

Introduction

This mission was requested to support the Director and Interim Manager of the SADC-GMI in a review, evaluation and lessons learned of the drought management pilots constructed under the SADC Groundwater and Drought Management Project (SADC-GDMP) which was the preceding phase to the current SADC-GMI project. An additional request was to compile an overview of the outputs and outcomes of the SADC-GDMP (2005-2011) and discuss its relevance for the current SADC-GMI. The Terms of Reference is given in Appendix 1.

The mission included a 5 days field visit to the pilot areas with the interim manager of the SADC-GMI and a 2 day discussion with the SADC-GMI Director. This short mission report gives account of the field visit, discussions and main conclusions and recommendations. I would like to thank the SADC-GMI Director and Interim Manager for the support given to the field visit and the fruitful discussions in Pretoria. The mission schedule and people met are given in Appendix 2

Summary overview of SADC-GDMP (2007-2011)

The SADC-GDMP was concluded with a Final Evaluation Report (Prepared by: O. Chapeyama) in November 2011. This report gives a summary of the project history:

The SADC-GDMP was one of the original suite of thirty two (32) priority project concepts developed by the then SADC Water Sector Coordinating Unit as the basis of the first Phase of the Regional Strategic Action Plan for Water Resources Management. After receiving initial support from the French Government, the project was fleshed out into a full-size GEF funded project with an estimated period of implementation of four years, beginning in 2004. The World Bank served as the implementing agency for the project while SADC Secretariat assumed the role of Executing Agency. Due to capacity limitations within the SADC Secretariat a Management Service Agreement (MSA) was entered into with the United Nations Office for Project Services (UNOPS) for the provision of project management services on behalf of SADC Secretariat. A Project Management Unit was established by UNOPS in collaboration with SADC in Gaborone to provide day-to-day project management and execution oversight. GEF Grant number TF055090 to the value of US\$ 6.5 million was signed on September 16, 2005, and became effective on March 15, 2006. The Project Manager and Technical Executive Officer started in January 2007. The SADC Groundwater and Drought Management Project was officially launched on March 22, 2007 with a workshop in Bulawayo, Zimbabwe. Project implementation started more than a year behind schedule with a number of initial implementation difficulties being experienced. To compensate for the delayed start-up, the project was granted a no-cost extension in 2010 to the new completion date of October 31st 2011.

The project was set up to address the following problems related to water resources management in Southern Africa:

- Critical shortages of water occasioned by temporal and spatial variations in rainfall across the region. These variations result in serious water shortages which compromise development opportunities especially for the rural poor;

- Limited understanding of the hydrological linkages between surface and ground water among decision makers which has resulted in more attention being paid to surface water than groundwater in planning for water resources management;
- Limited data on groundwater resources which is compounded by management capacity limitations at various management levels starting at community level to the level of policy makers. This results in unsustainable water management practices especially in transboundary contexts where national sovereignty considerations override collaborative management of this scarce resource.

It was against this background that the SADC-GDMP (2007-2011) was developed with the aim of enhancing the capacities of SADC Member States in the development of strategic policies for the management of groundwater and mitigation of the impacts of drought on this resource. The expected key outcomes from the project were defined as:

- Increased awareness on groundwater and drought management issues of concern in SADC among various stakeholders, key policy and decision makers in the environmental, water, energy, agriculture and other ministries.
- Increased inclusion of groundwater issues into the water resources management frameworks for Integrated Water Resources Management (IWRM).
- Establishment of a SADC Groundwater Centre of Excellence.

These outcomes were planned to be achieved through the implementation of a series of activities under four project components as follows:

Component 1: *Development and testing of a groundwater drought management plan for the Limpopo River Basin pilot areas*

Component 2: *Regional groundwater drought management support*

Component 3: *Establishment of Groundwater Management Institute of Southern Africa*

Component 4: *Project Management and Administration*

Outputs of the SADC-GDMP 2005-2010

Component 3 of the SADC-GDMP has been successfully completed and resulted in the establishment of the SADC-GMI hosted by the University of Bloemfontein. The SADC-GMI is the implementing agency for the current project entitled Sustainable Groundwater Management in SADC Member States (P127086) and referred to in this report as the SADC-GMI project

The main output under Component 1 of the SADC-GDMP was the implementation of the drought management pilot plan including the construction of the 6 pilot schemes (see table 1 and the next sections).

All other outputs were delivered under Components 2 and are subdivided in two categories: regional studies and awareness creation and dissemination products (table 1).

Table 1: Activities and outputs of the SADC-GDMP 2007-2011

Component	Activity	Implementer
Component 1: Pilot projects	Development and testing of 4 pilot schemes designed and constructed in the Limpopo River Basin	Well Field/.BGS
Component 2: Regional Groundwater Drought Management Support: consultancy studies	Development of a Regional Groundwater Vulnerability Map (based on hydrogeological map and database)	GEUS/CSIR
	Mapping Ground Water Dependent Ecosystems	CSIR
	Valuation of Groundwater	Atkins/ENTEC
	Transboundary Monitoring Study for development of real time regional GW monitoring network (SADC-HYCOS) and guidelines for shared monitoring	Well Field/BGS
Component 2 Regional Awareness Creation and Dissemination Products	Regional Awareness Creation: - GW awareness campaigns - Graphic profile, - Web site - Media releases - Policy Brief (Policy Primer)	GDMP-PMU
	SADC groundwater statistics	Beekman
	Policy and Legislative framework within SADC	GWMATE

A full list of all the reports and other written material was compiled by the consultant (Appendix 3) and a soft copy with all reports was handed over to the SADC-GMI Director and discussed during the mission. The main conclusions with respect to the ongoing project are:

- The full set of documents of pilot projects will be helpful for the preparation of guidelines for the infrastructure solutions under the present project
- The four consultancy studies contain relevant information for the component 2 and 3 of the SADC-GMI project.
- The regional awareness products will be reviewed by the SADC-GMI communication expert for use in the present project.
- The policy and legislative review was not in file yet and will be a useful input to the planned update of such an overview
- Overall it is considered important to share all material with the focal groups in the member states and make sure that it is used where needed and repetition of work is avoided

The drought management pilots

Background and description

The testing of practical local groundwater drought management strategies at pilot level was covered under Component 1 of the SADC-GDMP. The work was implemented by Wellfield Consulting Services in Gaborone. A summary of the objectives, planning and implementation of this component is given in Appendix 4 (from the Component 1 Final Report). Pilot projects were undertaken in Botswana (Gobojango, Tsetsebjwe), Zimbabwe (Diti, Wunga) and South Africa (Maheni, Segole, Shakudza). The planned projects in Mozambique were never implemented due to logistical constraints. Figure 1 gives the locations of the villages. Technical details on the interventions and the type of schemes are given in Appendix 4.

Visit to the pilot areas

The review of the pilots included a 5 day inspection visit inspection to the pilots in Botswana and South Africa. The attempt to visit one pilot in Zimbabwe (Diti) failed because of the weather conditions which made the roads unsuitable to drive with the available car.

On the first day a visit was made to John Farr of Wellfield in Gaborone to collect a full set of all the reports provided for Component 1 and to hear his view on the successes and constraints during project implementation and handing over.

The program of the visit is given in Appendix 2, the technical details of the schemes in Appendix 4 and a set of locality maps and photographic record in Appendix 5.

The main purpose of the visit was to do quick inspection on the physical status and the use status of the schemes. We visits were not announced and we did not meet with officials but only with local stakeholders who we met during the inspection visit. The main observations and findings are listed on the next page and summarized in table 2



Figure 1: Regional locality map of the pilot projects implemented during the Groundwater and Drought Management Project in 2012.

Main findings during the visits with respect to the schemes and general conditions were:

- General
 - None of the visited systems are in use and it seems they have never been or only for a short time)
- Botswana
 - Schemes are rather remote. Far away from village / farmer communities

- Schemes not used but also not dismantled!
- Coordinates in the Wellfield report are incorrect and misleading
- Zimbabwe
 - Time consuming border crossing
 - Bad road conditions
 - Future visits may be easier via Bulawayo
- South Africa
 - All Improved wellheads and pipeline abandoned
 - New water supply projects in place or under construction: was this checked in 2011?
 - Spring in Segola looks tidy and in good shape. More information needed if project intervention has contributed to this
 - No sign that (community based) monitoring (groundwater and rainfall) of the South African pilots has even started

Table 2: summary of findings during the field inspection

Country	Pilot	Physical status	Use status	Issues
Botswana	Gobojango	<ul style="list-style-type: none"> - Scheme not operational but most components in reasonable/good state. - System could be made operational against modest cost 	<ul style="list-style-type: none"> - System is not used after handing over - Village chief is referred to for further information - Few farmers living near the scheme 	<ul style="list-style-type: none"> - System located outside the village. - Nearby well is operated for irrigation - System not used but also not dismantled
	Tsetsebjwe	<ul style="list-style-type: none"> - Same as Gobojango but in slightly worse condition (piping). - Site is fully overgrown and difficult to reach 	<ul style="list-style-type: none"> - System is not used after handing over - Few nearby agricultural plots - No nearby houses 	<ul style="list-style-type: none"> - Far away from village - Some nearby agricultural plots - System not used but also not dismantled
South Africa	Segola	<ul style="list-style-type: none"> - Spring protection works in good shape - Fence door locked - V-notch in place but blocked by debris 	<ul style="list-style-type: none"> - Nobody around to explain the current use of the spring and if monitoring has taken place 	<ul style="list-style-type: none"> - Regional bulk supply pipeline under construction
	Shakadza	<ul style="list-style-type: none"> - Borehole seems out of use is in bad shape and fencing is absent 	<ul style="list-style-type: none"> - Not clear how present water supply is arranged 	<ul style="list-style-type: none"> - School has well which is out of order for quite some time
	Maheni	<ul style="list-style-type: none"> - Existing borehole site abandoned (for quite some time) as well as 1200 m pipeline/taps 	<ul style="list-style-type: none"> - Not clear how long system has been used after handing over 	<ul style="list-style-type: none"> - Village is now supplied from new scheme with uphill reservoir

General observations during the field visits were:

- Differences between the 3 countries (social, institutional, physical, issues)
- Border passing is a bottleneck for project implementation
- Villages are small and most of them at rather remote locations.
- Road conditions require 4WD vehicles

Lessons learned

The observations during the field visit were discussed in a 2 day meeting with the SADC-GMI Director and Interim Manager and draft lessons learned were formulated to be taken up by the present project under Component C (*Promoting infrastructure solutions for sustainable and more climate resilience management of groundwater in SADC*).

These lessons learned can be finalized after a visit to the pilots in Zimbabwe and a recommended 2nd visit to the pilots in Botswana and South Africa.

2nd visit to the pilots

A follow up mission to the pilots in Botswana and South Africa is needed to meet with the key stake holders and do a technical inspection. Main topics and questions to address during this visit were formulated during the 2 day meeting:

- Did the schemes ever work or when were they abandoned?
- Why were the schemes abandoned?
- Who is considered the owner of the scheme?
- Why are the schemes in Botswana not in use but still in a good condition
- Is a restart possible from a community point of view and how should this be organized?
- Who will own the scheme, who will operate the scheme, who will be responsible for O&M?
- What are the rehabilitation cost to bring the schemes back into operation?
- What happened to the monitoring (groundwater and rainfall) and where are the instruments (dip meters and rainfall gauges?)

These visits should preferably be made by the sociologists who were involved in planning and implementation phase and a technical expert. Wellfield has confirmed that the sociologists for Botswana and Zimbabwe are most likely still available and can be approached to do these visits.

The field visit team should also include a team member of SADC-GMI (or a consultant appointed by them) and preferably the Steering Committee member of the respective country. A logistic issue raised during the discussion is that the visit to Zimbabwe would probably be easier if the Bulawayo border post is used to enter the country.

A detailed terms of reference can be made once a decision on the visits is made. Based on the outcomes of the visits a decision has to be taken on the future of the pilots. Options are:

- Upgrade the systems and activate the pilots in close consultation with the community. This may require a temporary support of the SADC-GMI to achieve a sustainable handing over.
- Same as above but additional support of the SADC-GMI and use of the scheme as a demonstration site
- Abandon the pilots (which is in fact the reality already for Shakadza and Maheni)

Lessons learned for planning and design

Key recommendations for the planning and design of infrastructure solutions under the SADC-GMI are:

- The key lesson learned is that selection new pilots should be based on a more demand driven basis and respond to local needs. This should be worked out and incorporated in the selection criteria for new schemes.

- The SADC-GDMP pilots are in small and often remote villages which may be one of the reasons for the non-functioning of the schemes. It is recommended to assess if there a threshold on the size of the village and/or location? Also small towns or urban fringes can be considered as potential targets for drought management infrastructure
- Work with national/ local contractors and suppliers. This reduces cost and time loss due to border crossing and import issues. Local contractors are also expected to work easier with the communities. This will secure that stakeholders are better involved during planning and construction
- Check the plans for water supply projects (including bulk supply over long distances) through an early involvement of regional or national water authorities
- Develop a and plan for community based monitoring

Technical observations and knowledge issues

- Check why reservoirs in the pilots are of plastic (JoJo tanks) and assess if brick reservoirs could be a cheaper option.
- Specific questions for TseTsebjwe: was the well dry since the handing over?, for Gobajango: has the sand dam provided water in the wells during the first 2 years?, Segola: is the spring used to provide water during droughts?
- Road sand dams are an interesting option to incorporate in the design of new drought management schemes. The consultant can provide information of the planned use of road sand dams in Kenya and Ethiopia. The photo is an example of a natural/spontaneous road sand dam and is taken on the road to Diti (Zimbabwe)



- A number of research topics came up during the discussions such as the design and impacts of sand dams, opportunity and design of road sand dams, factors for failure of rural water supply schemes, guidelines for demand driven development of drought management interventions, pro and cons of rural versus (peri)urban drought management interventions etc. It was concluded

that the SADC-GMI can play an important role in promoting this through writing research proposals, linking universities and engage specific organizations like Waternet or CapNet.

SADC-GMI specific recommendations

- Operational issues : secure availability of 4WD cars if needed, have a clear driving policy , ensure accurate GPS readings
- Incorporate the lessons learned in the small grants manual
- Share the lessons learned with the national focal groups and engage them in the formulation of selection criteria for drought management infrastructure under component 3
- Check with the procurement specialist of the World Bank how the contracting of local contractors and suppliers for relatively small projects can be accommodated under World Bank procurement rules (lesson learned from the SADC-GDMP)

Lessons learned for the Wellfield Final report

The lessons learned in the SADC-GDMP Component 1 Final Report by Wellfield are added in Appendix 6. These lessons learned largely confirm the key observation during the missions that successful interventions should be demand driven and with a strong involvement of the local government and the concerned community (both during planning, design and construction). Handing over should take place only when the system is fully operated by the community and has proved to provide reliable supply of water.

Other recommendations that are relevant for the present project are:

- The best time to demonstrate water supply drought mitigation is during a dry period
- Community based monitoring systems (rainfall, groundwater) are important and may require support after the completion and handing over of the systems.

General recommendations from the meeting

- There a strong recommendation to organize an event to share and discuss the main outputs and outcomes of the SADC-GDMP with the member states and assure that the focal groups in the countries make maximum use of these outputs. This can be achieved through an *institutional memory workshop* in which the outputs of the SADC-GDMP are presented and discussed with the member states and with a selected group of experts who have been involved in the SADC-GDMP.
- Another recommendation is that the SADC –GMI gives active support to the SADC Groundwater Grey Literature Archive (see Position Paper). The SADC-GMI can approach the different organizations and donors to support such an important initiative. By doing so the SADC-GMI will also position itself as the focal groundwater management centre for the SADC region
- The SADC-GMI should make an inventory of organizations which have knowledge or products which are useful to promote in the SADC region such as the smart phone based monitoring of AKVO, the capacity building network of WaterNet and the mapping capabilities of IGRAC

Drought Management/WRM/WS&S in Botswana

See separate mission notes

APPENDICES

- 1 Mission ToR**
- 2 Mission itinerary and people met**
- 3 Main outputs of the SADC-GDMP 2007-2011**
- 4 Pilot projects planning and construction (from Wellfield/BGS final report, 2011)**
- 5 Locality maps and photographic impressions**
- 6 Lesson learned (from Wellfield/BGS final report, 2011)**

Appendix 1. Terms of Reference

IMPACT EVALUATION OF PILOT PROJECTS IMPLEMENTED UNDER THE SUSTAINABLE GROUNDWATER DROUGHT MANAGEMENT PROJECT IN THE LIMPOPO BASIN

Background

During discussions between the World Bank (represented by Mr Marcus Wijnen) and the Board of Directors of the SADC Groundwater Management Institute (SADC-GMI) on 19 May 2016 it was agreed that a review be undertaken of the pilot projects initiated as part of the SADC Groundwater and Drought Management Project (SADC-GMDP) in 2010. Pilot projects were undertaken in Botswana (Gobojango, Tsetsebjwe), Zimbabwe (Diti, Wunga) and South Africa (Maheni, Segole, Shakudza). The projects in Mozambique were never implemented.

It was further agreed that the review would be undertaken by Mr Albert Tuinhof, with support from the SADC-GMI. Mr Tuinhof's input is to be funded directly by the World Bank under a separate agreement. In addition to the evaluation of the pilot projects, Mr Tuinhof can also provide support to the Director of the SADC-GMI by sharing his overview of the experiences and lessons learned during the previous phase of the SADC GDMP. Further, he was involved in the formulation of the present project and can provide insights into the initial objectives and project structure.

Objectives

The objectives of the review are outlined as follows:

- Review the demonstration projects planned and implemented under the SADC GDMP to assess whether the objectives of the demonstration projects were met;
- Identify key lessons from that project that can be adopted into the current Sustainable Groundwater Management Project in SADC Member States project; and
- Prepare a summary/overview of the main components, achievements and lessons learned of the SADC GDMP (2005-2011) for discussion and evaluation with the Director of the SADC-GMI.

Tasks

To achieve these objectives, the following tasks will have to be undertaken by the consultant:

- Review previous project documentation describing the demonstration projects, including the objectives and implementation thereof;
- Visit the three demonstration projects to assess the state of the three projects implemented, and the benefit to the community which they were intended to serve;
- Interview the key role players who designed, implemented and managed the demonstration projects;
- Review the status of the demonstration projects and undertake a SWOT analysis thereof; and
- Document the findings and the recommendations for SADC-GMI (Component D) in a short report to be submitted to both the World Bank and the Director of the SADC-GMI.

To provide support to the SADC-GMI, the following additional tasks are to be undertaken:

- Collect and prepare soft copies of all (available) relevant documents, maps and other relevant deliverables from the SADC-GDMP;
- Prepare a short summary report on the SADC-GMI with reference to the main deliverables and products; and
- Discuss the report with the SADC-GMI Director and include the main conclusions in the mission report.

Appendix 2. Mission program and people met

Date	Activity	People
Jan 30	Arrival Johannesburg	
Jan 31- Feb 4	Field trip to inspect the drought management pilots	with Roger Parsons
Jan 31	Travel via Gaborone Travel to Palapy	John Farr of Wellfield
Feb 1	Visit the pilots in Botswana Travel to Mesina	
Feb 2	Travel to Zimbabwe for visit to pilot in Dite and return to Mesina	
Feb 3	Visit to South African pilots Travel to Louis Trichardt	Local stakeholders
Feb 4	Travel to Pretoria	
Feb 5	Mission report (half day) Meeting with James Sauramba	
Feb 6	Meeting with James Sauramba/ Roger Parson Visit to Dutch Embassy	Alexander van der Kaa
Feb 7	Wrap up meeting with James Sauramba and Roger Parson Meeting with Leo Meijer (Centre of Expertise /SALGA) Travel to Gaborone and GFDRR team meeting	
Feb 8	Meeting with DWA on groundwater monitoring Meeting with John Farr GFDRR team meeting	DWA team
Feb 9	Meeting with WUC on groundwater monitoring Meeting with University of Botswana/ Department of Environmental Science on groundwater monitoring Departure to Johannesburg	Moses O Moehadu Dr. Piet Kenabatho

Appendix 3 Main outputs of the SADC- GDMP 2005-2011

- Component 1: Development and testing of a groundwater drought management plan for the Limpopo River Basin pilot areas
- Component 2: Regional groundwater drought management support
- Component 3: Establishment of Groundwater Management Institute of Southern Africa
- Component 4: Project Management and Administration

Component 1

- **Development and testing of groundwater management systems strategies in the Limpopo basin pilots**

Pilots built in Botswana (2), Zimbabwe (2) and South Africa (3). The 2 pilots in Mozambique were designed but not built due to logistical and accessibility problems. Full set of reports, drawings and photos and available on CD

Component 2: Consultancy studies::

- **Development of a Regional Groundwater Vulnerability Map (based on hydrogeological map and database)** , implemented by CGEUS/SCIR
- **Mapping Ground Water Dependent Ecosystems** by CSIR
- **Valuation of Groundwater** by Atkins/ENTEC
- **Transboundary Monitoring Study for development of real time regional GW monitoring network (SADC-HYCOS) and guidelines for shared monitoring** by Wellfields/BGS

Component 2: Awareness and dissemination products

- **Groundwater Primer**
Brochure to raise interest for groundwater and drought management with politicians, Title: Groundwater Matters for Decision Makers in the SADC. Prepared by the Project Management Support unit (Barbra Lopi)
- **SADC-DSG (Decion Support Guidelines):**
Press release, flyer and presentation for:
 - DSG01 *Community based groundwater management*
 - DSG02 *Groundwater Dependent Ecosystem Mapping*
 - DSG03 *Groundwater Valuation*
 - DSG04 *Groundwater Drought vulnerability mapping*
 - DSG05 *Regional Groundwater Monitoring*

Prepared by METAGO, 2010

- **Policy and Legislative framework within SADC**

Overview on the status of Policy and Legislative framework within SADC and the SADC member states for ensuring the effective and sustainable development and management of groundwater resources. Prepared by GWMATE (Ana Vidal, Albert Tuinhof, Héctor Garduño) June 2010

- **Groundwater Statistics**

Compilation of **Groundwater Statistics** and Data on the SADC Region” in the form of two packages of data and statistics including an executive summary, explanatory notes for updating SADC country sheets and printing fact sheets, and a CD with all information in electronic format, Hans Beekman 2010

Component 2 Training

- **Groundwater in IWRM Training of Trainers Course**

Courses held in cooperation between SADC-GMDP, GWMATE, the African Groundwater Network and CapNet . Trainings conducted in Accra, Dar es Salaam, Addis Ababa and Maputo. Material: CAPNET groundwater in IWRM Training Manual (2012) + PowerPoints of the modules

- **SADC-GEF Workshop on Physical and Quality Groundwater Monitoring**

Training conducted by Albert Tuinhof and Nick Robins during the PSC meeting in Windhoek March 2009

- **Groundwater in Catchment Management – Groupwork**

Group work conducted by Albert Tuinhof and Richard Owen during various POSC meetings

Summary table:

Component	Activity	Implementer
Component 1: Pilot projects	Development and testing of 4 pilot schemes designed and constructed in the Limpopo River Basin	Well Field/.BGS
Component 2: Regional Groundwater Drought Management Support: consultancy studies	Development of a Regional Groundwater Vulnerability Map (based on hydrogeological map and database)	GEUS/CSIR
	Mapping Ground Water Dependent Ecosystems	CSIR
	Valuation of Groundwater	Atkins/ENTEC
	Transboundary Monitoring Study for development of real time regional GW monitoring network (SADC-HYCOS) and guidelines for shared monitoring	Well Field/BGS
Component 2 Regional Awareness Creation and Dissemination Products	Regional Awareness Creation: - GW awareness campaigns - Graphic profile, - Web site - Media releases - Policy Brief (Policy Primer)	GMDP-PMU with GWMATE support
	SADC groundwater statistics	Beekman
	Policy and Legislative framework within SADC	GWMATE
	Decision Support Guidelines and a Knowledge Management Systems for Groundwater Drought Management in the Region	METAGO
Component 2 Training	ToT Groundwater in IWRM Training of Trainers Groundwater monitoring training: information or management Groundwater in Catchment Management - Groupwork	GWMATE + Capnet, AGW, BGS

Appendix 4 Summary of the drought management planning pilots

1. INTRODUCTION

Testing of practical local groundwater drought management strategies at pilot level was covered under Component 1 of the SADC-GDMP. The work was implemented by Wellfield Consulting Services in Gaborone.

The overall objectives were to:

- 1: Develop and test specific community groundwater drought management plans and associated interventions within the Limpopo Basin pilot area to obtain empirical information that can be replicated and rolled out in the SADC region.
- 2: Design and pilot physical and social interventions for mitigation against groundwater drought within the Limpopo Basin (i.e. drought-proof an area by addressing poverty while still considering bio-physical environmental groundwater needs).
- 3: Derive and develop approaches, methodologies, and lessons learnt to input into the development of generic decision support guidelines and the region's knowledge base regarding groundwater drought mitigation.

The work comprised 5 phase:

Phase 1 -Inception

- *Review of groundwater related information in the Pilot Areas*

Phase 2 - Pilot programme definition

- *Stakeholder analysis and engagement within the Pilot Areas*
- *Delineation of Pilot Areas*
- *Institutional and regulatory analysis of groundwater management in Pilot Areas*
- *Representative pilot 'Nodes' selected*

Phase 3 - Drought mitigation planning

- *Drought intervention and groundwater management plans for Pilot Areas.*
- *Prepare design for drought interventions structures and develop ToRs for construction contractors*

Phase 4 - Drought intervention construction

- *Supervision of drought intervention activities*

Phase 5 - Monitoring and evaluation

- *Monitoring and evaluation of pilot 'Nodes'*
- *Strategy for sustainability of drought intervention measures*
- *Lessons learnt*

The goal was that the methodologies established and lessons learnt from these activities will be replicated in other areas of SADC to expand the knowledge and management of groundwater resources regionally. This will be done within the current SADC-GMI project under component 3. It is anticipated that the lessons learnt in this Pilot Project will be transferred to other implementers working in the SADC Region. The ultimate outcome of the work is major upscaling roll out across the SADC Region with support of the current SADC-GMI).

2. SUMMARY OF PROJECT ACTIVITIES

2.1 Inception Phase

At an initial Project Inception Meeting in March 2008 the Project Supervisor outlined the background to the project and discussion followed on the process of identifying Nodal Areas on which to focus. These in turn would become the focus of the subsequent stages of intervention and observation in Pilot Areas.

A series of matrices were designed to categorise the nodal areas. Three matrices dealing with the groundwater and water supply situation in the Pilot Areas were applied. These were the Groundwater Potential Matrix, the Data Availability Matrix and the Water Supply Matrix. The Socio Economic Matrices included the decision Matrix, Community mapping and opportunity Ranking

Specific questions were asked at community level to inform choice of intervention and appropriate sites. These included:

- water availability, accessibility, affordability and acceptability,
- impacts of drought on community water supplies and coping strategies deployed,
- socio-economic and socio-cultural constraints and opportunities for improved water management,
- identification of human actions and capacity-building methods to improve understanding of drought management.

2.2 Phase 2 – Pilot Programme Definition

The Phase 2 study comprised:

- Stakeholder Analysis and Engagement within the Pilot Areas
- Delineation of the Pilot Areas
- Institutional/Regulatory Analysis of Groundwater Management in the Pilot Areas
- Representative Pilot 'Nodes' Selected

The selection procedure revealed the following potential communities for intervention:

WESTERN PILOT AREA

Botswana: Gobojango, Semolale, Bobonong, Molalatau, Mathathane and Tsetsebjwe
Zimbabwe: Hwali, Dendele, Mamatuturi, Whunga, Siyoka and Shashe
South Arica: No obvious village communities in Pilot Area

EASTERN PILOT AREA

Zimbabwe: Gota, Diti and Chabile
South Africa: Segole, Shakudza, Tshivaloni and Maaheni
Mozambique: Chassanga, Mugugugo, Mahatlane, Tchale, Salane and Lisenga

The process of matching intervention with community eventually provided the scope of the work shown in Table 4.

Table 4 Likely interventions

Objective of pilot intervention	Social and institutional sustainability requirements	Technical sustainability requirements	Environmental issues and drought preparedness	Upscaling potential
BOTSWANA [Water for vegetables, water for livestock]	Buy in MoA support at national and regional level. No NGO culture Strong community structure linked to local government. Focus on small communities (women important). No tradition of vegetable growing.	Sand rivers for dams and trenches. Needs hydrogeological assessment.	Trees along river banks could be a GDE issue. Impact of livestock watering around sand dam. Community management plan needed.	Well documented pre- and post-intervention situation. Identify likely success and constraints. Institutional linkages. Upscaling and dissemination.
ZIMBABWE [Water for domestic, gardening and livestock to return communities to the status quo]	Provision of basic water needs. Establish community water user and management organisation. Secure involvement of World Vision. Linkage to government structure	Sand rivers. Groundwater hydrogeological assessment needed. Upgrade former infrastructure	GDE issues? Community management plan. Implementation arrangements.	Well documented pre-and post-implementation Identify success factors and constraints. Upscaling and dissemination.
SOUTH AFRICA [Secure water for drinking and livestock at times of drought]	Introduce community management of water supply and focus on drought preparedness. Need support from DWAF/LG at various levels and agree on responsibilities and mandates between parties	No technical intervention. Concentrate on social intervention.	GDE issues? Community management plan Implementation arrangements	Well documented pre-and post-implementation. Identify success factors and constraints. Upscaling and dissemination.
MOZAMBIQUE [To be determined]			Community management plan Implementation arrangements	Well documented pre- and post-implementation. Identify success factors and constraints Upscaling and dissemination

2.3 Phase 3 – Drought Mitigation Planning

Phase 3 comprised:

- Drought Intervention/Groundwater Management Plans for Pilot Areas
- Prepare Designs for Drought Intervention Structures
- Develop ToRs for Construction Contractors.

An important part of this work was the preparation of detailed Groundwater Intervention Management Plans. These include five basic components:

1. Village description including present groundwater resource status, infrastructure, livelihoods – cash economy or agricultural economy, community health and community aspirations.
2. Detailed baseline analysis of the community status in terms of groundwater resources and livelihoods - essential information with which to judge subsequent impact created by intervention of whatever kind.
3. Proposed and justified groundwater (drought-orientated) intervention accompanied by description of the dialogue with the community and other stakeholders – i.e. community buy-in.
4. Description of the agreed intervention and expected impact on the community.
5. Identification of appropriate indicators with which to monitor the impact of the intervention on groundwater resource usage and overall wellbeing, i.e. community or sample household wealth (number of cattle), livelihood diversification, number of visits to clinic, water point usage, abstraction equipment maintenance actions, etc.

The Planning Process and Plan reports were compiled in collaboration with the respective communities for the following finally agreed intervention sites:

Botswana:	Tsetsebjwe and Gobojango
Zimbabwe:	Diti and Whunga
South Africa:	Segole, Shakudza and Maheni

Phase 4 – Drought Intervention Implementation

BOTSWANA

The works on the two sites in Botswana consisted of the following:

Gobojango – Dinde River

- Constructing a new sub-surface weir built with rubble masonry and concrete complete with stilling basin.
- Excavating a 2.0 m diameter collector hand dug well to a depth of 6m and lining it with 1.5 m diameter concrete rings.
- Connecting the collector well with the sub-surface weir using up to four (4) 140 mm diameter HDPE pipes fitted with wire wrap screens at the ends and buried within the river channel.
- Fitting mountings for a windmill over the collector well in accordance with manufacture's specifications
- Supplying and installing 2 no. 5,000 litre capacity uPVC tanks and mount them on 1.0 m high dwarf walls.
- Supplying and fitting 150m in length and 63mm diameter pipe work from the sub-surface weir, collector well, windmill and to the storage tanks.
- Reticulating water to the tanks and the community gardens.
- Providing heavy duty diamond mesh fencing for plot size 100m by 100m complete with access gates.

Tsetsebjwe

- Excavating a 2.5m diameter hand dug well to a depth of 6m and lining it with 2.0m diameter concrete rings.
- Fittings mountings for a windmill over the hand dug well in accordance with the manufacture's specifications.
- Supplying and installing 2 No. 5,000 litre capacity uPVC tanks and mounting them on 1.0m high dwarf walls.
- Supplying and fitting 150m in length and 63 mm diameter pipe work from the hand dug well, collector well, windmill and to the storage tanks.
- Reticulating water to the tanks and community gardens.
- Providing heavy duty diamond mesh fencing for plot size 100m by 100m.

During the construction of the facilities, trees were only cut down when absolutely necessary and open trenches were restricted to minimum to prevent animals falling in and allow free movement of animals and people.

ZIMBABWE

The works on the two sites in Zimbabwe consisted of the following:

Dite

- Constructing a new sub-surface weir built with rubble masonry and concrete complete with stilling basin.
- Excavating a 2.0m diameter collector well to a depth of 6m and lining it with 1.5m diameter concrete rings.
- Connecting collector well with the sub-surface weir using up to four (4) – 140mm diameter HDPE pipes fitted with wire wrap screens at the ends and buried within the river channel below the scouring level of the river.
- Fitting mountings for a windmill over the collector well in accordance with manufacturer's specifications.
- Supplying and installation of 2No. 5,000 litre capacity uPVC storage tanks and mounting them to a 1.0m high dwarf walls.
- Supplying and fitting 63mm diameter pipe work from the sub-surface weir, collector well, windmill and to the storage tanks.
- Reticulating water to tanks and the community gardens.
- Providing heavy duty diamond mesh fencing for plot size 100m by 100m community garden.
- Rehabilitating 3 other wells (Ben 01, Ben 02, Mushatone). Wells need cleaning and re-equipping with hand pumps.
- Drilling a new borehole for Dite Primary School.
- Rehabilitating Mapanda Well. Well needs cleaning, and re-equipping with hp.
- Rehabilitating a reticulation system and internal plumbing for clinic water supply.

Whunga

The works at Whunga comprised:

- Constructing a new sub-surface weir built with rubble masonry and concrete complete stilling basin.
- Excavating a 2.0m diameter collector well to a depth of about 6m and lining it with 1.5m diameter concrete rings.
- Connecting collector well to with the sub-surface weir using up to four (4) – 140mm diameter HDPE pipes fitted with wire wrap screens at the ends and buried within the river channel below the scouring level of the river.
- Fitting mountings for a wind mill over the collector well in accordance with manufacturer's specifications.
- Rehabilitating existing concrete storage tank.

- Supplying a 63mm diameter uPVC pipe work from the collector well windmill to the storage reservoir.
- Reticulating water to storage tank and community garden.
- Providing heavy duty diamond mesh fencing for plot size 100 m by 100 m community garden.
- Rehabilitating an existing sub-surface weir built with rubble masonry and concrete complete with stilling basin.
- Excavating 2.0 m diameter collector well and lining it with 1.5 m diameter concrete rings then equipping with a hand pump at the existing sub-surface weir.
- Excavating a 2.0 m diameter well and lining it with concrete rings then equipping it with a hand pump at Right Hand side of the river near the drift.
- Excavating a 2.0 m diameter well and lining it with concrete rings then equipping it with a hand pump at the other side of the new sub surface weir opposite the new collector well.

During the construction of the facilities, trees were only cut down when absolutely necessary and open trenches were restricted to minimum to prevent animals falling in and allow free movement of animals and people.

SOUTH AFRICA

The scope of the intervention in South Africa comprised the following:

Maheni Village

- Head works rehabilitation and heavy duty diamond mesh fencing of an existing supply (backup) borehole.
- Fitting a monitoring access conduit for the supply borehole.
- Providing 1200 m of 63 mm diameter HDPE reticulation pipe work from the supply storage reservoir to the village to act as a backup to the Municipal Village Water Supply.
- Installation of ground water and climatological monitoring equipment for involvement of local school children and other community members in ground water level and rainfall monitoring.

Sagole Village

- Spring protection works i.e. construction of a berm at least 17m uphill from the spring to divert any surface runoff away from the eye of the spring.
- Construction of a collector chamber at the spring to function as a distribution box for pipes.
- Installation of v-notch for flow measurement of the spring.

- Providing heavy duty diamond mesh fencing for the spring area.
- Fitting a monitoring access conduit for an existing borehole.
- Installation of groundwater and climate monitoring equipment

Shakadza Village

- Head works rehabilitation and fencing the existing supply borehole.
- Fitting a monitoring access conduit for the supply borehole.
- Installation of groundwater and climate monitoring equipment.

Phase 4 Supervision of drought intervention activated

The social interventions, notably in South Africa were instituted by the project sociologists. These were aimed at introducing community management of water supply with specific regard to drought preparedness. In addition various training and awareness sessions were undertaken with the respective communities. These activities were aimed at gaining community support and ownership of project elements that were being provided to the community. These activities ensured the sustainability of the interventions which in turn are designed to assist in securing successful community based groundwater management.

Phase 5 – Monitoring and evaluation

Phase 5 was intended to encompass:

- Monitoring and evaluation of pilot 'Nodes'
- Strategy for sustainability of drought intervention measures
- Lessons learnt

In the context of the project there are two essential aspects to monitoring, namely:

- Monitoring relating to the success or otherwise of the implemented interventions with respect to achieving the objectives of the project, especially the maintenance or enhancement of community livelihoods during drought by improved utilisation of groundwater.
- Monitoring relating to any potential environmental (social and physical) impacts created by the implemented interventions.

Although baseline monitoring was undertaken, time delays in procuring the physical interventions prevented any useful post-intervention monitoring from being undertaken. However, it is anticipated that communities will continue their own monitoring protocols until such time as SADC is again in position to hold a dialogue with them to provide assistance in identifying triggers for emergency action at the onset of drought.

Appendix 5: Locality Maps and Photographic Record

Gobojango



Figure 2: Locality map of the Gobojango pilot project site.



The sand dam is in good order, having filled up with sand on the upstream side of the wall



The structure of the windpump is in good order, but the area around it is overgrown



The collector well is in good condition, but the surrounding concrete slab has been undermined



The water tanks and fence are in a good state, but the field has not been developed

Tsetsebjwe

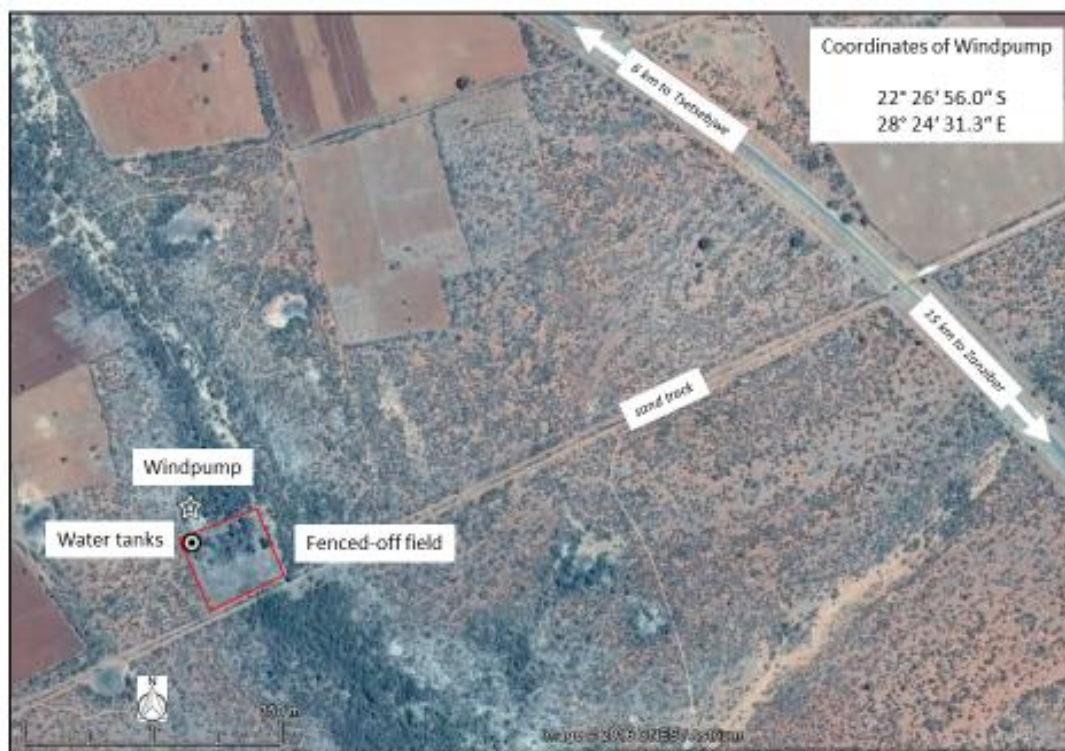


Figure 3: Locality map of the Tsetsebjwe pilot project site.



The Tsetsebjwe site is overgrown and clearly never been brought into operation as planned



The water tanks and fence around the planned fields are in good order



The structure of the windpump is in good order, but the status of the pump is not known



The collector well is in a poor state of repair, with the pipes disconnected and the manhole cover missing

Maheni

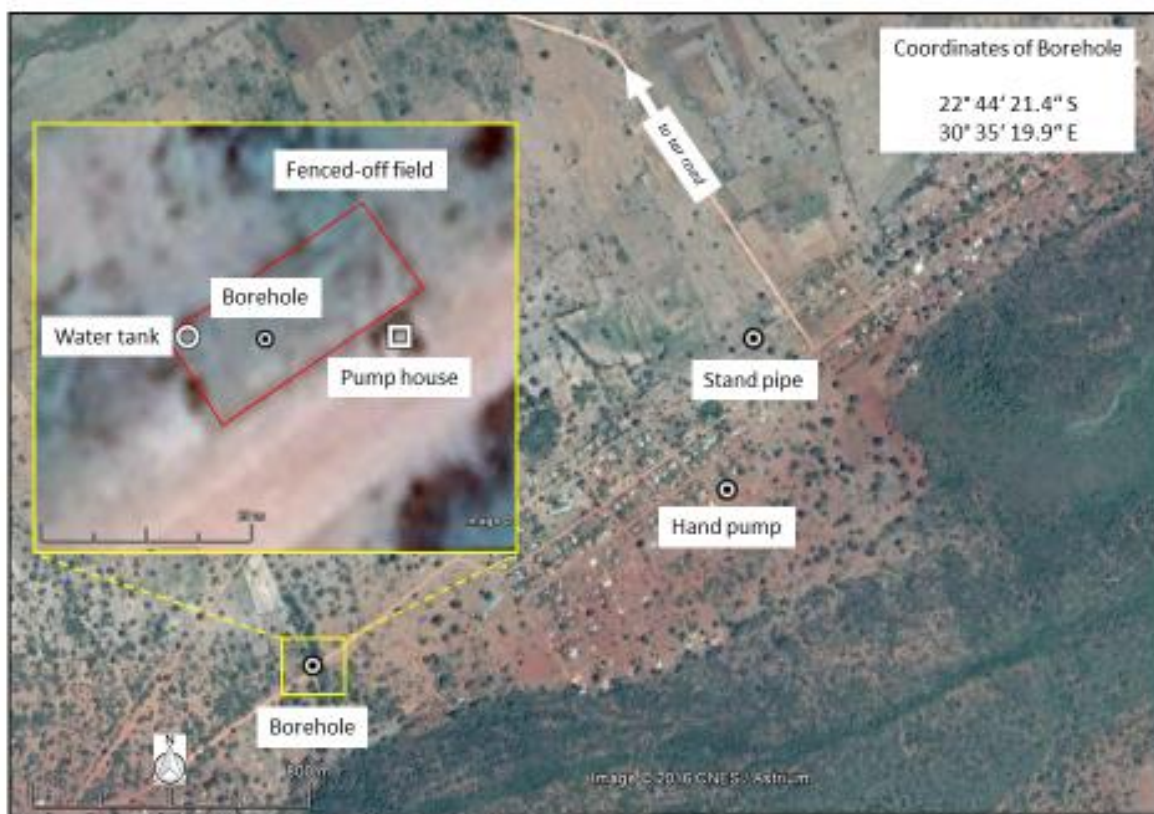


Figure 5: Locality map of the Maheni pilot project



The area around the pump is overgrown, but the equipment is still in place



The infrastructure at the borehole is still in place, but obviously not used



The stand pipe at the end of the pipeline is still in place, but the taps have been removed



The hand pump is broken and in a poor state of repair

Segola



Figure 6: Locality map of the Segole pilot project site.



The fence around the spring is in good condition



The structure at the spring is in good condition



Flow through the V-notch is hindered by rocks and other materials, indicating that flow monitoring is not taking place



Litter in the area immediately downstream of the spring

Shakuda

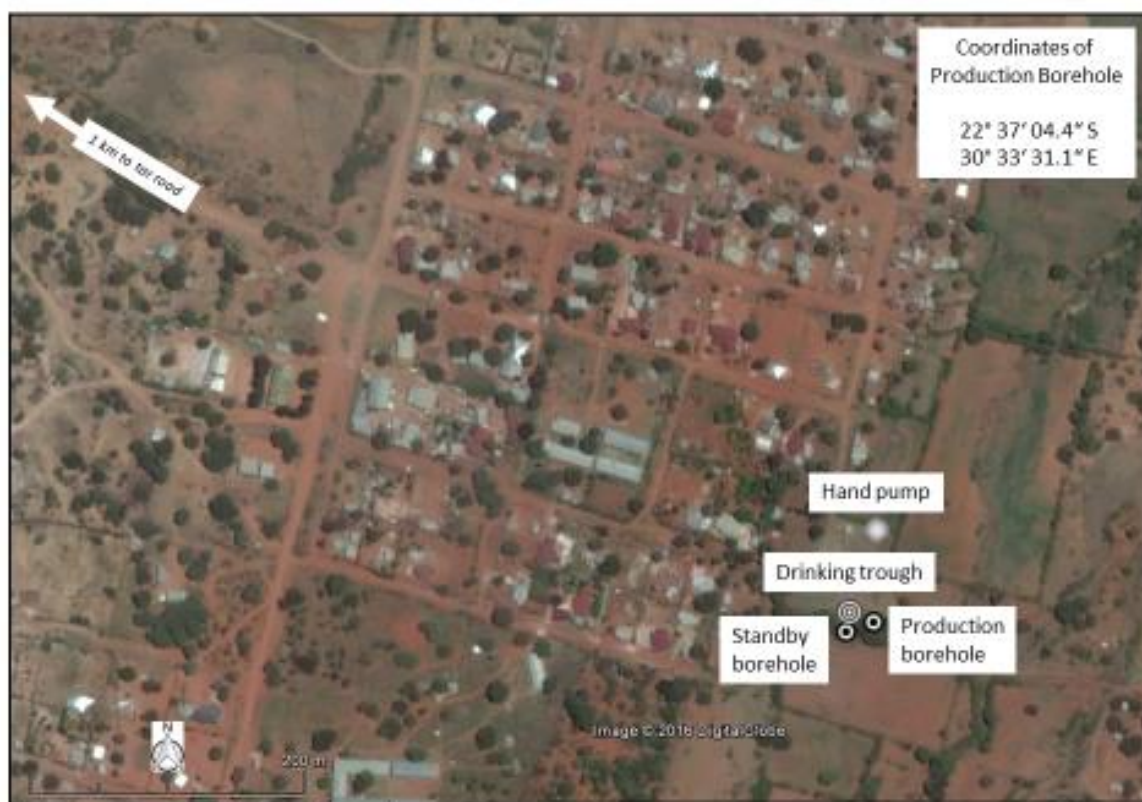


Figure 4: Locality map of the Shakudza pilot project site.

Appendix 6 Summary of lessons learned (Wellfield 2011)

The project team was issued with a questionnaire in July 2011 in order to gather thoughts/ideas/experiences gained during the course of the project in order to inform future work. The lessons learnt questionnaire was divided between five separate themes, and these are retained as the most suitable way of reporting those lessons:

- Overall project approach
- Specific programme issues
- Overall programme
- Project management
- Alternative ideas

Overall Project Approach

Applicability of the project approach within the existing water supply sector

Lesson Learnt:

- The best time to demonstrate water supply drought mitigation measures is during a dry period.

Applicability of the particular physical interventions

Lesson Learnt:

- *It is difficult to change the water supply practices of communities unless these are demonstrated in a positive and practical way that shows a distinct benefit.*

Likely acceptance and utilisation of interventions

Lessons learnt:

- *Keep the community informed of intervention construction progress.*
- *Ensure the contractor involves local people in intervention construction.*
- *The WDC should visit site regularly to monitor progress.*
- *Ensure a reliable supply of groundwater is available before hand-over so that cultivation can begin.*

Sustainability of interventions into the future

Lessons Learnt:

- *Need to have the support of the local ADO to ensure successful cultivation.*
- *Need to have rainfall and groundwater monitoring systems in place.*
- *Need to inform the Department of Water Affairs of the well deepening needs.*
- *Long term monitoring of community activities need to be undertaken with advice on interpretation of data collected.*
-

Specific Programme Issues

Working with Communities

Lessons Learnt:

- *The pace of the intervention process needs to be maintained without extensive and disappointing delays.*
- *Technical information needs to be imparted to the community not just the social interaction between Project and Community.*
- *Support is needed during the post-Project phase of monitoring.*

Water Management Committees

Lesson Learnt:

- *Collaboration with an active community 'Water Development Committee' or its equivalent, is vital to the success of any intervention*

Other Stakeholders (in Botswana)

Lesson Learnt:

- *Stakeholder collaboration is essential to successful implementation of any intervention*

Physical Interventions

Lessons Learnt:

- *Full acceptance of the value of the interventions will only be forthcoming during the onset of the next drought period.*
- *The community must be involved in choice and design of physical #interventions.*

Overall Programme

Project schedule and timing – significant delays – impacts

Lesson Learnt:

- *Collaboration with active local NGOs is vital to avoid duplication of effort.*

Physical interventions – contracting approach

Lesson Learnt:

- *Efficient letting of sub-contracts is needed.*

Project Management

Adequacy of management structure – support, logistics etc

Lessons Learnt:

- *Management of a dispersed team with varied skills must be rigid and thorough.*
- *Care is needed to work within the constraints of each Member State.*

Alternative Ideas

What we could have done differently, what better outcomes could we have achieved?

Lesson Learnt:

- *Dialogue/consultation at community level must include both social & physical inputs.*
- *Post-Project monitoring may be lost through lack of continuity within SADC.*

THE WAY FORWARD

Of the issues raised in Chapter 3, Lessons Learnt, the most significant is the premature termination of the project which precludes any monitoring of the post-intervention phase. This could mean that a number of the intended outcomes of the project may not be achieved, not least help with the determination of triggers from the monitoring indicators that define when emergency action might be necessary. The respective communities need to be encouraged to continue monitoring as they have agreed, in anticipation of the new Groundwater Management Institute being able to pick up the reigns of the dialogue with them in due course. It is important that this information is gathered from the communities in due course so that it can be used to inform the eventual roll-out of the interventions throughout SADC.

The Road Map for the Future – the Phase 2 Programme

Armed with the documentation produced in the current project it should be easy in the Phase 2 Programme to pick up the thread. In the meantime ongoing indicator monitoring at community level will produce a considerable volume of new experience and hopefully hard data. This needs to be gathered and assessed. At the same time the current project documentation needs to be reviewed and assimilated so that a new team, without the current team experience, can grasp the planning processes that have been developed and vary those processes to fit any changes that may have occurred, e.g. perhaps in the light of post-Project drought experience which may indicate ways of improving or even streamlining some of the actions developed in the current project.

The design of a roll-out Phase 2 Project needs to follow the objectives laid down in this project, and that it should achieve, at village level:

- Drought proofing (including developing existing coping measures).
- Structured development rather than relief.
- Early warning: monitoring and forecasting to trigger actions.
- Early response.
- Drought preparedness.

At the regional level the roll out of drought proofing interventions needs to transfer experience gained in one country into another. Each country has its own discrete governance, experience and knowledge as well as its own traditional coping strategies. Exchange of ideas can be brought about within the Phase 2 project. For example, Botswana and South Africa tend to provide piped water to villages, whether it be groundwater or river intake, whereas Zimbabwe and Mozambique have a more bottom

up approach with each community supplied by boreholes or wells commonly equipped with hand pumps. Sand dams are a common feature of supplementary water for livestock and for watering gardens in Zimbabwe but are rarely deployed in Botswana. Elsewhere in the SADC Region vegetable and fruit gardens in Malawi and Zambia are sufficiently productive that villagers tend to have a surplus of produce with which to trade. Their experience may well help villagers in Zimbabwe and South Africa. There are many other examples.

The phase 2 roll out also needs to make some decisions regarding procedure. One of the issues with informing the community was the use of outside contractors who brought their own labour with them. Although a convenient way to progress it did not allow any room for community involvement and, therefore, complete community ownership. It might be preferable to use technical leaders and local labour rather than a formal contractor. Indeed it may be that one method suits this country, while the other method suits that country. A third alternative might be to work with NGOs that are active in a particular area. This is an attractive option as it would prevent duplication of effort and would allow deployment of technical staff familiar with the local social and physical conditions.

The Phase 2 Roll Out

The proposed Phase 2 roll out of interventions needs to be carried out at project level and should be based on the procedures and types of interventions trialled in the current project. Upscaling from the present pilot project is not seen as a problem provided sufficient resources are available. The project would be wise to work at sub-catchment scale moving from one area to the next rather than attempting blanket coverage throughout the SADC Region. The roll out shall comprise the following key stages:

1. Discussion at national level to determine what the community welfare issues are and to consider likely drought proofing interventions.
2. Review of prevailing physical conditions (geology, groundwater and surface water availability, water supply coverage, climate, land use, physical access, etc.).
3. Review of prevailing sociological conditions (governance, stakeholder analysis, existing drought coping strategies, etc).
4. Analysis of need – water scarcity in villages, for livestock for agriculture/horticulture, equipment status, knowledge and understanding (including experience from previous drought episodes).
5. Dialogue with Government (through national level to local level) to determine a list of communities that are poorly drought proofed which would benefit from either physical or social intervention.
6. Deployment of paired sociologist/technician teams working with selected communities on awareness and Rural Community Water Management Plan preparation, creation of water committees, etc.
7. Establish emergency procedures to be implemented at the onset of a drought period. Note that the triggers will be determined from local experience and from the community monitoring work in due course.
8. Identification of indicators that can be monitored by the village (and school children) and help appoint responsible community members. Provide training and provision of equipment plus a protocol for recording and reporting. Commence monitoring at the pre-intervention stage to acquire baseline data.
9. Preparation of TORs for physical interventions, approval from village and implementation with a technician present at the intervention stage to keep villagers informed.

10. Preparation and implementation of agreed social interventions and implementation, ensuring that not only are Community heads, stakeholders and government informed through any existing committee, but so too is the wider community.
11. Maintain periodic dialogue with the village at the post implementation phase – collect data and assist in determining appropriate trigger points for emergency action.

The Phase 2 roll out project may chose to streamline some of the procedures adopted in the Planning Process. This is not recommended as this process evolved during the pilot project as the best framework with which to achieve the project aims while keeping the community and its stakeholders within the decision making procedure. The existing Planning Process templates (e.g. Tsetsebjwe for physical intervention, Shakadza for social intervention) can be used to produce draft documents rapidly for use with community leaders while drawing up the subsequent Rural Community Water Management Plan.

An important issue that the Phase 2 Project needs to address at an early stage is how to select and prioritise sub-catchment areas where it is to operate and then how to select communities in need of drought proofing. Neither of these issues was completely resolved within the Pilot Project. The former because the operating areas were given by a previous study which did not strictly adhere to the question of rural community need and the selection of villages, which although drawn from a shortlist were chosen partly because of access and partly because cost effective schemes of workable interventions could be drawn up within those villages. It is recommended that village selection is carried out using an overall matrix based decision system but that final community selection should be based as much on the recognition of a needed and cost effective intervention as well as the perceived effectiveness of each community's existing drought proofing strategy and willingness for collaboration. Other factors such as access, of course need also to be considered.

Another important issue that the Phase 2 Project needs to recognise is that in the drought proofing issues will be broadly similar for many of the villages at sub-catchment scale. For example, if one village would benefit from a sand dam and a community garden, many of the neighbouring villages would also. If a social empowerment type intervention would benefit one village the chances are that it would benefit most of the surrounding villages as well. This means that during the upscaling process, rather than dealing with different types of intervention as was the case at pilot scale, similar interventions can be processed and implemented at the same time across any number of villages during the upscaling. This should not mean that short cuts can be made at the Planning Process stage as the key to successful implementation and community involvement is through detailed and comprehensive dialogue with, and approval from, the community itself.

The ultimate outcome of the upscaling during the proposed Phase 2 Project is to inform existing community drought proofing implementers of the benefits of adopting the Rural Community Water Management Planning Process and Plan procedures. (The secondary outcome, of course, is that selected communities receive a higher level of drought proofing.) All too often an NGO will go into an area with a drilling rig providing communities with a new borehole and hand pump. Little thought is given either to sustainability of its intervention or of the real need of the community. The process recommended to the Phase 2 project will demonstrate on the ground to these implementers that there may well be more cost effective and robust interventions: awareness and training, hand dug wells, sand dams, community empowerment, triggers for emergency and emergency procedures etc.

CONCLUDING STATEMENT

Experience from the Pilot Project has shown that the processes developed in the Pilot Project are entirely suitable for the subsequent upscaling roll out proposed at Phase 2. The Pilot Project has demonstrated the value of the comprehensive Rural Community Water Management Planning Process complete with awareness and training at community and stakeholder level. Although this process may seem cumbersome to an upscaled regional scale project it is vital to the success of any drought proofing intervention project. It is recommended that the existing documentation for Process Planning and Plans be used as a template for future work; the Botswana and Zimbabwe examples where a physical intervention is undertaken and the South African examples where social intervention is predominant.

Intervention site selection remains difficult as the developed decision support matrix was only partly contributory to final community selection. Emphasis will need to be given to factors such as need, willingness of the community and access.

It has been unfortunate that the Pilot Project has been unable to continue sufficiently into a post-intervention monitoring period for two reasons:

- Assistance to communities in selecting emergency implementation triggers cannot be provided.
- Experience of monitored data into a drought event will not be gathered.

It is essential that a means be found to continue the dialogue with the intervention communities in order to ensure that the monitoring phase is not lost altogether. Loss of this experience would be detrimental to the larger regional scale work envisaged at Phase 2. In any event, the villages must be visited at the start of Phase 2 so that lessons can be learnt from the post intervention monitoring work that the communities are themselves charged with.

It is hoped that the work reported here will ultimately lead to a process that can be adopted by all implementers in the SADC Region, government and NGOs alike. The common practice of drilling and equipping a borehole with a hand pump may seem to be the panacea to many NGOs, but the villagers themselves may have other more beneficial ideas for drought proofing what, is after all, their community. Let it be hoped that future drought proofing interventions will increasingly involve a Planning Process that will be shared between the community and the implementer throughout the SADC Region.