QC)**. The need to build capacity in QA/QC and benefits of modern technology are underscored. This includes developing and conducting vocational training programs for groundwater technicians to improve the quality and efficiency of groundwater data collection; use of modern technologies such as digital field forms in mobile phone applications and data loggers; The chapter emphasises the need to conduct (computer aided) routine checks to verify the quality of the data before it is captured in databases.

Chapter 6 highlights the need to **store data** in a structured way, in digital formats that can be easily processed, to enable efficient and cost-effective access, retrieval and processing for future studies. The choice of database software should be based on the expected amount of data to be stored as well as available human capacity and skills to manage the data and the database systems. The chapter recommends the use of advanced server-based database solutions that provide the most robust solutions, though at relatively high cost. There is need to consider the high setup and maintenance costs as well as the cost of sustaining the advanced server-based database solutions. Otherwise if there are insufficient resources, the best would be to use more simple solutions. Well-designed spreadsheets can be an adequate and highly cost-effective alternative to advanced desktop or server-based database solutions. If the data are well-structured, migrating the data to more advanced database systems at a later stage when needed, is relatively straightforward, allowing for progressive development.

Chapter 7 presents the **importance of sharing and providing access to data** to promote awareness and stakeholder involvement in groundwater management. Data sharing enables informed decisions in planning and management of national and transboundary aquifer resources. The chapter promotes cooperation between and among data custodians. It also promotes use of modern technology on data sharing. For example, using open data standards allows for seamless access to data from other organisations whilst eliminating the need to manage the data in multiple places and organisations.

Chapter 8 highlights that **data needs to be turned into information** to communicate key messages to stakeholders and to develop fact-based interventions. The chapter takes note of different stakeholders which require information to be presented differently. Of much importance is data analyses and interpretation for development of policies and management interventions. Additionally, and importantly, analyses and interpretation also assist in identifying data gaps and data quality issues that may lead to reassessment of data needs and data collection and/or management procedures.

Chapter 9 underscores the need for **budget planning** and to understand the various costs involved in data collection and management activities. Funding for groundwater data related activities can be sourced in different ways. External funding may be suitable for initial investments, but budget for continued management and maintenance should as much as possible come from national financial resources.

Chapter 10 concludes the Framework by presenting **national and transboundary** institutional aspects of groundwater data collection and data management. This covers the need gradually implementing transboundary programmes of groundwater data collection and data management, starting with an initial assessment based on gathering, harmonizing and combining existing datasets from the countries, before moving on to joint monitoring. The chapter underscores the need to harmonise the collection and storage of national data in such a way that it can be used at transboundary and regional levels. Though data may be collected through national organisations, transboundary and international institutions such as Lake and River Basin Organisations (L/RBOs) or the SADC Groundwater Management Institute (SADC-GMI) are well positioned to provide support to or even lead transboundary programs of groundwater data collection and data management.



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