



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND: GEF Trust Fund

For
more

information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

| | | | |
|---|--|------------------------------|---|
| Project Title: | Sustainable Groundwater Management in SADC Member States | | |
| Country(ies): | Regional | GEF Project ID: ¹ | 4966 |
| GEF Agency(ies): | The World Bank | GEF Agency Project ID: | P127086 |
| Other Executing Partner(s): | Southern African Development Community - SADC | Submission Date: | August 2 6 ² , 2013 |
| GEF Focal Area (s): | International Waters | Project Duration (Months) | 60 |
| Name of parent program (if applicable): | | Project Agency Fee (\$): | 771,321 |
| For SFM/REDD+ <input type="checkbox"/> | | | |
| For SGP <input type="checkbox"/> | | | |
| For PPP <input type="checkbox"/> | | | |

A. INDICATIVE FOCAL AREA STRATEGY FRAMEWORK²:

| Focal Area Objectives | Trust Fund | Indicative Grant Amount (\$) | Indicative Co-financing (\$) |
|-----------------------|------------|------------------------------|------------------------------|
| IW-1 (select) | GEFTF | 5,703,400 | 27,400,000 |
| IW-3 (select) | GEFTF | 2,415,779 | 15,078,000 |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| (select) (select) | (select) | | |
| Total Project Cost | | 8,119,179 | 42,478,000 |

B. INDICATIVE PROJECT DESCRIPTION SUMMARY

| Project Objective: To enable sustainable management of groundwater in the SADC Member States. | | | | | | |
|---|-------------------------|---|---|------------|------------------------------|-----------------------------|
| Project Component | Grant Type ³ | Expected Outcomes | Expected Outputs | Trust Fund | Indicative Grant Amount (\$) | Indicative Cofinancing (\$) |
| Component A. Strengthening institutional capacity for sustainable groundwater management | TA | Strengthened institutional capacity amongst decision-makers in SADC Member States and | <i>Legal, policy & regulatory frameworks:</i> technical assistance, analysis and strategic guidance provided to Member States to support updating, harmonising and implementing | GEFTF | 1,927,055 | 7,920,000 |

¹ Project ID number will be assigned by GEFSEC.

² Refer to the reference attached on the [Focal Area Results Framework and LDCE/SCCF Framework](#) when completing Table A.

³ TA includes capacity building, and research and development.

| | | | | | | |
|--|----------|--|--|--------|-----------|-----------|
| | | <p>Shared Watercourse institutions.</p> <p>Progress in harmonisation of national legislation, policies and regulatory instruments at national and transboundary level.</p> <p>Enhanced technical skills of staff and decision-makers in SADC Member States on sustainable groundwater management.</p> <p>Improved quality, quantity and access to groundwater data made available through the creation of common database.</p> | <p>legislation, policy and regulatory instruments.</p> <p><i>Transboundary:</i> Progress in integrating groundwater in shared watercourse commissions and agreements through collaborations with a minimum of two River Basin Organisations-</p> <p><i>Training:</i> to support implementation of institutional change.</p> <p><i>Data management:</i> Promotion of data monitoring standards, sharing and access at national and transboundary level.</p> | | | |
| <p>Component B. Advancing knowledge, monitoring and information sharing on transboundary and national groundwater</p> | TA & Inv | <p>Improved management of shared aquifers through the development and implementation of TDA and SAP.</p> <p>Common SADC information & knowledge</p> | <p><i>Transboundary Diagnostic Analysis (TDA) and Strategic Action Plan (SAP) to develop conjunctive management solutions as well as mechanisms for data collection and sharing in the Ramotswa Dolomite Aquifer (Botswana & South Africa).</i></p> <p><i>SADC Information & knowledge sharing</i></p> | GEFT F | 2,697,877 | 8,280,000 |

| | | | | | | |
|---|-----|---|---|-------|-----------|------------|
| | | <p>sharing platform fully operating and actively used.</p> <p>Research findings supports policy-dialogue and decision-making in SADC Member States.</p> | <p><i>platform</i>: A fully integrated data management system interlinked with a GIS platform and coupled with IT solutions that enable access and interaction (building on parallel and previous initiatives).</p> <p><i>Research studies and dissemination of findings</i> on: climate change, drought management, pollution, remote sensing, geophysical methods, water buffering, quick scans and mapping, and reduced drilling cost.</p> | | | |
| <p>Component C. Promoting infrastructure solutions for groundwater sustainability and climate resilience</p> | Inv | <p>Appropriate infrastructure solutions for sustainable and climate resilient groundwater management are promoted in Member State (at transboundary , national and local levels).</p> | <p><i>Infrastructure solutions for groundwater management and storage</i> are piloted at selected locations:</p> <ul style="list-style-type: none"> - analysis of appropriate infrastructure solutions reflecting the geological and geophysical aspects of groundwater; - operational and civil works support for building drought-resistance at selected sites; - impact evaluation: to monitor progress, trouble-shooting problems and reporting on results; - campaign to support scale-up potential. | GEFTF | 2,312,466 | 25,278,000 |

| | | | | | | |
|--|----------|---|---|-------|--|---------|
| Component D. Operationalisation of the SADC Groundwater Management Institute for Southern Africa (GMI) | TA & Inv | A sustainable regional center of excellence in groundwater management (transboundary and national), supporting SADC's mandate, and serves the needs and capacitates SADC Member States in sustainable groundwater management. | <p><i>Operationalising GMI as a permanent institution:</i> registering as a legal institution and finalising charter, organisational structure, operating management procedures.</p> <p><i>Re-engaging the SADC Sub-committee on Hydrogeology as the Board of GMI</i> and as Steering Committee for the proposed Project. Engaging national-level task forces.</p> <p><i>Setting up technical and administrative functions:</i> Adequate Information and Communication Technologies and office resources.</p> <p><i>Technical assistance</i> on groundwater, environment and social, procurement and financial management.</p> <p><u>Monitoring & Evaluation to assess and report on project impacts and results.</u></p> <p><i>Platform for stakeholder interaction/consultation:</i> workshops, forums, online interactive presence, in-depth training and courses.</p> <p><i>Financial sustainability plan:</i> Analysis and plan for financial viability and long-term sustainability of GMI.</p> | GEFTF | <u>770,822,795,153</u> | 700,000 |
|--|----------|---|---|-------|--|---------|

| | | | | | | |
|--|--|--|--|----------|-----------------------------------|------------|
| | | | <i>Communication and awareness: GMI website, communication materials and activities.</i> | | | |
| Subtotal | | | | | <u>7,708,220</u> <u>7,732,551</u> | 42,178,000 |
| Project Management Cost (PMC) ⁴ | | | | (select) | <u>410,959</u> <u>386,628</u> | 300,000 |
| Total Project Cost | | | | | 8,119,179 | 42,478,000 |

C. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE, (\$)

| Sources of Cofinancing | Name of Cofinancier | Type of Cofinancing | Amount (\$) |
|----------------------------|--|---------------------|-----------------------|
| GEF Agency | World Bank: Cooperation on International Waters in Africa | Grant | 2,000,000 |
| GEF Agency | World Bank: Lesotho | Soft Loan | 2,520,000 |
| GEF Agency | World Bank: Malawi IDA/LDCF | Soft Loan/Grant | 2,000,000 |
| GEF Agency | World Bank: Mozambique | Soft Loan/Grant | 6,980,000 |
| GEF Agency | World Bank: Tanzania | Soft Loan | 15,400,000 |
| GEF Agency | World Bank: Zambia | Soft Loan | 12,000,000 |
| GEF Agency | World Bank: Zimbabwe | Grant | 360,000 |
| Bilateral Aid Agency (ies) | Swiss Cooperation Agency (SDC)/UNESCO – Stampriet-Kalahari Karoo transboundary aquifer | Grant | 500,000 |
| Bilateral Aid Agency | Scottish Government Climate Justice – Malawi | Grant | 718,000 |
| National Government | Existing budget allocations for groundwater management | In-kind | Unknown at this stage |
| Total Cofinancing | | | 42,478,000 |

*Annex 1 to the PIF provides preliminary detail on the potential co-financing sources.

D. INDICATIVE TRUST FUND RESOURCES (\$) REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

| GEF Agency | Type of Trust Fund | Focal Area | Country Name/Global | Grant Amount (\$ (a) | Agency Fee (\$ (b) ² | Total (\$) c=a+b |
|------------|--------------------|----------------------|---------------------|----------------------|---------------------------------|------------------|
| WB | GEFTF | International Waters | Regional | 8,119,179 | 771,321 | 8,890,500 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |

⁴ To be calculated as percent of subtotal.

| | | | | | | |
|------------------------------|----------|----------|--|-----------|---------|-----------|
| (select) | (select) | (select) | | | | 0 |
| Total Grant Resources | | | | 8,119,179 | 771,321 | 8,890,500 |

¹ In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

² Indicate fees related to this project.

E. PROJECT PREPARATION GRANT (PPG)⁵

Please check on the appropriate box for PPG as needed for the project according to the GEF Project Grant:

| | <u>Amount</u> <u>Requested (\$)</u> | <u>Agency Fee</u> <u>for PPG (\$)</u> ⁶ |
|--|--|---|
| No PPG required. | | |
| (upto) \$50k for projects up to & including \$1 million | | |
| (upto)\$100k for projects up to & including \$3 million | | |
| (upto)\$150k for projects up to & including \$6 million | | |
| (upto)\$200k for projects up to & including \$10 million | 100,000 | 9,500 |
| (upto)\$300k for projects above \$10 million | | |

PPG AMOUNT REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES) FOR MFA AND/OR MTF PROJECT ONLY

| Trust Fund | GEF Agency | Focal Area | Country Name/ Global | (in \$) | | |
|-------------------------|------------|------------|-------------------------|----------|----------------|--------------------|
| | | | | PPG (a) | Agency Fee (b) | Total c = a + b |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| (select) | (select) | (select) | | | | 0 |
| Total PPG Amount | | | | 0 | 0 | 0 |

MFA: Multi-focal area projects; MTF: Multi-Trust Fund projects.

⁵ On an exceptional basis, PPG amount may differ upon detailed discussion and justification with the GEFSEC.

⁶ PPG fee percentage follows the percentage of the GEF Project Grant amount requested.

PART II: PROJECT JUSTIFICATION⁷

Project Overview

A.1. Project Description. Briefly describe the project, including ; 1) the global environmental problems, root causes and barriers that need to be addressed; 2) the baseline scenario and any associated baseline projects, 3) the proposed alternative scenario, with a brief description of expected outcomes and components of the project, 4) incremental/additional cost reasoning and expected contributions from the baseline , the GEFTE, LDCF/SCCF and co-financing; 5) global environmental benefits (GEFTE, NPIF) and/or adaptation benefits (LDCF/SCCF); 6) innovativeness, sustainability and potential for scaling up

GLOBAL ENVIRONMENT PROBLEM, ROOT CAUSES AND BARRIERS TO BE ADDRESSED

1. Groundwater is a fundamental resource for social, economic and environmental sustainability in the 15 Member States of the Southern African Development Community (SADC). Human well-being, livelihoods, food production, ecosystems and natural habitats, industries and growing cities across the region are directly reliant on groundwater. All Member States experience rising demand for water as a result of rapidly growing populations and economic growth. Climate change is predicted to cause exacerbated water-stress with greater groundwater drought vulnerability across transboundary aquifers and countries. The proposed Project, *Sustainable Management of Groundwater in SADC Member States* intends to support decision makers, planners, implementers and research communities in southern Africa to manage present and future groundwater complexities and challenges at national, transboundary and regional level.

2. **Groundwater and hydro-meteorological variability.** The region covered by the SADC Member States stretches from the Democratic Republic of Congo (DRC) and Tanzania at the equator, down to the southern tip of South Africa at 30° south latitude, and as far east as Mauritius at 57° longitude. Weather and rainfall conditions vary greatly; for example, from over 4,000 mm/year of average annual rainfall in the tropics of DRC to less than 50 mm/year and high evaporation in the arid conditions of the south-western deserts of Namibia. Surface waters in southern Africa are well documented in comparison to its groundwater systems. However, it is estimated that the SADC Member States have 2,491m³/capita/year in renewable groundwater resources (i.e., a total of 647km³ in annual average).⁸ This is a higher per capita amount than Europe and Asia separately. The fact that only a fraction of the groundwater in southern Africa is utilised (1.5%) shows the underdevelopment of the resource.

3. In hydrogeological terms, the known occurrence of groundwater systems is predominantly in sedimentary basins with isolated outcrops of crystalline rocks. According to the International Groundwater Resource Assessment Centre (IGRAC), the following groundwater provinces dominate the region:

- *Basement Provinces.* Precambrian crystalline basement rock forms continental-mass outcrops in 100x300 km wide bands inland from the Atlantic coast in towards Angola, Namibia, South Africa and the DRC. In large areas, groundwater is present at shallow depths. These basement provinces also dominate most of Tanzania, Malawi and Zimbabwe.
- *Sedimentary Basin Provinces.* In the depression-zones of the DRC and Kalahari basins, there are consolidated and unconsolidated sedimentary formations. The Karoo basin (predominantly in Namibia, South Africa and Botswana) is a vast raised plateau of coarse sandstone. Thick and extensive sedimentary layers can contain groundwater at substantial depths.
- *Volcanic Provinces.* A complex geology characterises the east Africa Rift Valley. Vast basalt effusions are particularly prominent in parts of Malawi, Tanzania, South Africa and Botswana within the Rift valley. Groundwater quantity and quality can be affected by volcanism.

⁷ Part II should not be longer than 5 pages.

⁸ Regional Groundwater Valuation Study, SADC (2011).

- *High-Relief Folded Mountain Provinces.* In South Africa, the Cape Fold Belt is an example of this province. Folded rocks are arranged in complex structures and contain fragmented groundwater.
- *Local alluvial aquifers* along rivers and coastlines which have important shallow aquifers recharged by rainfall and river water inflow.

4. Across the 12 continental SADC Member States (excluding Madagascar, Mauritius and the Seychelles), over 20 transboundary groundwater systems have been identified. Although some have been researched in detail, scientific information and knowledge on the characteristics and processes of these groundwater systems is lacking or difficult to obtain. The list of known transboundary aquifers in the SADC Region are shown in figure 1 and presented in table 1.

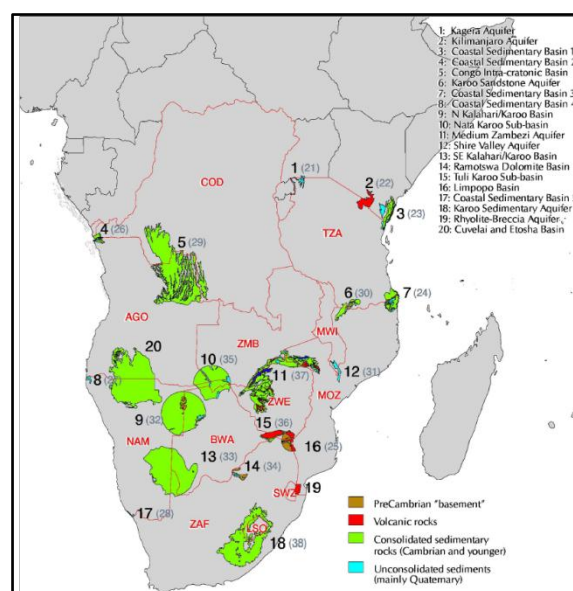


Figure 1. Map of major transboundary aquifers in southern Africa⁹

| Table 1. Transboundary Aquifer in SADC Region | | | |
|---|-------------------------------------|--|-----------------------------------|
| Coastal Sedimentary basin | Angola; DRC | Ncojane Aquifer | Botswana; Namibia |
| Congo Intra-cratonic basin | Angola; DRC | Sand River Aquifer | Botswana; Zimbabwe; South Africa |
| Kagera Aquifer | Tanzania; Uganda | Nata Karoo Sub-basin/Lower Caprivi | Angola; Botswana; Namibia; Zambia |
| Kilimanjaro Aquifer | Tanzania; Kenya | Northern Kalahari-Karoo basin/Okavango basin | Angola; Botswana; Namibia; Zambia |
| Karoo Sandstone Aquifer | Mozambique; Tanzania | SE Kalahari-Karoo basin/Stampriet Orange River | Namibia; Botswana; South Africa |
| Rovuma Basin/Karoo Sandstone | Mozambique; Tanzania | Karoo Sedimentary Aquifer | Lesotho; South Africa |
| Pungwe Basin/Medium Zambezi Aquifer | Mozambique; Zimbabwe | Tuli Karoo Sub-basin/Gaborone to Shashe river | Botswana; South Africa |
| Save Alluvial Aquifer | Mozambique; Zimbabwe | Tosca Dolomite | Botswana; South Africa |
| Limpopo River basin | Mozambique; South Africa; Zimbabwe | Panda (Nyamandlovu) Aquifer | Botswana; Zimbabwe |
| Incomati/Maputo River basin | Mozambique; Swaziland; South Africa | Shire Valley Aquifer | Zambia; Zimbabwe; Mozambique |
| Umbeluzi/Rhyolite-Breccia Aquifer | Mozambique; Swaziland | Ramotswa Dolomite Basin/Ramatlabana/Molopo | Botswana; Namibia; South Africa |
| Coastal Sedimentary basin | Angola; Namibia | Coastal Sedimentary Basin | Namibia; South Africa |
| Cuvelai Etosha basin | Angola; Namibia | Eiseb Graben; N Kalahari-Karoo basin | Namibia; Botswana |

5. **Social and economic importance drivers.** In southern Africa, it is estimated that over 70% of its 250 million people depend on groundwater as the primary source of water. Access to and quality of groundwater directly affects wellbeing of households and livestock, and productivity of small-scale subsistence farming for the vast majority of people living in SADC Member States. Only 23% of SADC's population access water from reticulated supplies with surface waters. Formal or improved groundwater provides water to approximately 37%, and over 40% of people rely on informal (unimproved) sources which are generally unsafe and often prone to drought (from both ground and surface waters).

6. The expansion of industries and commercial farming has exacerbated the importance of groundwater as key to economic growth. In capital cities, such as Lusaka and Gaborone, factories and urban populations rely on groundwater as the sole source for water. With further urbanisation and economic activities, demand will increase.

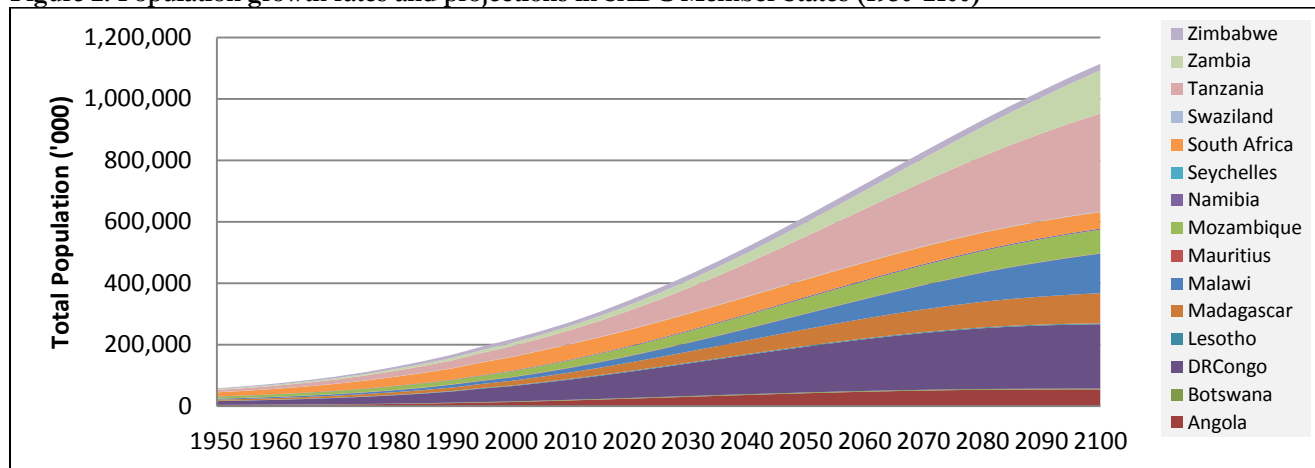
⁹Source: <http://www.un-igrac.org/publications/329> . Local aquifers are added.

Compared to surface water, groundwater is becoming more important as a source for water supply in recent years: from improving water services in small and growing towns to supplementing private and public water supply in larger cities. Groundwater is equally important for agricultural productivity and food security. At present, the sector is estimated to be the biggest water user (83%) and 12% of the water used in agriculture is generated from groundwater. Growing number of feasibility studies and investment show accelerated interest and use of groundwater for developing commercial agriculture across the region. Groundwater development in each SADC Member State largely reflects the respective importance of the resource. Member States such as Namibia, Botswana and South Africa, are heavily dependent on groundwater and are actively integrating the use of groundwater in their water resources management policies. Others, who rely mostly on surface water, have little data or comprehension of their groundwater resources.¹⁰

7. In 2011, the SADC Secretariat commissioned a study on the economic valuation of groundwater resources. The methodology assessed the economic value of groundwater from the perspective of agriculture, mining, hydropower, groundwater dependent ecosystems (GDE) and human use against a number of future development scenarios. The valuation illustrated the striking economic importance of groundwater. For example, the Kuseb, Swakop and Omaruru aquifers in Namibia have an estimated net present value over 25 years in the order of US\$1,300,000,000. Yet groundwater is not granted equal attention.

8. In the next 25 years, the population of southern Africa is expected to double (see UN projects below). Rapid economic growth across Member States is expected to endure in the medium-term future; with drivers including strong investment, favourable commodity prices, and generally prudent macroeconomic management. The average GDP growth for sub-Saharan Africa, for example, is expected to rise to 5.7% in 2014.¹¹ With economic and population growth comes growing water demand and pressures on groundwater. Equally, the integration of groundwater with other sectors, such as agriculture and hydropower, will be increasingly important.

Figure 2. Population growth rates and projections in SADC Member States (1950-2100)



9. **Pollution of groundwater.** Expanding commercial agriculture (especially horticulture) in some parts of the region has led to the contamination of aquifers with fertilizer derived nutrients.¹² Activities in domestic, agriculture, mining, industry and urban sectors also degrade the groundwater resources. The widespread use of on-site sanitation in rural and urban areas cause contamination of shallow aquifers in fractured or karst bedrock with pathogens and nitrates, and groundwater have been over-drawn in some urban and peri-urban areas. For example, waste disposal practices and uncontrolled drilling of boreholes in Lusaka greatly contribute to a simultaneous drop in water levels and an increase in contamination of the unconfined aquifer underlying the city. The same holds for

¹⁰ See Annex 4 for more details.

¹¹ Regional Economic Outlook, IMF (2013).

¹² For example, fertilizers contaminate shallow alluvial aquifers with nitrates in the middle stretches of the Kafue Valley, Zambia. Nitrates have entered shallow aquifers in Kutama and Sinthumule districts, South Africa as a result of modern agricultural practices under dryland cropping and excessive drawdown for irrigation has affected aquifers in districts such as the Lomagundi Dolomite aquifer, Zimbabwe.

Dar es Salaam were shallow private wells are threatened by contamination of domestic pollution (latrines and waste dump). Mining activities led to the contamination of aquifers with bacteria and other contaminants as well as the extensive loss of water, and even destruction, of some aquifers to the detriment of other users. Pollution from mineral processing has resulted in contamination of aquifers with arsenic in Zimbabwe and heavy metals and sulphates in shallow groundwater systems in Botswana.

10. **Groundwater and drought.** About a third of SADC's population lives in drought prone areas and over half are negatively affected by drought. In the driest areas, across south-western Africa, groundwater is often the only source of water. Groundwater is also essential for wildlife and other biota in dryland areas - areas that often attract tourism (e.g., Okavango basin). Groundwater drought occurs when there is a decline in recharge, levels, storage and discharge. When there is groundwater drought in the arid parts of southern Africa, livelihoods are destroyed causing social upheaval and distressed ecosystems and natural habitats.

11. One of the key advantages of groundwater is its reliability. After surface rivers and streams have dried up, groundwater can still be accessed through wells, springs and boreholes. Because aquifers react much slower to changes in rainfall, they can bridge surface water deficits and provide a buffer between dry and wet seasons. The buffering capacity is not without limits. Under certain conditions - for example rising dry season demand and reduced recharge from rainfall - some groundwater sources may fail, and a groundwater drought may occur. Yet managed aquifer recharge (MAR) and storage can be sharply increased through a systematic mapping and design of water buffering solutions.¹³

12. **Natural eco-systems and groundwater.**¹⁴ Ecosystems in the region are greatly dependent on groundwater. It is clear that the impact of groundwater drought is likely to be greatest in natural wetland ecosystems such as those that occur in the Okavango Delta (Botswana), Zambezi, Kafue and Luangwa flood plains (Angola and Zambia), Lake Malawi/Nyassa/Niassa and Lake Chilwa (Malawi and Mozambique), the Oshana system (Namibia), the sand river systems (eastern Botswana, southern Zimbabwe and northern South Africa) and the dambo/mbuga/vlei valley systems (Zimbabwe, Zambia and Tanzania) amongst others. Overall, there are five recognised wetland systems: palustrine, riverine, lacustrine, estuarine and marine systems. Each of these exists throughout the region, representing specific and usually highly localised ecosystem (including human dependence on the ecosystem services provided by the wetlands). These services include habitat for fish and other food stocks, provision of fibre and natural medicines, crops for cattle grazing, and (in some cases such as the Okavango Delta and Kruger National Park) support for wildlife on which tourism industries depend.

13. While these ecosystems have been researched, investigations have mostly addressed botanical/wildlife/natural environment issues. The nature of groundwater dependent ecosystem interaction has not been reliably established, and often not considered in wetland system studies. The extent to which these wetlands and other ecosystems are dependent on groundwater is not known and constitutes a fundamental knowledge gap. However, there is qualitative evidence that the existence of many of them (and thus the existence of all flora, fauna and human activity that are part of them) may be threatened by changes in groundwater levels, groundwater discharges and/or groundwater quality.

14. **Strategic importance of transboundary groundwater systems.** Large transboundary aquifers (TBA) are at the heart of the strategic importance of groundwater in SADC Member States. Over 20 cross-boundary groundwater systems have been identified (table 1/figure 1) and all are larger than local aquifers. In several instances, there is competitive demand and use of groundwater between countries. TBAs are exposed to pollution, which in some rural communities has reached critical levels with outbreaks of waterborne diseases and abandonment of wells. A lack of shared management, monitoring and exchange of groundwater information contributes to mismanagement, which in turn can be a potential source of conflict.

15. In southern Africa, there has been an increase of legal agreements and institutional frameworks to enable transboundary cooperation and integrated water resources management in shared watercourses over the past two decades. At regional level, the Revised SADC Protocol on Shared Watercourses (2000) informed the ratification of

¹³ See "Profit for Storage, the cost and benefits of water buffering" on: www.bebuffered.com

¹⁴ GDE in SADC were mapped under component 2 of the GDMP 2005-2011.

a number of basin level agreements and establishment of river basin organisations, RBOs (see section below on baseline). Groundwater is considered part of ‘watercourses’ in the Revised SADC Protocol as well as a number of river basin agreements. Transboundary agreements also emphasise management issues such as control of abstraction, pollution control, protection of recharge areas, and shared management. Yet, the operationalisation of commitments is often superseded by surface water priorities. This is equally the case for investments into the establishment and strengthening of river basin organisations.

16. Building linkages and synergies between the national-, regional-, and river basin-level institutions and investments is needed to address conjunctive ground and surface-water management challenges. By strengthening a platform for transboundary cooperation, SADC Member States could optimise scarce human and financial resources, build joint understanding of groundwater challenges and achieve mutual benefits in the management and development of water resources.

17. **Climate change.** The impact of climate change in southern Africa will pose substantial challenges to water resources management. The region is already known for climatic variability that translates into reoccurring drought and flood conditions with varying frequency and magnitude - from the deserts of Namibia to the floodplains of Mozambique. With climate change come greater variation in rainfall and increases in temperature. By 2050, temperatures are expected to rise with 1.5-2.0°C on average in the north of the SADC region, and by 2.5-3.0°C in the south (compared to 1961-1990 average). Research by NOAA has indicated that dramatic warming of the Indian Ocean can make monsoons 10-20% drier, contributing to prolonged and more severe droughts. Figure 3 illustrates a comparison of groundwater drought vulnerability of future climate change compared to present situation.

18. Climate change will predictably impact the use and recharge patterns of aquifers. This will impact GDEs and the extent to which communities and cities can access waters at the end of the annual dry seasons. More extreme weather and water-related events will affect the vulnerability of livelihoods and ecosystems. Longer dry seasons, or prolonged droughts can push the resilience of communities and natural systems and cause greater competition for groundwater sources.

19. Aquifers can provide an opportunity to introduce a number of adaptive measures to greater climate change. Examples include managed aquifer recharge (MAR), storage, protection and expansion of recharge through flood and runoff capture. Recent developments on MAR and water buffering in many countries can be used to enhance the use of aquifers for drought resilience.

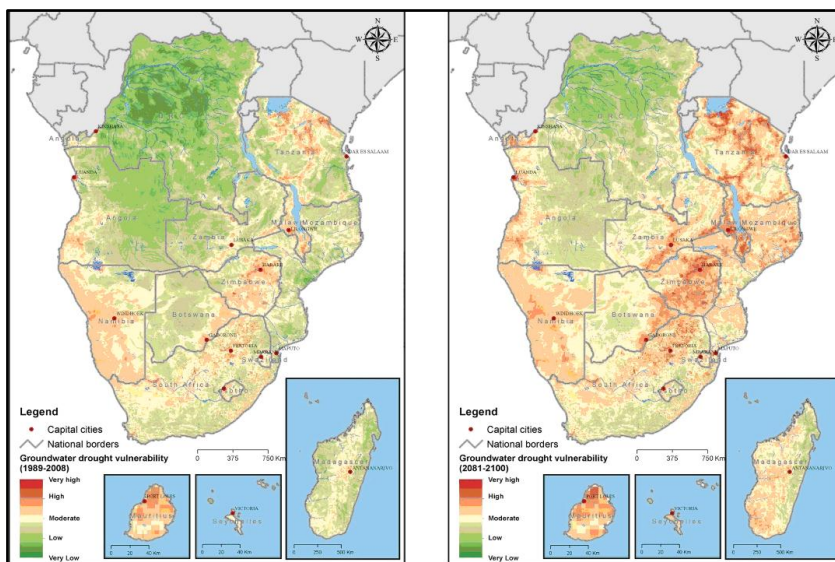


Figure 3. Groundwater drought vulnerability, present (left) and future (right)¹⁵

20. **Institutional capacity and frameworks.** Groundwater is not prominently featured in water legislation or policies at national level in southern Africa. The resource is normally not considered in water planning, and there is shortage of skills and tools within governments to monitor compliance with standards and abstraction. Institutionally, groundwater is often fragmented across different sectors such as agriculture and urban water supply, leading to a lack of integrated management. These factors contribute to neglect, mismanagement and an absence of conjunctive management of ground and surface-water. Substantial efforts have, however, been made to strengthen institutional groundwater capacity with the support of international initiatives (see coordination section A4 below).

¹⁵ SADC Groundwater Management Decision Support Guidelines based on IPCC SRES A1B (2011).

Developing policy guidelines and tools was also outputs of the GEF-financed *SADC Groundwater and Drought Management Project* (2005-2011). Lessons learnt from previous support across initiatives show that there is a need to advocate and follow up on implementation and adherence to policies, laws and standards at national level.

21. Strengthening institutions is equally important to improving policy and legislative instruments. The SADC Member States have endorsed the mandate of the SADC Secretariat to support national governments and transboundary cooperation on shared watercourses. In 2011, the SADC Subcommittee on Hydrogeology (which consists of representatives from SADC Member States) committed to the establishment of a regional center of excellence in groundwater – i.e., the Groundwater Management Institute for southern Africa (GMI). The GMI could fulfil a critical function for the promotion and implementation of institutional frameworks at national and transboundary level.

22. **Scientific research, knowledge and information exchange.** Amongst SADC Member States, research on groundwater receives meagre funding and political support in comparison to other science areas. At the international level, groundwater mapping is for the most part available as a result of long-term commitment by governments (with support from Germany, UK, France, the EU and the Netherlands amongst others). The integration of available information has also been made possible through initiatives by UNESCO/ IGRAC, the International Hydrologist Association (IHA) and BGR (Bundesanstalt für Geowissenschaften und Rohstoffe). For example, the International Groundwater Resource Assessment Centre (IGRAC) facilitates the exchange of global groundwater knowledge. Despite such initiatives, there is a dearth of information at the local, national and transboundary level. Quantitative information on the characteristics of aquifers (recharge, flow regimes, quality etc.) is still meagre and available information is not always easily accessible as is shown. Although some countries may have more developed research programmes, such as South Africa, and regional initiatives have advanced knowledge creation and sharing there is a need to build on achievements, create linkages between the existing initiatives, improve access to existing information and develop and link with training programmes for technical staff from SADC Member States and to promote and enable the sharing of information.

23. **Sustainable infrastructure solutions.** Appropriate infrastructure will be increasingly important for sustainable management of groundwater. The majority of investments in groundwater infrastructure are reactive rather than proactive. With growing water demand, investments in new boreholes and wells are expanding quickly in many parts of the SADC region. Drilling for groundwater is often uncoordinated and unregulated. Due to the lack of maintenance and rehabilitation, it is also not uncommon that infrastructures fail to operate after a short period of time. For example, UNICEF has estimated that a total of 40% of installed hand pumps in Africa are no longer working. Sustainable groundwater is specifically important in drought-prone areas. To bridge dry and wet seasons, enhanced managed aquifer recharge and water buffering techniques (such as sand dams) can facilitate recharge of shallow aquifers which provide water to communities that are vulnerable and exposed to drought. Experiences and good practices in the SADC region and in other semi-arid regions like the Sahel and Horn of Africa should be shared to provide a broader portfolio on technical solutions and the guidelines to plan and develop them.

BASELINE SCENARIO AND ASSOCIATED BASELINE PROJECTS

24. The baseline scenario for the proposed Project is complex with its regional nature and the fact that activities will interlink horizontally and vertically; from connecting technical staff in Member States (Government, knowledge centres, private sector etc.) to global and regional groundwater initiatives. Equally, the Project will support initiatives to promote transboundary cooperation as well as strengthen groundwater management from within countries. The proposed Project will, however, be soundly implemented as part of the endorsed structures and mandates of the SADC Secretariat and in line with the confirmed commitment of the SADC Member States (see section on proposed implementation arrangements). The proposed GEF-project *Sustainable Groundwater Management in SADC Member States* will be implemented with direct co-financing from the multi-donor Trustfund Cooperation on International Waters in Africa (CIWA). The Advisory Committee of CIWA, consisting of participating donors, has endorsed the engagement for a US\$2 million Grant for the purpose of supporting the Project. CIWA's mission is "to facilitate cooperation on water resources management and development in Africa in order to unlock the potential for sustainable, inclusive, climate resilient growth". In addition to being processed in conjunction with the CIWA grant, the proposed Project has an identified co-financing in the order of US\$42.48 million. Below follows an outline of the baseline scenario, divided into the regional, national, transboundary initiatives and projects that are associated with the proposed Project. Details of the preliminary co-financing sources are provided in Annex 1.

SADC-level Baseline context: Southern African Development Community

25. **The Revised SADC Protocol on Shared Watercourses (2000).** In accordance with the 1992 SADC Treaty (Article 21), the Member States shall “through appropriate institutions of SADC, coordinate, rationalise and harmonise...sectoral policies and strategies, programmes in projects in areas of cooperation”. Recognising the important role of water in fostering economic growth and cooperation, the SADC Member States signed the “Protocol on Shared Watercourse Systems in the Southern African Development Community Region” on August 28, 1995. The Protocol was later repealed and replaced by the Revised Protocol on Shared Watercourses. This was intended to align the Protocol with the provisions of the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses that had been adopted in April 1997.¹⁶ The Revised Protocol was signed by all SADC Member States on August 07, 2000 and is a legally binding agreement. The objective of the Revised SADC Protocol is “to foster closer cooperation for judicious, sustainable and coordinated management, protection and utilisation of shared watercourses”. To achieve its objective, the Protocol states that SADC Member States are to pursue: the establishment of agreements and institutions; promotion of sustainable, equitable and reasonable utilisation of shared watercourses; development and management of water; harmonisation of legislation and policies; and the promotion of research, information exchange, capacity building and application of appropriate technologies.

26. **The SADC Regional Water Policy (2005).** In 2005, the SADC Regional Water Policy (RWP) was developed to provide strategic guidance and to incorporate principles of Integrated Water Resources Management (IWRM)¹⁷ that had advanced since the ratification of the Revised Protocol. The RWP promotes sustainable balance between water resources development, economic growth and food security; alongside preserving the integrity of ecosystems. Moreover, the RWP emphasised the necessity of regional integration and cooperation between Member States and between water-related sectors (Policy statements 3.2.1-3.3.1). The Regional Water Policy provided a strategic and policy framework for the development of Regional Strategic Action Plans for IWRM.

27. **The SADC Regional Strategic Action Plan, RSAP III (2011-2015).** The RSAP serves as a work-plan for the implementation of the Revised Protocol and the Regional Water Policy, outlining concrete projects. The current SADC RSAP III (2011–2015) acknowledges the importance of groundwater to the region as a whole. A dedicated Groundwater Management Programme of Action (GMP, Programme No. 11) in the RSAP lists the following four priority project interventions:

- *Policy and Institutional Framework:* Minimum harmonised structures are established for institutional, legal and policy measures to improve groundwater management at the national and regional levels. Interactions between groundwater and surface water are also strengthened and institutionalise.
- *Transboundary Aquifer Management:* Transboundary Diagnostic Analyses and Strategic Action Plans are developed to reach an informed consensus on the factors affecting transboundary aquifers.
- *Awareness Raising on Groundwater Management:* An information and data management platform is established to integrate local and regionally applicable tool for enhancing management of shared aquifer systems. The information disseminated is derived from the SADC Code of Good Practices. The construction of subsurface dams will also be promoted.
- *Regional Cooperation and Groundwater Management:* Provisions on groundwater management are included in shared watercourse agreements to strengthen regional cooperation and increase the resilience of these agreements to changing circumstances brought about as a result of climate change. The recent UN articles on groundwater management will be further examined and considered to be incorporated into the groundwater management agenda in the region.

¹⁶ The Convention of 1997 is the first international law that is applicable to groundwater. However, the Convention has shortcomings as it defines groundwater only as part of a “system of surface and groundwaters”.

¹⁷ IWRM reflects the process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems, Global Water Partnership (2005).

28. The proposed Project will help implementation of the above priority interventions. Therefore, the Project strengthens the agreements reached by Member States through established mechanisms for regional cooperation. The proposed Project will also be aligned with, and strengthen, the institutional structures for cooperation on shared watercourses. SADC's institutional structure for managing and advancing the shared watercourses and IWRM-agenda is elaborated in the section on proposed implementation arrangements.

National-level Baseline context: country priorities and bilateral support

29. Groundwater availability, characteristics and dependency varies across the 15 Member States of SADC as outlined in previous sections. Although the role of groundwater may differ between countries, many challenges are shared. In countries such as Zambia, Namibia, Botswana and South Africa, the mining sector is increasing its use of groundwater. Equipped irrigation is a major user of groundwater, often constituting over 60% of water use (e.g., South Africa). In all Member States, groundwater pollution is a growing concern. The rapid expansion of on-controlled drilling of boreholes and construction of shallow on-site sanitation is causing nitrate-contamination of aquifers.

30. Groundwater is generally not granted sufficient recognition in water laws, policies and regulatory instruments in SADC Member States. A recent review of water legislations in SADC showed that all Member States have some form of water law, but only a few make reference to groundwater specifically.¹⁸ Also, effectiveness of existing legislation is undermined by inconsistencies between different sector-legislations and between surface and ground water.¹⁹

31. A few Member States have separate legal provisions for surface and groundwater (e.g., Botswana and Lesotho) and some have dedicated groundwater policy (e.g., South Africa). Other Member States have water laws and policies reflecting an integrated water resources approach. Water legislation in the SADC region, is however, often outdated with respect to groundwater management needs. Although harmonisation of water laws and policies is a priority commitment in the Revised SADC Protocol on Shared Watercourses, the SADC Regional Water Policy and transboundary basin agreements, the implementation of harmonisation has still not included groundwater.



Figure 4. Groundwater use in SADC Member States²⁰

32. Depending on water-needs and available funding, the level of investments into groundwater management and exploration is different among Member States. Financing for groundwater is often external (e.g., multi- and bilateral support) bringing inherent challenges in sustaining staff capacity, financial resources and administrative ownership.

¹⁸ Groundwater Governance: A Global Framework for Country Action *Thematic Paper 6 Legal and Institutional Frameworks* K.Mechlem. (2012).

¹⁹ In Zambia, for example, water resources were recently governed by the Water Act of 1949 from the times of colonial rule. The 1949 Act did not make provisions for groundwater and as such, created an incentive for groundwater use over surface-water (the latter requiring permits). The Water resources Management Act was approved by parliament in 2011.

²⁰ Groundwater – Matters for Decision Makers in SADC, SADC.

33. *GEF-Implementing Agency national-level support.* The World Bank supports a number of SADC Member States at the national level with their pursuit to achieve development objectives in water resources management. The Bank's financial and technical support for water resources is articulated in the World Bank's Country Partnership Strategies, which in turn are aligned to country water-sector development strategies and the support of other international cooperating partners. The International Development Association (IDA) of the World Bank provides financing for water projects in countries such as Lesotho, Malawi, Mozambique, Tanzania and Zambia. The details of the IDA support are outlined in Annex 1.

34. In countries such as Mozambique, Zambia and Tanzania, the World Bank developed Country Water Resources Assistance Strategies (CWRAS) together with counterparts at national level and in government. The purpose of the CWRAS is to define major water-challenges and provide a roadmap for solutions that the Bank can support. Groundwater and transboundary cooperation on shared watercourses feature as priorities in the CWRAS and as a result, IDA-financed operations include interventions to support groundwater management and international cooperation.

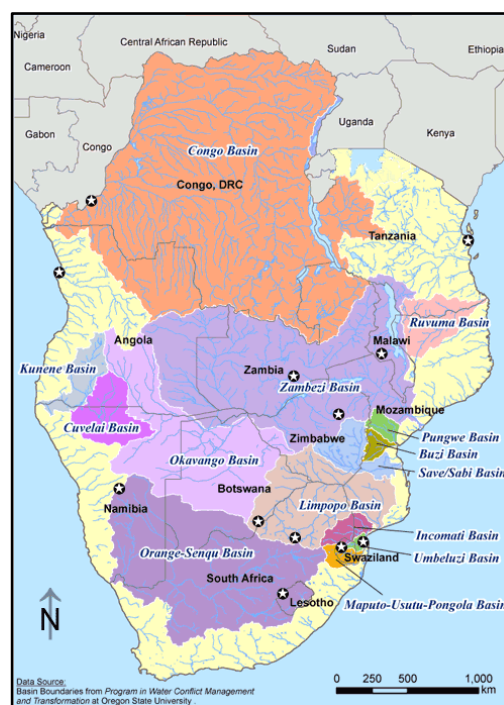
Transboundary-level Baseline context: shared river basins

35. Globally, there are only a fraction of legal agreements that are specific for transboundary groundwater systems. One of these agreements covers the Nubian Sandstone Aquifer in northeast Africa, requiring data collection and exchange. Otherwise, groundwater is often addressed as one of many water-related issues in international treaties on shared rivers.

36. The Revised SADC Protocol and the Regional Water Strategy has informed agreements and institutions on shared watercourses. Since the mid-1990s, when the original Protocol was ratified, there has been a move towards basin or regional-wide cooperation on shared waters and away from bilateral arrangements. Today, there are transboundary basin agreements and river basin organisations in place in many of the region's major shared rivers (figure 5).

37. Groundwater features to some extent in a number of river basin agreements. For example, in the Zambezi Watercourse Commission Agreement of 2004 (ZAMCOM), the watercourse is considered "the system of surface and ground waters of the Zambezi constituting by virtue of their physical relationship a unitary whole flowing normally into a common terminus, the Indian Ocean". The ZAMCOM Agreement also states that "Member States shall take all appropriate technical, legislative, administrative and other measures in the utilisation of the Zambezi Watercourse in order to...prevent, reduce or control pollution of the surface and ground waters of the Watercourse and to protect and enhance the quality status of the water and associated ecosystems for the benefit of present and future generations". In the case of the interim Tripartite Incomati and Maputo Rivers Agreement of 2002, the country obligations go further where signatories should ensure that "groundwater abstraction facilities, regardless of the use or destination of the water ...[should not exceed]... above 3,5 million m³ per year".

Figure 5. Transboundary river basins in SADC²¹



38. The inter-dependence between river and groundwater flows is a priority for transboundary cooperation on shared watercourses. This is particularly important in shallow alluvial aquifers. Surface water flows can contribute directly into groundwater resources, often in high-flow or high-rainfall periods/events. Equally, groundwater can be the 'influent' to surface flows. Understanding the transmission between the two is

²¹ For a full list of transboundary cooperation in SADC, see <http://www.icp-confluence-sadc.org/transboundary-river-basins-sadc-region>.

particularly important with respect to drought, pollution and sustainability of groundwater dependent ecosystems and community livelihoods.

39. Despite the importance of transboundary groundwater cooperation in the context of river basins, there is little data collected and exchanged across Member States on shared aquifers. Moreover, the protocols, mechanisms and IT-solutions for groundwater data-exchange need strengthening in the context of river basin organisations.

Relevant previous GEF support: SADC Groundwater and Drought Management Project

40. The baseline scenario is informed by the achievements of the previous GEF-supported *SADC Groundwater and Drought Management Project (GDMP)*. The GDMP was implemented between 2005 and 2011, with a total of US\$7 million from the GEF. The priority interventions of the Project were: piloting drought management plans and infrastructures in the Limpopo basin; develop economic valuation and drought vulnerability studies along with awareness raising and decision support guidelines; and the establishment of the Groundwater Management Institute for southern Africa (GMI). The GDMP was successful in reaching and engaging policy and technical decision-makers at national and local level in SADC Member States. For example, the strategic guidance of the Project was provided by the SADC Subcommittee on Hydrogeology who functioned as a project steering committee, establishing a level of ownership among Member States and the endorsed institutional structures of SADC. Outputs such as outreach and communication on groundwater, Decision Support Guidelines, economic valuation studies, drought vulnerability mapping, and the local drought-management pilots were considered especially important. The GDMP also managed to set the foundation for the GMI for southern Africa. A host institution was selected by the Member States, and articles of association and MoU for the GMI were endorsed. However, these achievements were completed at the end of the Project and there was an administrative obstacle in transferring the funds to ensure the operationalisation of GMI.

41. As many regional projects, the GDMP faced challenges associated with overly complex implementation arrangements and contradicting procedures for procurement at different scales. The project will be cognizant of the major lessons learned from the GDMP: the importance of communication; strengthen the implementation of groundwater management tools and policies/laws at national level and enable linkages with transboundary level institutions; tailor infrastructure solutions to realistic local contexts; ensuring operational alignment of administrative and procurement procedures among implementing parties; and importantly, addressing the administrative and financial sustainability for the GMI to carry project forward in the long-term. For a detailed overview of the previous Project, see Annex 2.

PROPOSED PROJECT: EXPECTED OUTCOMES AND COMPONENTS

42. In the realm of groundwater management in southern Africa, the proposed Project supports a number of higher level objectives. These include strengthening the ability of Governments and decision-makers in SADC Member States to manage and develop groundwater sustainably (at transboundary and national levels) in support of social and economic development, whilst facing the challenges of climate change risks, pollution and growing water demands.

43. The direct Project Development Objective (PDO) of the project is to develop and enable capacity and tools for the sustainable management of groundwater in the SADC Member States. To achieve the project development objective, the proposed project will consist of four components as outlined below.

44. The project will contribute to two of the objectives of the GEF International Waters window. First, it will support the GEF IW Objective 1: Transboundary Basins/ Aquifers (i.e., catalyse multi-state cooperation to balance conflicting water uses in transboundary surface and groundwater basins while considering climatic variability and change); and IW Objective 3 Capacity Building (i.e., support foundational capacity building, portfolio learning, and targeted research needs for joint, ecosystem-based management of trans-boundary water systems).

45. The direct co-financing from CIWA will contribute to Components A and C in particular. The Project Appraisal Document will outline more clearly the delineated financing in the project.

46. **Cross-cutting themes, activities and partnerships.** The Project is built around three key pillars that are mirrored in the components below: institutions, information and infrastructure. Certain cross-cutting themes are important to integrate the components and activities. These themes are: shifting the notion of groundwater as only a

sovereign resource to the notion of groundwater as a shared resource²²; integrating climate resilience as a shared priority; promoting conjunctive and coordinated groundwater management between scales (i.e., from local to transboundary) and sectors; and building dialogue and relations with stakeholders. With the shortage of skilled experts from within the region, the proposed Project will furthermore integrate training across the components. To encourage that various groundwater initiatives in the SADC region are mutually reinforcing, it will be important to build partnerships with academic institutions, river basin organisations, and international cooperating partners²³. Equally important is the notion of building upon the achievements made by previous, on-going and planned support.

Component A: Strengthening institutional frameworks for sustainable groundwater management

47. *Objective.* Component A aims to enhance the institutional capacity of governments in SADC Member States and transboundary organisations that are mandated to manage groundwater.

48. *Description.* Although several SADC Member States and some RBOs have provisions for sustainable groundwater in legal and policy frameworks, the institutional capacity to implement them is rarely adequate or sustained. Reasons behind this shortfall include lack of experienced and trained staff, inadequate national budget allocations (for fundamental activities such as regulation and monitoring; data quality, quantity, relevance, timeliness and [open-access](#)) and lack of attention to priority issues such as non-compliance and allocation. Component A will not only focus on the technical aspects of groundwater in institutional capacity building, but also advise Member States in facilitating implementation legislative and policy instruments to build sustainable groundwater management.

49. Component A will support alignment with the provisions of the UN International Law Commission Draft Articles on the draft 2008 Law on Transboundary Aquifers as recommended by the 3rd SADC Water Dialogue. The component will explore mechanisms for developing and deepening agreements to include groundwater provisions and linkages with other initiatives, such as with the Groundwater Commission of the African Ministerial Conference on Water (AMCOW). The SADC Water Division and the University of the Free State with the Groundwater Management Institute (GMI – see Component D) will play central roles in facilitating the long-term success of the component.

50. *Planned Activities and Outputs.* To achieve the objectives of Component A, the following activities are planned:

- Legal, policy and regulatory frameworks: support Member States with technical assistance, analysis and strategic guidance in their pursuit to update and harmonise legislation, policy and regulatory instruments for transboundary and national aquifers, and across sectors; and provide guidance to stakeholders on identifying solutions to implementation and compliance.
- Transboundary cooperation: the activity will help strengthen the integration of groundwater in shared watercourse commissions and agreements, addressing gaps in knowledge or mechanisms of cooperation; as well as promoting standards for groundwater data collection and open-data solutions for sharing information and analysis of groundwater information. [The objective of the activity is to support collaboration with a minimum of two River Basin Organisations in the region.](#)
- Groundwater protection and recharge: the activity will help Member States identify critical areas for managed groundwater recharge and develop protection plan. The activity builds on previous work on groundwater drought vulnerability mapping and associated analytical work.
- Development and dissemination of guidelines, standards and tools to decision makers and planners at local, national and transboundary levels: the activity will build on existing tools and expertise in parallel initiatives (e.g., CAP-Net and IGRAC) and help adapt/disseminate to practitioners in SADC Member States.

²² Aligned to the draft 2008 Articles on the Law of Transboundary Aquifers.

²³ The World Bank is an active donor in the SADC Strategic Water Reference Group, the SADC International Cooperating Partners Coordination Committee for water, and other donor-groups supporting transboundary cooperation (e.g., Zambezi International Cooperating Partners).

- Advocacy and negotiations for institutional compliance: the activity would support policy-makers, planners, technical experts and other stakeholders in Member States in the pursuit to build compliance to legislative and policy commitments for sustainable groundwater management at the transboundary and national level (including, for example, budgetary allocation and incorporation of groundwater in key strategic planning).
- Groundwater monitoring and data collection: supporting capacity building and technological solutions for expanding and revitalising groundwater data collection, management and sharing ([facilitated by -more open-access to groundwater data management at national and transboundary levels](#)).

51. *GEF Outcome & Output.* Component A would contribute to International Waters Outcome 1.1: Implementation of agreed Strategic Action Programmes (SAPs) incorporates transboundary IWRM principles (including environment and groundwater) and policy/legal/institutional reforms into national/local plans. (IW Output 1.1: National and local policy and legal reforms adopted); and International Waters Outcome 1.4: Climatic variability and change as well as groundwater capacity incorporated into updated SAP to reflect adaptive management. (IW Output 1.4: Enhanced capacity for issues of climatic variability and change and groundwater management).

Component B. Advancing knowledge, monitoring and information sharing on transboundary and national groundwater

52. *Objective.* Component B aims to improve the availability of and access to greater knowledge and information on groundwater across the SADC region.

53. *Description.* With more relevant and accurate information on groundwater, various stakeholders such as water resources planners, academic researchers and government staff in Member States and through shared watercourse institutions, could make more informed decisions and engage in greater dialogue on shared groundwater. The component will include Transboundary Aquifer Diagnostic in line with global best practice developed through the support of UNESCO. The component will also address the lack of research in new emerging groundwater challenges (such as climate change and pollution), meet training for practitioners in Member States, and help connect and disseminate multi-disciplinary information sources on groundwater in the region (informed by the TDA). As such, the component enables integration of local, national, regional and global data (for example, hydrogeological maps, population and land use variables, ecosystems, vulnerable groundwater dependent ecosystems, climate change analysis, wells inventory, amongst others).

54. *Activities and Outputs.* To achieve the objectives of Component B, the following activities are planned:

- Transboundary Diagnostic Analysis (TDA) and Strategic Action Plans (SAPs): through the multi-disciplinary analysis of shared aquifers, the activity will support Member States and associated RBOs in finding solutions to joint development and management as well as mechanisms for data collection and sharing. The proposed transboundary aquifers were part of the outcome from the 2012 SADC-ISARM analysis:
 - The Ramotswa Dolomite Aquifer (Botswana & South Africa), an approximately 120km long shared international boundary. The groundwater system is a karstic aquifer consisting of dolomite/chert poor and dolomite/chert rich sub-groups. It is highly compartmentalised due to base dyke intrusion. The main challenges facing groundwater management is bulk/raw water supply (both domestic and municipal), meeting local water demand (for communities, domestic and livestock water), agriculture (livestock watering and irrigation) and expanding mining; and if suitable,
 - The Shire Valley Alluvial Aquifer (Malawi & Mozambique), an alluvial groundwater system that supports irrigation, local communities and growing mining industries. Challenges, such as impact of reoccurring flooding and drought monitoring are groundwater-dependent and affect water use, such as agriculture and water supply. The TDA would strengthen cooperation and information sharing between the two countries, aligned with the auspices of the ZAMCOM Agreement.
- Supporting new research findings and disseminate information on solutions to critical groundwater management issues: climate change, drought, pollution, role of remote sensing and validation, groundwater buffering opportunities mapping, monitoring and early warning systems, decentralised management etc.

- **Information & Knowledge Sharing Platform:** the activity would involve building a fully integrated data management system interlinked with a GIS platform; storing, connecting and collecting information from various groundwater initiatives and data sources (e.g., the hydrogeological vulnerability mapping of the GDMP). The information sharing platform will be important as a 'back-bone' to the GMI website and easy access for SADC Member States and practitioners involved in research, planning, valuation etc. Linkages to on-going and future support to groundwater management (e.g., the SADC Hydrogeological Mapping, the TDA for the Stampriet Kalahari-Karoo Information Management System etc.) will be integral to success of the activity. The project will ensure transmission of lessons learned via the IW: LEARN program (financed at 1 percent of the GEF Grant).

55. *GEF Outcome & Output.* Component B would contribute to International Waters Outcome 3.1: Political commitment, shared vision, and institutional capacity demonstrated for joint, ecosystem-based management of water bodies and local ICM principles. (IW Output 3.1: National inter-ministry committees established; Transboundary Diagnostic Analyses & Strategic Action Programmes; local ICM plans); and International Waters Outcome 3.3: IW portfolio capacity and performance enhanced from active learning/KM/ experience sharing. (IW Output 3.3: Active experience/sharing/ learning practiced in the IW project portfolio).

Component C. Infrastructure solutions for sustainable and more climate resilient groundwater management

56. *Objective.* Component C aims to develop and scale up infrastructure solutions to enhance more sustainable management of groundwater.

57. *Description.* Across the SADC region, a number of physical interventions are deployed to improve and prolong groundwater recharge and water availability in community wells. For example, in the *SADC Groundwater and Drought Management Project*, pilots were developed in the upper Limpopo (Botswana, Zimbabwe and South Africa) from which a number of lessons were drawn. These pilots include small sand dams, rainwater harvesting techniques, improved monitoring, and rehabilitation of shallow wells in arid zones as part of community-designed drought management plans. A number of similar investments have faced sustainability challenges where infrastructures stop producing water due to problems such as maintenance. The proposed component would address lessons learnt and innovative solutions (such as GSM alerts to local authorities of malfunctioning wells) to address sustainability issues. Equally, lessons learnt from the pilots of the previous SADC Groundwater and Drought Management Project will be integral to the component design.

58. With climate change, sustainable groundwater infrastructure solutions will become ever more important to roll out so as to sustain the water availability for community use, for farming and livestock, and for sustaining groundwater dependent ecosystems. Component C provides the opportunity to compile best practise, new innovations and operational guides to member states in their individual promotion of more sustainable groundwater management, as well as developing ways in which climate resilience can be promoted at the local level through to the transboundary level.

59. It is envisaged that Component C would enable Member States to apply for small grants through which they could implement, trial and develop small scale infrastructure solutions for sustainable groundwater management.²⁴

60. *Activities and Outputs.* To achieve the objectives of Component C, the following activities are planned:

- **Infrastructure design on Managed Aquifer Recharge (MAR) techniques:** the activity would involve the analysis of appropriate infrastructure solutions reflecting the geological and geophysical aspects of groundwater in priority areas of Member States and transboundary aquifers.

²⁴The exact mechanism to implement the component across locations in selected Member States is still under consideration in collaboration with legal and operational design support. Lessons are being drawn from challenges with procurement and geographical spread encountered in the previous SADC Groundwater and Drought Management Project. [The size of grants and the institutional requirements necessary for their implementation will be developed at project design phase.](#) Appropriate solutions [and potential size of grants](#) will be further detailed in the Project Appraisal Document.

- Operational support for building drought-resistance at community level: the activity will involve manuals and guidance tools as well as technical assistance.
- Impact evaluation: the activity will support monitoring of progress, trouble-shooting problems and reporting on results.
- Guidelines and operational support to well siting and cost-effective well drilling²⁵.

61. *GEF-Outcome & Output.* Component C would contribute to International Waters Outcome 1.3: Innovative solutions implemented for reduced pollution, improved water use efficiency, sustainable fisheries with rights-based management, IWRM, water supply protection in SIDS, and aquifer and catchment protection. (IW Output 1.3: Types of technologies and measures implemented in local demonstrations and investments).

Component D. Operationalisation of the Groundwater Management Institute for Southern Africa

62. *Objective.* Component D aims to ensure the operationalisation of the SADC Groundwater Management Institute (GMI) as a permanent center of excellence in the region, hosted by the University of the Free State on behalf of and under the strategic guidance of the SADC Water Division. The GMI is one of the most important elements for the long-term sustainability of the project's outputs.

63. *Description.* The vision for the SADC GMI is to “ensure the equitable and sustainable use and protection of groundwater, as well as being a centre of excellence in the areas of groundwater drought management and management of groundwater dependant ecosystems in the region”. The genesis for GMI is found in the Groundwater Management Programme (GMP part of the RSAP II). The GMP identified the need for a regional institution to fill the observed gap on:

- Knowledge on groundwater, support capacity improvement of each Member State by providing technical assistance;
- Defining minimum joint standards for groundwater sustainable use and management;
- Support the establishment of coordinated management of transboundary aquifers;
- Establish central information clearing house that will be accessible to national, RBO and local levels;
- Serve as a focal interlocutor with other regional and international groundwater agencies;
- Prepare awareness creation material and coordinate their implementation;
- Facilitating training courses on groundwater management in River Basin Organisations²⁶
- Conduct and support SADC Member States in conducting scientific research;
- Periodically revise groundwater legal and policy frameworks and propose revision as appropriate;
- Promote integrated management of groundwater with surface water, land use and other sectors; and
- Solicit and administer long-term funding for financial sustainability.

64. The objective with the GMI from the perspective of the SADC Water Division is to: raise the understanding on the benefits of regional groundwater management through research, knowledge management, coordination and capacity building in the SADC region and as a result take the lead role in regional groundwater drought management; and to develop and maintain a long-term regional awareness of and the capacity to address groundwater drought; furthering the use of and periodically fine tuning the tools developed during the project.

²⁵ Use can be made of the extensive work done in this field by the Rural Water Supply Network (RWSN).

²⁶ This can be linked to long-term efforts of AGW-NET/CapNet in cooperation with IWMI, BGR, IGRAC and others to develop a training course on Groundwater Management for African Basin Organisations.

65. *Background.* The establishment of the GMI was a priority of the previous *SADC Groundwater and Drought Management Project*. The development of GMI was envisaged in two phases. The first phase involved consultation with Member States to develop the GMI vision. An elaborate institutional review was done to outline selection criteria for hosting the GMI and other organisational and governance structures. Phase 1 also included the full selection process: from endorsement of the GMI in 2007, through to the approval of the short-listed institutions of the SADC Water Resources Technical Committee, and finally approval at the SADC Summit of August 2008. The selected institute to host the GMI was the University of the Free State and its Institute for Groundwater Studies in Bloemfontein, South Africa. Phase 2 was envisaged to complete the organisational arrangements (i.e., registering GMI as legal entity, application as subsidiary organisation and secure subsidiary agreement, as well as employ necessary staff). The previous Project was able to complete Phase 1, but ran into challenges in transferring the necessary funds to complete Phase 2. Importantly, the SADC Member States have endorsed the establishment of GMI and are now awaiting appropriate support to operationalise the institute.

66. *Activities and Outputs.* To achieve the objectives of Component D, and build on the achievements under phase 1 of the establishment of GMI, the following activities are planned:

- Operationalising GMI as a functioning institution: the activity will involve ensuring registering GMI as a legal institution, finalising its charter and organisational structure, and operating management procedures. The activity includes engaging and hiring necessary staff to run the GMI and Project.
- Re-engaging the SADC Subcommittee on Hydrogeology as the Board of GMI as well as the Steering Committee for the proposed Project (including logistics for regular meetings, annual workplans and sharing of information). Redefining the roles and responsibilities of the national focal points, strengthen coordination and outreach with existing and new hydrogeological committees/task forces at the national level, and strengthen national-stakeholder engagement in the project activities.
- Setting up technical and administrative functions: the activity will involve ensuring the GMI has the adequate Information and Communication Technologies (ICT) and other minimum office resources to fulfil its mandate.
- Incorporate technical assistance and expertise on groundwater, environment and social, procurement and financial management.
- [Monitoring & Evaluation of project activities to assess and report on impacts and results to in line with agreed reporting formats and procedures with the Project Steering Committee, the SADC Secretariat and the World Bank.](#)
- Build a platform for stakeholder interaction and consultation: activities will include workshops, participation in regional forums, developing an online and interactive presence, providing in-depth training and courses.
- Financial sustainability plan: the activity will involve an analysis and plan for securing the financial viability and long-term sustainability of GMI beyond the lifetime of the proposed Project.
- Communication and awareness: the activity will involve development of the GMI website that is interlinked and harmonised with the online presence of the SADC Secretariat's website; the production of communication materials and activities that help support the vision of GMI and the objective of project activities, and other interactive communication tools necessary to help build capacity, dialogue and sharing of information.

67. The Project Management Costs (PMC) has been established in line with the University of the Free State requirements on covering administrative costs for implementing externally funded grants (in accordance with South African legislation). The University develops such an estimate based on an Indirect Cost Recovery Percentage that will not exceed the five percent PMC on GEF grants. The PMC will cover such costs necessary for the University to provide office space and every-day running costs (including heating and water). The delineation between the PMC and Component D will be further outlined in the World Bank Project Appraisal Document (PAD).

68. *GEF-Outcome & Output*. Component D would contribute to International Waters Outcome 1.2: Transboundary institutions for joint ecosystem-based and adaptive management demonstrate sustainability. (IW Output 1.2: Cooperation frameworks agreed with sustainable financing identified).

Proposed Project Implementation Arrangements & Institutional context

69. The preferred implementation arrangements for the proposed Project reflect the arrangements agreed by the SADC Secretariat and the SADC Member States.

70. **Implementing agencies.** The SADC Water Division, at the Infrastructure & Services Division of the SADC Secretariat in Gaborone Botswana, is the custodian of the proposed new Project. The vision of the SADC Water Division is “to attain the sustainably, integrated planning, development, utilisation and management of water resources that contribute to the attainment of SADC’s overall objectives of an integrated regional economy on the basis of balance, equity and mutual benefits for all member States”.

71. The SADC Water Division chooses to achieve its vision and implement operational project activities through applying the subsidiarity principle agreed by the SADC Council of Ministers in 2004. The said principle aims to promote cost-effectiveness and sustainability of activities that promote implementation of the SADC Treaty and SADC Protocols (including the 2000 Revised Protocol on Shared Watercourses). The application of the subsidiarity principle is considered suitable for technically complex projects such as the proposed groundwater project, and it ensures comparative and optimised use of the SADC Water Division staff capacity. As such, an approved ‘subsidiarity organisation’ will be implementing the Project on behalf of the SADC Secretariat. A subsidiarity organisation has been identified for the proposed Project.

72. As part of the SADC Groundwater and Drought Management Project (www.sadc-groundwater.org) which was completed in 2011 and supported by the World Bank/GEF, the arrangements for a regional center of expertise in groundwater were developed. In 2008, the University of the Free State in Bloemfontein, South Africa, was selected by the SADC Subcommittee on Hydrogeology as the preferred hosting institution for the Groundwater Management Institute for Southern Africa (GMI). The selection followed both an institutional review and a competitive bidding process. With the support of the earlier project, the organisational arrangements for GMI were also outlined and established. The GMI was, however, not fully operationalised due to a shortfall in transferring necessary funds. The new proposed Project has a dedicated component and resources for the operationalisation of the GMI, including activities to develop and implement a plan for the GMI’s long-term financial sustainability.

73. To implement the new Project, the University of the Free State will act as subsidiarity organisation to the SADC Secretariat as described above. Within the University, it is the Institute for Groundwater Studies that will deliver and manage the Project on a day-to-day basis (including financial management and procurement). The Institute for Groundwater Studies at the University will also host and build the GMI. The linkage to the SADC Water Division will be reinforced through provision of strategic guidance of the new Project. The Project Steering Committee function will be fulfilled by the SADC Subcommittee on Hydrogeology that is made up of representatives from SADC Member States. These proposed Steering Committee arrangements would be the same arrangement as for the previous SADC Groundwater and Drought Management Project (2005-2011). Below follows an outline of the institutional framework for shared watercourses in SADC.

74. **SADC Institutional Context.** The SADC Secretariat is mandated with the strategic planning and management of SADC Programmes for the coordination and harmonisation of policies and strategies in Member States (SADC Treaty 1992, Article 14). In the 2000 Revised Protocol on Shared Watercourses, the institutional mechanisms and functions for the implementation of the Protocol were established. The table below outlines the main institutions and their respective areas of responsibility.

75. The annual meeting of the Committee of Water Ministers is preceded with a meeting of the Water Resources Technical Committee (WRTC). To support the WRTC, a Subcommittee on Hydrogeology was established to address issues and priorities related to groundwater management across the SADC region. As mentioned, this Subcommittee equally functioned as a Steering Committee for the previous GEF-financed SADC Groundwater and Drought Management Project and will continue to fulfil this function for the new proposed Project. An illustration of the agencies involved and respective relations is provided in Annex 3.

| Table 4. Institutional structure of SADC Water Sector Organs | |
|---|--|
| Institution | Function |
| Committee of Water Ministers | Oversee implementation of the Protocol Assist in resolving potential conflicts Guide cooperation & harmonisation of legislation, policies, strategies, programmes & projects Recommend & advise the SADC Council of Ministers |
| Committee of Water Senior Officials | Examine the reports from the WRTC Advice & update the Committee of Water Ministers on decisions for Council & status of implementation of Protocol |
| Water Sector Coordinating Unit/SADC Water Division | Monitor implementation of, advice & provide guidance of interpretation of Protocol Liaise with SADC organs & shared watercourse institutions on matters pertaining to Protocol Organise & manage technical & policy meetings Mobilise & facilitate technical & financial resources for implementation of Protocol |
| Water Resources Technical Committee & Subcommittees | Provide technical support/advice to Committee of Water Sr Officials through Water Sector Coordination Unit Appoint standing subcommittees for longer term tasks |
| Shared Watercourse Institutions | |
| States establish appropriate institutions such as watercourse commissions, water authorities or boards as may be determined | |
| Shared Watercourse Institutions shall provide information necessary to assess progress on the implementation of the provisions of this Protocol | |
| States undertake to adopt appropriate measures to give effect to the institutional framework referred to in the Protocol | |

ADDITIONAL COST REASONING AND EXPECTED CONTRIBUTIONS FROM BASELINE

76. In the SADC region, groundwater management is being supported through national projects (such as IDA financed national water resources projects or river basin support), bilateral support, regional trust funds for cooperation on international waters (such as GIZ support to SADC transboundary waters and the World Bank supported Cooperation on International Waters in Africa) and global initiatives (such as UNESCO, FAO and GEF). However, there is a need to build a platform where international initiatives are aligned to the benefit of SADC Member States. Equally important is the need to strengthen the linkages between the national level governance of water to the transboundary and regional level. As such, the reasoning for the additional cost incurred by the proposed project is to enable such harmonisation and linkages between different players; particularly in the face of growing groundwater challenges and risk of disconnects between initiatives.

77. Further additionality of the proposed project is through the emphasis of groundwater as a longer-term resource to meet human, economic and environmental needs. Climate resilience is an imperative with respect to groundwater management; why it has been proposed as a cross-cutting theme and priority for both research and infrastructure activities in the project.

78. The baseline scenario indicates that a total of approximately US\$2.5 billion identified projects supporting water resources management across southern Africa. Of this, approximately US\$42 million has been identified as co-financing that will support the proposed project. The project presents an opportunity to build a regional and more coordinated framework for support to groundwater management – a sector that rarely receives dedicated and priority investment funds in the region.

GLOBAL ENVIRONMENT BENEFITS

79. The global environment benefits associated with the proposed Project relate to the more sustainable groundwater management that can be achieved across the vast areas of the 15 SADC Member States. In addition to the environmental challenges related to competing use of groundwater or growing risk of pollution and over use, water availability in southern Africa is expected to suffer from the negative impacts of climate change. According to the UNFCCC, major perennial rivers in the region will become seasonal as a result of climate change. This is expected to intensify the drilling of boreholes and deep wells to satisfy unmet demand. Signs are that a move in that direction has already begun. The immediate impact will be felt by poor communities living in this region. There is therefore a need to ensure that existing water use (either from shallow aquifers, deep wells or fossil/confined aquifers) is brought under sustainable management.

80. The SADC region is well known for its richness in biodiversity and forest ecosystems. Globally acknowledged parks of international importance are found in most of the SADC Member States. The contribution of nature based tourism provides important revenues that provide a sustainable financing framework and opportunities for rural communities. Most parks also rely on groundwater to satisfy the demand for water by wildlife and sustain important groundwater dependent ecosystems. In the absence of enforceable provisions to ensure the protection of groundwater recharge areas and sustainable management of groundwater systems, biodiversity protection will be undermined and prone to increased losses. Land degradation will ensue as vegetation cover dissipates, following drying streams, which depend on the groundwater discharge. The environmental impact and the disruption in livelihood of poor communities will be extensive. Given the potential future scenarios, and given the important role of groundwater in biodiversity protection, sustainable land management and the adaptive role it is expected to play in reducing the full impact of climate change, the global environmental benefits of the project are substantial.

INNOVATIVENESS, SUSTAINABILITY AND POTENTIAL FOR SCALING UP

81. One of the project's overall goals is to build on the platform of achievements of past projects and parallel, associated initiatives. Whilst doing this, resources and opportunities can be created to design and identify the "next generation of interventions" in support of groundwater management. The GDMP of 2005-2011 was instrumental in identifying institutional, policy and legal gaps in groundwater management and support was to a large extent to improve regional coordination and enhancing groundwater management issues in the overall sustainable development agenda of the SADC region. With these achievements made, the proposed project not only provides opportunities to sustain the gains of the GDMP, but also substantial opportunity for scale-up and inclusion of new innovations. The combination of having the project implemented by the SADC Water Division with the support of the Groundwater Management Institute in the University of the Free State in South Africa, enables both collaboration at the Governmental level in existing fora for cooperation on international waters (SADC) as well as operationalisation benefitting from the existing excellence of the academic institutions in the region (University of the Free State/GMI with partner agencies).

82. Although existing capacity in governments across SADC may be limited to provide the necessary and required support for groundwater management, the willingness to work towards such goals are reflected in the provisions of national water sector strategies, policies and laws, as well as commitment through transboundary agreements. Building on these institutional frameworks, the proposed Project can promote scaling up and harmonisation of instruments that can enable more sustainable groundwater management.

A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project preparation:

83. Stakeholders will include partners at regional and national levels, government agencies responsible for groundwater, academic research institutions, River Basin Organisations, NGOs, local and traditional councils, international cooperating partners as well as the media. The project will also play an 'integrating' function across the region where smaller initiatives driven by CSOs can link up to national, or higher-level initiatives. Global partners, such as UNESCO-IHP and IGRAC can facilitate the transboundary and research aspect of the project and support the global groundwater linkages. Cooperation with universities internationally, will also help implementation of the project. Other bilateral donors will work with individual countries and/or SADC Secretariat in support of the project. At local level, RBOs will be an integral part of the new management framework and institutional setup.

A.3 Risk. Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design (table format acceptable):

84. The following risks have been identified as needing mitigation efforts and/or close monitoring during implementation:

- Implementation delays: regional projects often take more time than a country project due to the need to reach agreement on follow-up steps, geographic areas to be covered, and capacity difference among the participating countries. However, the project would build-on the experience of GDMP and would strive to work closely with

decision-makers; give an active role of the Project Steering Committee (the SADC Subcommittee on Hydrogeology); prepare procurement documents taking into account on-ground capacity and would integrate implementation into the operation of the GMI host university.

- Authorities may not show interest beyond their sectoral focus that could compromise the establishment of effective groundwater management. However, the incentive of supporting them through an integrated information system and exchange of lessons could play a role in breaking the silos.
- Project supported institutional coordination mechanism established may not be sustainable after the project closes. The project will strive to streamline activities into existing water agencies and SADC will continue to play the leading role towards continuation. Awareness building and training also would play a role in ensuring sustainability.
- Coordinating with donors may be time consuming and costly: there are a number of donors interested in supporting SADC Member States improve their groundwater knowledge and management. While the project aims to bring these partners towards common vision, parallel financing may be pursued to avoid unnecessary cost and implementation delays.

A.4. Coordination. Outline the coordination with other relevant GEF financed and other initiatives:

85. At the regional level, coordination will be done in collaboration with the leadership of SADC Water Division in Gaborone, Botswana. Strategic management and guidance will be facilitated through the Steering Committee developed under the GDMP and that consists of members from the Hydro-Geological Subcommittee of the SADC Water Resources Technical Committee (WRTC). At each country level, it will be led by the National Project Focal Point that is also a member of the Steering Committee.

86. Co-financing to the Project includes the targeted activities to strengthen groundwater management as part of national water resources strategies and investments. The World Bank's IDA support to a number of SADC Member States promotes coordination with the proposed Project. Equally important, the implementing agencies also coordinate with a variety of projects and stakeholders through the platform upheld through SADC and through international initiatives such as ISARM and parallel ICP-supported projects (including UNESCO and GIZ in particular). Below follows a detailed outline of the global and regional initiatives that form part of the baseline. The activities listed below demonstrate the opportunity for the proposed Project to collaborate and coordinate with other relevant GEF-financed and other initiatives, build and integrate findings that are mutually beneficial for the SADC Member States.

Global/Regional-level Baseline: Initiatives with direct activities in southern Africa

87. Thanks to global and regional initiatives, there are today resources of hydro-geological mapping and groundwater data of southern Africa along with greater attention to groundwater governance and capacity-building challenges. The proposed Project will strive to build a platform to connect groundwater-experts, decision-makers, and representatives from ground-water dependent sectors (such as mining or agriculture) as well as other interested stakeholders. Through the Project's Component D, the Groundwater Management Institute for southern Africa (GMI) will enable the establishment of a center of excellence that is located within the region. This can translate into more effective coordination and collaborations among different global and regional initiatives

88. **UNESCO.** One of UNESCO's International Hydrological Programmes (IHP), led together with the International Association of Hydrologist (IAH) and in collaboration with regional partners, is the Internationally Shared Aquifer Resources Management (ISRAM) initiative. Since 2000, ISARM have provided inventories of transboundary aquifers, guidelines and tools. With the support of the GEF, UNESCO is thereby able to provide technical expertise and enable sharing of knowledge across sectors and countries. UNESCO is also leading on promoting a high-level network of multidisciplinary experts to address the complex issues of transboundary aquifers (e.g., TWAP-Groundwater Component: GEF financed Transboundary Waters Assessment Programme).

89. In southern Africa, UNESCO-IHP (in cooperation with IGRAC) has recently been given support from the Swiss Agency for Development and Cooperation (US\$2.5 million) to include the Stampriet-Kalahari/Karoo Aquifer as one of three global case studies in the *Groundwater Resources Governance in Transboundary Aquifers Project*. The Project

will promote research and cooperation through improved knowledge and recognition of groundwater, cross-border dialogue and cooperation, shared management tools and facilitating governance reform.

90. The UNESCO Chair in Hydrogeology is located at the University of the Western Cape's Institute for Water Studies, Cape Town. On behalf of the African Ministers' Council on Water (AMCOW) and UNESCO in Windhoek, Namibia, the UNESCO Chair has been promoting training and research on groundwater.

91. **Groundwater Governance: A Global Framework for Country Action.** Together with the GEF, UNESCO, IAH and the World Bank, FAO is leading Groundwater Governance Project. Its aim is to "raise awareness of the paramount importance of sustainable groundwater resources management in averting the impending water crisis; and influence political decision making for better stewardship of groundwater resources worldwide". The project is promoting groundwater governance diagnostics and through training, consultations and country case studies (for example South Africa and Tanzania).

92. **International Groundwater Resources Assessment Center, IGRAC.** With the support of UNESCO, WMO & the Netherlands Government, IGRAC promotes to include groundwater fully in the assessment of freshwater resources of the world in order to encourage and enhance the conjunctive and sustainable utilisation of both groundwater and surface water. Relevant project activities include: Global Groundwater Information System (CGIS) including participative Global Groundwater Monitoring Network (SADC-workshop Nov 2012), guidelines and protocols, and contributions to transboundary groundwater assessment programmes. Together with UNESCO-IHP, IGRAC is executing the Groundwater Component of the GEF-TWAP and the SDC-funded *Groundwater Resources Governance in Transboundary Aquifers Project*. In both projects IGRAC is providing technical support and setting up the information management systems. Together with BGR and other partners (African Groundwater Network/Cap-Net, ANBO, IWMI) and largely based on GW-MATE (World Bank) expertise, IGRAC recently initiated developing a course on *Groundwater Management for (African) River Basin Organisations*. The first course will be conducted for ORASECOM Sept.2013.

93. **Africa Groundwater Network & CAP-Net.** Advocating and raising awareness on the value and potential of groundwater in Africa is the priority of the Africa Groundwater Network (AGW-Net). AGW-Net contributes to capacity building at multiple levels, encourages information sharing, bridging surface and groundwater practitioners and aims to foster academic cooperation. AGW-Net is part of the global initiative Capacity Building for Integrated Water Resources Management (CAP-Net).

94. **WaterNet.** The regional network, WaterNet, promotes training, research and outreach on IWRM to academics, technical experts and government officials in southern and eastern Africa. With annual conferences and an online-presence, WaterNet aims to strengthen regional institutions and human capacity. WaterNet works on behalf of SADC and together with national and international initiatives.

95. **The SADC Grey Literature Archive**²⁷. With support of the British Geological Survey, GIZ, UKAid and AusAid, SADC has developed a Groundwater Grey Literature Archive. The archives have collected and organised historical documents (dating from the 1890-1970).²⁸

96. **SADC Hydrogeological Mapping Project and SADC Water Information Sharing Hub.** Also with the support of GIZ, UKAid and the EU, a SADC Water Information Sharing Hub has been set up, presenting amongst others, the SADC Hydrogeological Mapping Project.²⁹

97. **The International Atomic Energy Agency (IAEA)** has made significant contributions to various national groundwater resource assessments. This support could be extended to the role of the environmental isotopes analysis to transboundary aquifers.

²⁷ <http://www.bgs.ac.uk/sadc/reportSearch.cfm>

²⁸ Additional efforts have been made by organisations such as IAH and IGRAC on meta-data base of literature and other information. The GMI has a unique opportunity to provide a platform for sharing the collective data and sources.

²⁹ <http://www.sadcwaterhub.org/content/sadc-hydrogeological-mapping-project-final-report>

Description of the consistency of the project with:

B.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAs, NAPs, NBSAPs, national communications, TNAs, NCSAs, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.:

98. The proposed project will support SADC and the Member States in implementing the SADC Regional Strategic Action Programme (RSAP III, 2011-2015). The RSAP identified at least seven critical thematic areas of intervention for groundwater management. These include: (i) legal and regulatory framework; (ii) institutional strengthening; (iii) linkages with sustainable development policies; (iv) data collection, management and dissemination; (v) awareness building, education and training; (vi) stakeholder participation; and (vii) infrastructure development.

99. Specifically, Programme 11 of the RSAP (i.e., “Groundwater Management & Development”) has the objective to “improve coordination over the management of groundwater resources”. The priority interventions of the RSAP Programme 11 are outlined in the Baseline Scenario section.

100. The RSAP has provided a useful framework for crowding-in support from international cooperating partners around common vision developed by the SADC Member States. The commitment of SADC and the Member States is reflected in the establishment of a regional Groundwater Management Institute (GMI).

101. At national level, the proposed Project will also help Member States in strengthening and implementing national strategies for the improved management of water resources, and particularly groundwater. Alignment with national level programmes (supported by, amongst others, IDA) will facilitated linkages between the regional level and the national level. In addition, a number of the SADC Member States have developed and endorsed NAPAs.

B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities:

102. The proposed Project is consistent with GEF-5 International Waters focal area that supports groundwater system and shared aquifer sustainable cooperative joint management. The Project will also address issues related to climatic change and variability, and the impact of droughts and floods as extreme events in a transboundary context.

B.3 The GEF Agency’s comparative advantage for implementing this project:

103. The GEF Implementing Agency for the proposed Project is the World Bank.

104. The primary focus of the proposed Project is to enable sustainable groundwater management at transboundary and national levels. This will be achieved through activities that can deliver awareness raising, information sharing, improved groundwater management and new scientific research on groundwater challenges. The Project cannot, however, achieve such results in a stand-alone context. Thus, the Project will be closely linked to parallel projects (i.e., the co-financing).

105. The direct co-financing from the Cooperation on International Waters in Africa (CIWA) – a multidonor Trustfund managed by the World Bank – creates a unique opportunity for strengthened processing and implementation support.

106. The co-financing in many of the Member States is supported by the World Bank financing instruments - through IDA (International Development Association) and IBRD (International Bank for Reconstruction and Development). While the World Bank has a substantial portfolio across the SADC region, an estimate was conducted how much of the resources allocated to water resource management projects could be dedicated to groundwater sustainable use and management. This will be further refined and a clear commitment from each project in each country will be produced during project preparation phase. The portfolio of water resources projects in the SADC region supported by the World Bank has integrated groundwater in their project designs. Others could easily be supported to retrofit groundwater (including agricultural and natural resource management projects) in to their existing design. This would allow a consolidated and holistic approach leading towards IWRM. Such integration will be undertaken at a landscape approach covering the RBOs under which a given aquifer covers.

107. Further, the World Bank has established an effective working relationship with SADC Secretariat as part of the GDMP project and in support of transboundary water courses and climate change dialogue. The World Bank continues to participate as a member of the SADC Water Strategy Reference Group and bring extensive experience in international water including in supporting countries establish a transboundary groundwater management.

108.While the SADC Member States have shown interest to use resources available to them for climate change adaptation, the specific management groundwater in reducing the impact of climate variability through groundwater has not been articulated extensively. The World Bank's engagement in other global climate change adaptation initiatives, gives the agency the ability to better coordinate and align initiatives.

109.The World Bank has had a long-standing commitment to global priorities and region-wide programs and the 2008 Regional Integration Strategy for Africa provides a coherent and strategically focused framework to guide the Bank Group's assistance in support of regional integration and regional programs in the provision of regional public goods. The strategy acknowledges that regional approaches to the management of shared waters can provide improved water security and more sustainable management of these resources than achievable through national action. It further recognises that effective management is all the more urgent given the potentially disruptive impact of climate change on water resources availability and increasing water demand resulting in potential conflicts arising from limited supplies. In addition, the Bank has been increasingly providing support to complex groundwater projects and other research. The Bank's Strategy for Africa also recognises that many of African challenges (such as climate change, water resource management and food security) are best addressed through cooperation and integration at the regional level.

110.The Country Assistance Strategies for the individual SADC Member States all include a strong focus on water and recognition of the role of water in fostering the goals of economic cooperation. For example, the Country Brief Note for Namibia states that "Groundwater sources are facing increasing pollution from pesticides and excess fertilizers" and that the country is facing groundwater depletion. The Interim Strategy Note for Angola recognised the weakness of water sector institutions, while that for Botswana alludes to the fact that in the long run water will be the scarcest commodity and is critical to the country's development. Country Water Resources Assistance Strategies for Mozambique and Zambia highlight the important role of groundwater while productive development of groundwater resources are being supported in several of the SADC Member States, including Tanzania and Malawi.

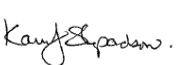
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the [Operational Focal Point endorsement letter\(s\)](#) with this template. For SGP, use this [OFP endorsement letter](#)).

| NAME | POSITION | MINISTRY | DATE |
|----------------------------------|--|---|------------|
| Carlos Avelino Manuel Cadete | National Director & GEF Focal Point | Angola: Ministry of Environment | 08/19/2013 |
| Ingrid M. Otukile | Chief Natural Resources Officer & GEF Focal Point | Botswana: Ministry of Environment, Wildlife & Tourism | 05/08/2012 |
| Bavon Samputo Elima | GEF Focal Point | DRC: Ministry of Environment, Nature Conservation & Tourism | 13/08/2013 |
| Stanley Damane | Director of Department of Environment & GEF Focal Point | Lesotho: Ministry of Tourism, Environment & Culture | 04/20/2012 |
| Dwight Davison Kambuku | Director of Water Resources | Malawi: Ministry of Agriculture, Irrigation & Water Development | 04/16/2012 |
| Ali Mansoor | Financial Secretary & GEF Focal Point | Mauritius: Ministry of Finance and Economic Development | Awaited |
| Marilia Telma Antonio Manjate | Head of Dept of International Cooperation & GEF Focal Point | Mozambique: Ministry for the Coord. of Environmental Affairs | Awaited |
| Teofilus Nghitila | Environment Commissioner & GEF Focal Point | Namibia: Ministry of Environment & Tourism | 08/20/2013 |
| Didier Dogley | Special Advisor to the Minister & GEF Focal Point | Seychelles: Ministry of Home Affairs, Environment, Transport & Energy | 04/13/2012 |
| Zaheer Fakir | Acting Deputy Director-General International Cooperation & GEF Focal Point | South Africa: Department of Environmental Affairs | 04/18/2012 |
| Stephen Mfana Zuke | Director & GEF Focal Point | Swaziland: Environment Authority | 8/22/2013 |
| J.K. Ningu | GEF Focal Point | Tanzania: Vice President's Office | 04/16/2012 |
| K. Nkowan | Director & GEF Focal Point | Zambia: Ministry of Lands, Natural Resources & Env. Protection | 04/16/2012 |
| Tinayeshe Mutazu | Director | Zimbabwe: Ministry of Water Resources Development & Management | 04/20/2012 |

*Endorsement Letter from Madagascar not available due to suspension with SADC.

B. GEF AGENCY(IES) CERTIFICATION

| This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation. | | | | | |
|--|---|-------------------|---|----------------|-------------------------|
| Agency Coordinator, Agency name | Signature | DATE (MM/dd/yyyy) | Project Contact Person | Telephone | Email Address |
| Karin Shepardson, GEF Executive Coordinator, World Bank |  | 4/8/2013 | Paola Agostini Regional Coordinator Africa Region | (202) 473 7620 | pagostini@worldbank.org |

ANNEX 1: CO-FINANCING & ASSOCIATED INITIATIVES

The proposed *Sustainable Groundwater Management in SADC Member States Project* is a regional level project that will engage with, and support country-, transboundary-, regional- and global-level institutions and projects. The direct co-financing for the proposed US\$9 million of GEF financing for the project, is in the order of US\$42.48 million. The details of the associated baseline projects and related initiatives are presented in the table below.

Moreover, the GEF-financed project will be fully blended with a US\$2.0 million grant from the Multidonor Trustfund *Cooperation on International Waters in Africa (CIWA)* which is administrated by the World Bank. The CIWA-Advisory Committee, consisting of participating donors, endorsed the engagement for the project in May 2013.

| PROJECT/INITIATIVE | TOTAL | \$42,478,000 |
|---|-------|--------------------|
| Regional-level direct financing: CIWA (World Bank Multidonor Trustfund) | | \$2,000,000 |
| Direct support to the SADC Groundwater Management Project (Cooperation on International Waters in Africa CIWA) – \$2m | | |
| <ul style="list-style-type: none"> - CIWA support for the realisation of the SADC Regional Strategic Action Plan, part of proposed Project. - Focused support for the Groundwater Management Institute and Transboundary Diagnostic Analysis - Endorsed by CIWA Advisory Committee in May 2013 | | \$2,000,000 |
| Zambezi Watercourse Commission: Zambezi River Management Project (CIWA) - \$4m | | |
| <ul style="list-style-type: none"> - Reinforcement of the Zambezi River Water Information System (ZAMWIS) - Operational Decision Support systems with GIS - Support to strategic basin wide planning | | - |
| Global, Africa & SADC-level initiatives *The total sum is estimated to be higher. | | \$1,218,000 |
| Africa Groundwater Network (AGWNET), CAP-Net (UNDP) | | |
| <ul style="list-style-type: none"> - Groundwater needs assessment, Limpopo Basin Commission with LIMCOM | | - |
| SADC Groundwater Grey Literature Archive (GIZ, British Geological Services, UKAid, AusAid) | | - |
| Groundwater Resources Governance in Transboundary Aquifers: Stampriet-Kalahari/Karoo (UNESCO-IHE/Switzerland) – \$2.67m | | |
| <ul style="list-style-type: none"> - Improve knowledge, cross-border dialogue, management tools and reforms - Implementation together with the Orange-Senqu River Commission (ORASECOM) | | 500,000 |
| Lower Shire River (Malawi/Mozambique): University of Strathclyde & Water for People project (Scottish Government Climate Justice Fund Project) – \$0.72m | | |
| <ul style="list-style-type: none"> - Capacity building & monitoring - hydrogeological mapping | | 718,000 |
| UNESCO Chair, University of the Western Cape | | |
| <ul style="list-style-type: none"> - Capacity building, training - Research on groundwater in South Africa and southern Africa | | - |
| South African Water Research Commission | | |
| <ul style="list-style-type: none"> - Research & policy, including groundwater | | - |
| Groundwater Governance: A Global Framework for Action (GEF –initiative led by FAO) – \$4.6m | | |
| <ul style="list-style-type: none"> - Training and consultations in southern Africa - Country case studies (incl. South Africa, Tanzania) | | - |
| International Groundwater Resources Assessment Center, IGRAC (UNESCO, WMO & the Netherlands) | | |
| <ul style="list-style-type: none"> - Development of Global Groundwater Information System (CGIS) - Development & promotion of guidelines and protocols for groundwater assessment - Pillar in UN World Water Assessment Programme's groundwater programme - Special programme: Transboundary groundwater (e.g., GEF's UN-Learn, GEF Science, TWAP GEF Transboundary Waters Assessment UNEP, etc.) including 2012 Second assessment on transboundary rivers, lakes and aquifers - Capacity building: groundwater management for river basin organisations (southern Africa 2013, with BGR, Cap-Net, ex GW-Mate) | | - |
| UNESCO International Hydrology Programs: Internationally Shared Aquifer Resources Management ISARM | | |
| <ul style="list-style-type: none"> - Multidisciplinary approach to transboundary aquifers governance and management - Network of experts to compile global inventory and guidelines - Promote and enable cooperation | | - |
| Transboundary Waters Assessment Programme TWAP (GEF-UNEP), closed 2010 | | - |

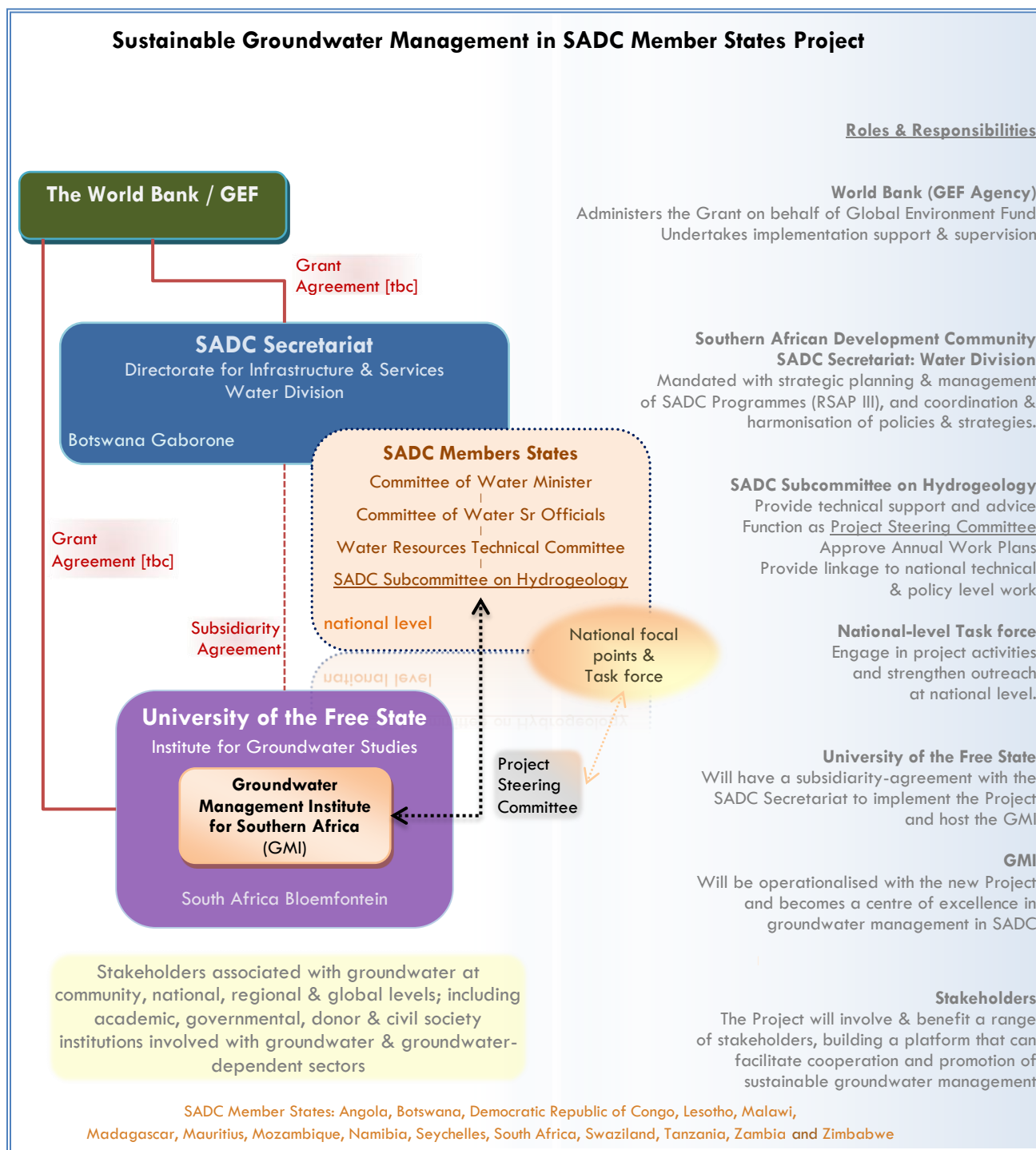
| | |
|---|---------------------|
| National-level support: World Bank country-level investment | \$39,260,000 |
| Angola Water Sector Institutional Development (IDA) – \$177m - Redesign and improvement of water supply derived from groundwater (Luena, N'Dalatando, Huambo, Kuito, Malanje, Uige) | - |
| Democratic Republic of the Congo Urban Water Supply Project (IDA) – \$190m - Groundwater assessments Kinshasa, Lubumbashi, Matadi | - |
| Lesotho Water Sector Improvement, Phase 2 (IDA) – \$38 - Institutional and Policy support for the implementation of the Water Policy and Lesotho Water Act (e.g., State of Water Resources reporting, Water quality guidelines etc. – all heavily groundwater dependent) - Hydraulic Model for Maseru water supply (including groundwater) - Metolong Community Water and Sanitation Programme (groundwater) | 2,520,000 |
| Malawi Second National Water Development Project (IDA) – \$120m - Strengthening local governance of water resources management, supply and sanitation | - |
| Malawi Shire River Basin Management Project (IDA, LDCF) – \$130m (of which \$13m is allocated to improved hydrological and meteorological monitoring) - Strengthen geohydrological monitoring and data management - Operational decision support system that includes hydrogeology | 2,000,000 |
| Mozambique Water Services and Institutional Support Project (IDA) – \$80m Mozambique Water Private Sector Contracts (OBA, yard tap connections reliant on groundwater) - Development of water asset management FIPAG's well field production (including Mutuzi, M'Paco, Tete, Moatize, Angoche, Nampula, Nacala) - Infrastructure investments for wells and transmission (Ilha de Mozambique, Mocimboa da Praia) | 6,500,000 |
| Mozambique Greater Maputo Water Supply Expansion Project (IDA) – \$130m | - |
| Mozambique Water Resources Development (IDA) – \$70m - Rapid Water Resources Assessment to produce monographs (focus: groundwater) - Hydrological and Groundwater Studies | 400,000 |
| Moz Climate Resilient Growth: Transforming Hydro-Meteorological Services - Improved hydrological data collection through refurbished stations and introduction of standard operating protocols (including groundwater) | 80,000 |
| Tanzania Water Sector Support Project (IDA) – \$200 is contribution to the large Water Sector Development Program which guides all water related interventions and spans up to 2020. - Basin level water resources management: transboundary and national mapping and instituting legal protection of 25 important groundwater recharge areas, gazette as protected areas - Strengthening Water Resources Management and Development Framework (incl. protection of groundwater recharge areas, and improvement of groundwater monitoring stations) - Water supply projects reliant on groundwater (borehole construction, monitoring etc.) for Dar es Salaam and smaller urban centers. - Priority investments: Integrated river and lake basin management plans (including determining groundwater availability/quality and priority investments for conjunctive surface and groundwater management) for transboundary and national systems (e.g. Ruvuma River, Lake Victoria, Lake Tanganyika, Nyasa etc.) | 15,400,00 |
| Zambia Water Resources Development Project (IDA, Components A & B) – \$50m Support to the National Groundwater Management and Development Program (especially in the Kafue River Basin which is part of the international Zambezi River and the Tanganyika which is shared with DRC and Tanzania) through: - Construction, rehabilitation and upgrading of groundwater monitoring networks - Review and upgrading of operating procedures and processes to enhance the capacity of Groundwater information management systems and functions - Catchment and basin-level water resources development plans and carrying out associated - strategic groundwater assessments | 7,000,000 |
| Zambia Water Sector Performance Improvement Project (IDA) – \$33m - Rehabilitation works on groundwater boreholes in Kafue River Basin (e.g. studies, design, goods) | 5,000,000 |
| Zimbabwe Beitbridge Emergency Water Supply and Sanitation Project – \$2.65m - Water quality monitoring and repair to leaking raw water pond | 360,000 |
| National-level support: in-kind Government contribution | TBC |
| Government budget allocation for groundwater and transboundary water resources management | - |

ANNEX 2: OVERVIEW OF SADC GROUNDWATER & DROUGHT MANAGEMENT PROJECT (2005-2011)

| SADC Groundwater and Drought Management Project: outputs & outcomes |
|--|
| Component 1: Development and Testing of a Groundwater Drought and Management Plan for the Limpopo River Basin Pilot Areas |
| <p>Water user groups were established representing stakeholders (local authorities, specific community groups, farmers, men and women) in each of the seven pilot sites in Botswana, South Africa and Zimbabwe in the Limpopo River Basin.</p> <p>Interventions were adapted to the local context of the different pilot areas.</p> <p>Management plans were developed and disseminated. School-teachers and students were engaged during trainings offered to each pilot communities to facilitate monitoring and data collection.</p> <p>Physical interventions included (i) the construction of small sand dams; (ii) planned installation of windmill pumps in four communities to transfer water from shallow wells to water storage tanks ('jo-jo' tanks); (iii) water storage tanks in four localities; (iv) fencing and preparing demonstration plots for small scale irrigation in four localities to benefit the community; and (v) community management plans.</p> <p>Training workshops were conducted for water committees and relevant local government staff.</p> |
| Component 2: Regional Groundwater Drought Management Support |
| Sub-component 2.1: Development of a Regional Groundwater Vulnerability Map (based on hydrogeological map and database) |
| <p>Groundwater vulnerability maps were developed to provide workable, interactive and updateable tools to be implemented.</p> <p>Data was collected from SADC Hydrogeological Map and Atlas (HGMA), which contained essential data representative of the state-of-the-art information resources relevant to groundwater in the SADC region.</p> <p>TBA analysis completed. Database and mapping system established.</p> <p>Natural land cover were identified and linked to shallow water tables and low storability aquifer systems to map vulnerable GDE.</p> <p>The maps were produced as three major maps including, a map showing groundwater reliability, a map showing the groundwater threats overlying the groundwater reliability maps, and a map showing overall composite groundwater insecurity in drought situations over the SADC regions integrating both the groundwater threats and reliability maps and socio-economic vulnerability.</p> |
| Subcomponent 2.2: Research on Groundwater Knowledge Gaps |
| <p>A process and methodology for identifying GDE using available regional data sets and remote sensing techniques was developed.</p> <p>Results of research were incorporated into the development of the vulnerability maps and the decision support guidelines.</p> <p>Representative activities and locations for determination of groundwater valuation were selected in consultation with PSC members.</p> |
| <p>Study on groundwater valuation: Determination of appropriate methodologies for valuation of groundwater, Guidelines for its application in the SADC region through 4 case studies</p> <p>Transboundary Monitoring: Study for development of real time regional groundwater monitoring network along the lines of the SADC-HYCOS initiative; Guidelines for shared monitoring of trans boundary aquifers in the SADC region</p> |
| Sub-component 2.3 Regional Awareness Creation regarding Groundwater |
| <p>An Awareness Campaign/Communication Strategy was developed and implemented successfully. Awareness activities established included:</p> <p>Development of a graphic profile</p> <p>Project brochures with summarised information about the project and its outputs.</p> <p>Regular regional media releases and radio inserts.</p> <p>Production of information material targeted at decision makers</p> |
| Subcomponent 2.4 Develop Decision Support Guidelines and a Knowledge Management Systems for Groundwater Drought Management in the Region |

| |
|---|
| <p>Data and lessons learnt were collated from reports prepared during the preparation phase including the Limpopo Basin Analysis, and Regional Analysis for the SADC Region reports.</p> <p>Lessons learned from execution of other project components were collated to develop the Decision Support Guidelines.</p> <p>A focused and targeted approach to the communication of the DSG was recommended. The communication elements were presented in a format that was deemed accessible and easy-to-reference when required by policy-makers to make decisions.</p> <p>The DSG were endorsed in May 2011 and widely disseminated to SADC WRTC, PSC members and relevant stakeholders.</p> |
| Component 3: Establishment of the Groundwater Management Institute of Southern Africa (GMISA) |
| Sub-Component 3.1: Identification and Establishment of the Groundwater Management Institute of Southern Africa |
| <i>Phase 1- Identification of the GMISA host and ensure consensus and commitment</i> |
| <p>The SADC WRTC unanimously re-endorsed the GMISA concept and made recommendations on the shortlisted institutions in May 2008.</p> <p>During February and March 2007, a set of selection criteria used to determine the most qualified potential host institutions were developed. The criteria were reviewed by Member States, comments incorporated, and the final selection criteria were approved at the April 2008 Project Steering Committee (PSC) meeting.</p> <p>The University of the Free State re-confirmed as preferred host institution by SADC.</p> <p>Four suitable candidate host institutions were selected and visited to further determine their suitability, in April 2008. This shortlist was presented to the Water Resources Technical Committee (WRTC) for its review and recommendation to the Integrated Committee of Ministers (ICM). The ICM, at its meeting in June 2008, in Manzini, Swaziland, reviewed the process of identifying the host institution for GMI and endorsed the recommended short listed institutions. The Institute for Groundwater Studies at the University of the Free State was the preferred host institution on the shortlist.</p> |
| <i>Phase 2: Establishment and initiation of the GMISA</i> |
| <p>A GMI mandate and Articles of Association (along with MoU) were endorsed.</p> <p>A strategic business plan was drafted.</p> <p>Initiated but not completed due to the hindrances in operationalising the GMISA.</p> <p>Terms of references for the post of Director, Administrator and Technical Specialist were prepared and candidates had been selected.</p> |
| <i>Establishment of the Groundwater Drought Monitoring Fund (GDMF)</i> |
| Governance documents agreed, GDMF not established. |
| Component 4: Project Management and Administration |
| Sub-component 4.1: Project Steering Committee (PSC) |
| <p>The PSC was commissioned and represented water managers the SADC Members States.</p> <p>A total of 9 PSC meetings were held throughout the project implementation.</p> |
| Sub-component 4.2: Project Services Agency (PSA) |
| <p>SADC signed an agreement with UNOPS as the PSA on February 20, 2006.</p> <p>Procedures and systems for project administration were established.</p> <p>The SADC PMU was established in Gaborone, Botswana in January 2007.</p> |
| Sub-component 4.3: Project Management Unit (PMU) |
| <p>A work plan outlining the performance targets agreed by the Bank mission, PMU and SADC was developed.</p> <p>The work plan was implemented and managed by the PMU. The Bank mission monitored the implementation of the plan.</p> <p>PMU liaised with project stakeholders and coordinated project with other regional initiatives including conferences, German Development Service (GIZ), and the SADC/ African Ministers Council on Water (AMCOW) workshop.</p> |

ANNEX 3: PROPOSED IMPLEMENTATION ARRANGEMENTS

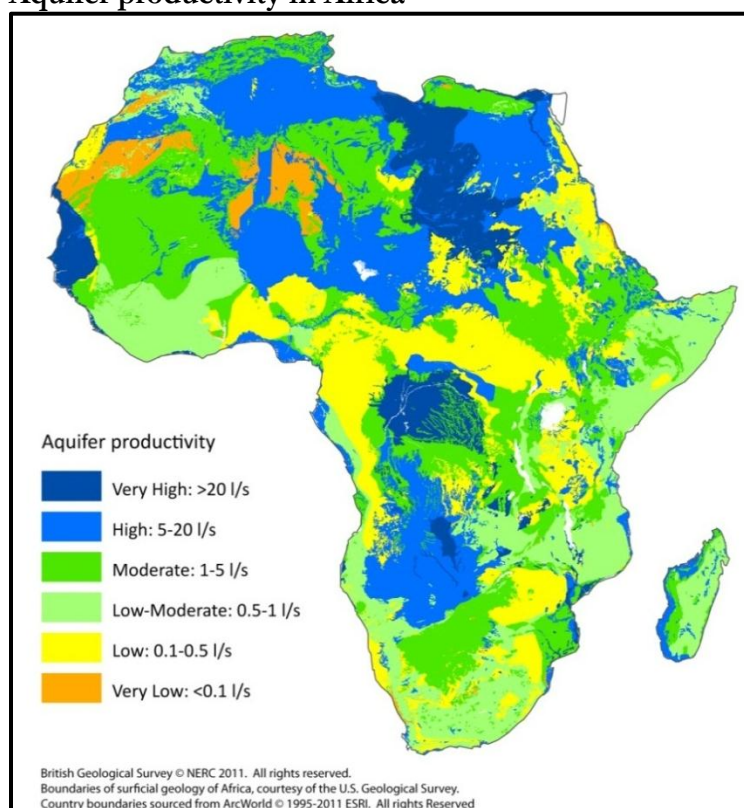


ANNEX 4: GROUNDWATER PRODUCTIVITY AND DEPENDENCY IN SADC

| Table 2. Summary of groundwater dependency in SADC Member States | | | | | |
|--|-------|-------|-------------|----------|---------|
| Member State | Rural | Urban | Agriculture | Industry | Overall |
| Angola | ** | ** | ** | * | ** |
| Botswana | *** | ** | *** | *** | *** |
| DRC | * | * | * | * | * |
| Lesotho | ** | ** | * | * | * |
| Malawi | *** | * | ** | * | ** |
| Mauritius | ** | ** | ** | ** | ** |
| Mozambique | ** | ** | * | * | ** |
| Namibia | *** | *** | *** | *** | *** |
| Seychelles | ** | ** | * | * | * |
| South Africa | *** | ** | ** | ** | ** |
| Swaziland | *** | * | ** | * | ** |
| Tanzania | *** | ** | ** | * | ** |
| Zambia | ** | ** | * | ** | ** |
| Zimbabwe | *** | ** | *** | ** | *** |

Scale: ***major; **moderate; *minor

Aquifer productivity in Africa³⁰



³⁰ For more information, see GWMA TE Strategic Overview 5: Appropriate Groundwater Management Policy for Sub-Saharan Africa in face of demographic pressures and climate variability (http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2012/05/02/000386194_20120502021959/Rendered/PDF/682830NWP0water050Box367908B00PUBLIC0.pdf)