Community Information Guide:
SAFE Water Supply, Sanitation and Hygiene (WASH) in Swaziland

sahee
foundation
switzerland

SWAZILAND

Telephone: (+268) 404 6244/8.
Fax: (+268) 404 4708.
Telex: 2301 WD.
E-mail: mnre@realnet.co.sz

GOVERNMENT

Ministry of Natural Resources and Energy,
Department of Water Affairs,
P. O. Box 961,
Mbabane,
Swaziland.

Our Ref: GE 01 /016

Your Ref:

12th February, 2015.

The Director.
Vusumnotfo,
P.O. Box 229,
Piggs Peak,

Dear Madam,

RE: COMMUNITY INFORMATION GUIDE: SAFE WATER SUPPLY, SANITATION AND HYGIENE (WASH) IN SWAZILAND.

Reference is made to the above captioned subject matter.

The Department of Water Affairs' both Technical and Social Teams participated in the development of the Community Information Guide for Safe Water Supply, Sanitation and Hygiene (WASH) in Swaziland.

The Department therefore approves the use of the manual by the rural communities and WASH Partners in Swaziland.

Grateful for your continued collaboration.

Yours faithfully,

NOMPUMELELO NTSHALINTSHALI

For: DIRECTOR OF WATER AFFAIRS.

VUSUMNOTFO – ***We are 17 communities in Swaziland working to strengthen skills within our families, preschools and community leadership. Our aim is that young children reach their full potential as the foundation for sustainable community development.***

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		impact on their health if the majority of people in their community do not have adequate sanitation structures and effective hygiene habits i.e. concept of public health.
Chapter 8	Keeping Water SAFE - *Community Environmental practices*	For communities to understand that in order that their children will have SAFE water, we must all understand how the water cycle works and engage in practices that protect and promote our water resources.
Handout	Overview: Rural Water Supply Branch's (RWSB) required Standards and Procedures for Rural Water Domestic Scheme Development	

STORIES - Each chapter starts with several stories. The purpose is to stimulate discussion regarding common problems associated with community water projects. Read and discuss the stories before going through the chapter content. After, revisit and re-examine the stories. This will stimulate discussion around how participants can apply the chapter contents to their situations.

ACTIVITIES - Activities in each chapter can be used to promote a more practical understanding of chapter contents.

ATTACHMENTS - Attachments referred to in each chapter are located after the yellow page at the end of each chapter.

SELF REFLECTION - The self-reflection questions at the end of each chapter are designed to help participants internalize the contents of each chapter. This is necessary as the first step in changing personal behaviour. Over time, this will improve the collective behaviour within each community.

Chapter 0
Community Information Guide: SAFE Water Supply, Sanitation and Hygiene (WASH) in Swaziland

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0.1. Objective, references, of Information Guide

This Community Information Guide serves as a strategy to help realize the Kingdom of Swaziland's National Water Policy statement - *Swaziland shall create an environment that enables all stakeholders (government, civic organizations, private sector and NGOs) to play a meaningful role at all levels of the management of water resources in the country*[1]

To "***participate meaningfully***" all stakeholders must have an understanding of the key concepts, procedures, and requirements associated with sustainable management of water resources at community level - *within the requirements of the Kingdom of Swaziland.*

Specific to these requirements, this Community Information Guide references:

- The Constitution of the Kingdom of Swaziland (2005)
- National Development Strategy of Swaziland (1999 - 2025)
- Swaziland: Water Act, 2003
- National Water Authority: National Water Policy - final draft (Oct, 2011)
- Integrated Water Resource Master Plan (October 2011 - for public consultation)
    - Volume 1 - Situation Analysis
    - Volume 2 - Proposed Strategies and Action Plan
- Swaziland Rural Water Supply Branch (RWSB) -
    - Guidelines for Drinking Water Quality in Rural Areas
    - Procedures for the Approval of Rural Water Schemes in Swaziland
    - Design Manuals for Rural Water Supply Systems (November 2003)
        - Volume 1 - Background, Legal and Institutional Aspects
        - Volume 2 - Design and Technical Requirements
        - Volume 3 - Design Procedures and Reporting
        - Volume 4 - Standard Drawings

0.2. Target Audience/s

The primary audience is communities. Information is presented at the level that people without formal technical training can understand, while remaining true to the underlying technical principles embedded in water projects. The objective is for community members to understand the basic concepts associated with water projects, so that they can engage meaningfully with technical staff - *but not to replace the need for technical staff.*

The secondary audience is all other stakeholders, including government, donors and technocrats. Currently, their focus tends to be on project funding, and construction. The result is that community mobilization, training, preliminary design, sanitation structures and hygiene components are often not adequately catered for in project funding cycles.

[1] National Water Authority: National Water Policy - Final draft (Oct 2011) - Policy Statement 4.6.1.1 - p61

If communities do not have the understanding to engage meaningfully with technical staff, and if project funding cycles do not adequately accommodate engagement, this inadvertently contributes to lack of community ownership, which contributes to poor maintenance of water schemes, which results in the benefits from community water schemes not being realized.

Instead, all parties involved in any and every aspect of water project development need to have a common understanding of the concepts, standards and procedures highlighted in this Community Information Guide.

This common understanding will ensure that the development, funding, and construction of water projects is carried out within the Kingdom of Swaziland's institutional framework (Phase A) and technical requirements (Phase B), as well as facilitate more active and positive engagement of communities.

This will ensure that the technical, people, financial and environmental issues embedded in water projects are all considered in the most effective manner - thus contributing to the vision of the water sector, which is:

National economic prosperity and social upliftment - through equitable, productive and optimum utilization of water resources - while ensuring environmental sustainability[2]

0.3. Background to manual

SAHEE Foundation provided a grant to Vusumnotfo to develop this Community Information Guide. SAHEE[3] Foundation is committed to grass roots, sustainable, community led efforts, concentrating on Swaziland and Peru.

Vusumnotfo's participation in Swaziland's WASH Forum[4] meetings informed the development of this Community Information Guide. Vusumnotfo also drew upon experiences gained from implementing its permaculture garden project *Food Security in a Changing Environment*[5].

Historically, so as to ensure the full benefit from a water scheme, the Water Sector came to understand that sanitation and hygiene components needed to be part of all water projects. Vusumnotfo advocates that we should also now be including environmental components into all water projects.

Specifically, this should include the fact that without adequate ground cover, 80% of rainwater received is lost through run off (as detailed in Chapter 8). For without adequate ground cover, the ground water and springs will not be recharged the result being that we will be constructing water schemes but there will be no water flowing through the pipes.

[2] National Water Authority: National Water Policy - Final draft (Oct 2011) - p9
[3] Sustainability for Agriculture, Health, Education and Environment
[4] Swaziland WASH Forum - a peer-sharing network of agencies and individuals involved or interested in water, sanitation and hygiene issues.
[5] EU Grant DCI-NSA PVD/2008/149-983

0.4. Editing

This Information Guide was edited by national stakeholders, including -

- Kingdom of Swaziland, Department of Water Affairs, Rural Water Supply Branch (RWSB)
- Ministry of Health, Environmental Health Officers
- SWADE
- Lutsango, Liphupho Lendlovukazi
- Swaziland WASH Forum members

A training pilot was carried out with community members from Herefords Settlement, under Mayiwane Inkhundla.

0.5. Reproduction and usage

Although this Community Information Guide is specific to Swaziland, the basic technical concepts of water project design, construction, operation and maintenance are universal.

0.6. Community training notes

It is critical that communities understand their responsibilities associated with the development of their water schemes - before the start of a "project", during the "project development phase" - and forever after.

It can be helpful to use an analogy that links the three phases of water scheme development to the human development stages of pregnancy, delivery, and growth, as shown below:

Three phases of water scheme development	Three stages of human development
Phase A - Kingdom of Swaziland - *Institutional Framework for the Water Sector*	**Preparing for "the baby" -** understanding roles, responsibilities, and requirements
Phase B - Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures*	**Pregnancy -** government provides support to the "mother and family", through check ups at the clinic, pre-natal advice, injections, support during birthing, and growing monitoring of the new borne baby.
Phase C - After the Project Development Phase - *Community Responsibilities*	**After birth -** this does not mean that government is responsible for "the baby" (water scheme), rather the family (community) is.

To address the negative cycle associated with "*how do you know that you don't know, if you don't know*" - training is more effective if it is carried out before starting on the preliminary design of a water project.

Ideally, training is best carried out:

- With a cross section of community members from the "community at large"
- Well before the community gets started on a water project (ideally, the information in this manual should be general knowledge at community level)
- Over a 4 day period, residential training (there is a lot of information to absorb, it goes deeper than poster format, and training will generate a lot of stories from participants, which an experienced facilitator can use to promote self reflection).

This Community Information Guide can also be used with a community whose water scheme is in need of rehabilitation. In this situation, the Community Information Guide will help a community to understand why their current water scheme is in need of rehabilitation. Such training should be undertaken for capacity building / self-reflection, not as a finger pointing exercise.

Chapter 1
Understand that the goal is SAFE water

STORIES - ***the purpose of these stories is to stimulate discussion***.

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Mkhulu Gwebu

Mkhulu Gwebu lives at the homestead where he grew up as a young boy. Every since he can remember, his family has fetched water from the near by stream. He is now 65 years.

Do you think that Mkhulu Gwebu has SAFE water? Explain your answer

Community Y

For over 10 years, Community Y has had a well functioning water scheme. The Water Committee carries out the maintenance requirements correctly and on time.

Over the last year, people have noticed that there is less and less water in the taps. People can only draw water in the early morning for about 2 hours before the taps are dry. However, the water is tested and is still of good quality.

Does this community have SAFE water? Explain your answer

Chapter 1
Understand that the goal is SAFE water

Chapter Outline

1.1. Water is only considered SAFE for human usage if it meets all 3 of these criteria: 1) Quantity, 2) Quality, and 3) Reliability

1.2. Fifty years ago in Swaziland (1960), the water that people collected from the streams and rivers, was SAFE water.

1.3. Today water collected from the streams and rivers in Swaziland is not SAFE water.

1.4. Although the Government of the Kingdom of Swaziland - together with communities and donors - has spent a lot of effort and money in developing water schemes - *unfortunately, many of these water schemes are no longer functioning well, and therefore, are not delivering SAFE water.*

Chapter 1
Understand that the goal is SAFE water

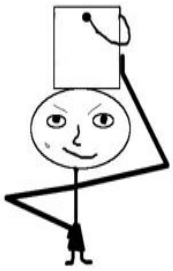
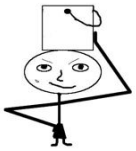
1.1. Water is only considered SAFE for human usage if it meets all 3 of these criteria: 1) Quantity, 2) Quality, and 3) Reliability

1) Quantity - *the amount of water available - enough to carry out domestic requirements per person per day*

The World Health Organization (WHO) recommends an absolute minimum of 15 litres per person per day.

Domestic requirements include water intended primarily for human consumption but which has other domestic uses such as washing and cooking (potable water).

If less water is available to a person each day, it will be difficult for that person to carry out their domestic requirements adequately - ***the result being that their health will be negatively affected.***

 15 litres	 15 litres	 15 litres	= 45 litres
Person 1 - Make	Person 2 - Babe	Person 3 - Sisi	Total minimum requirement for this homestead each day

Activity #1.1 - Visually demonstrate a 15 litre volume of water
Have available a 15-litre bucket or container so that participants can visualize accurately the absolute minimum water required for health

2) Quality - *water of a standard that will not make a human sick*

This includes both visual (things a person can see with their eyes) and non-visual (things that a persons can not see unless they use a magnifying glass or micro scope).

Activity #1.2 - Demonstrate that "there is another world that your naked eye can not see" -

- *Put several spoons of sugar in warm water so that it dissolves i.e. disappears*
- *Use a magnifying glass to look at various surfaces, observing how each surface looks different when seen with the naked eye and with a magnifying glass*

3) Reliability - *water that is always accessible, 24 hours a day, 7 days a week, 365 days of the year*

For example, water taps that give water only in the early morning are **not** reliable.

1.2. Fifty years ago in Swaziland (1960), the water that people collected from the streams and rivers, was SAFE water.

Activity #1.3 - Compare the water available in your community 50 years ago (1960) to the water available today.

Which **water source** did your family collect water from?
- Can you still collect water from this source today?

What was the **Quantity** of the water? -
- *Was it quick to fill a 30-litre bucket?*
- *How does this compare with today?*

What was the **Quality** of the water? -
- *Did the water make your family sick?*
- *How does this compare with today?*

What was the **Reliability** of the water? -
- *Was water always available for your family to collect?*
- *How does this compare with today?*

If you were born after 1960, ask your grandparents or parents these questions - you might be surprised by their answers!

1.3. Today water collected from the streams and rivers in Swaziland is not SAFE water.

*Activity #1.4 - Make a list of the problems you encounter when collecting **water from an unprotected spring, stream or river.** For each problem indicate if it is related to Quality, Quantity, or Reliability*

List of Common Problems	*Poor Quality*	*Low Quantity*	*No Reliability*
After a heavy rain, the river water is very dirty.	*X*		
Many of the springs are now dry during the winter		*X*	*X*
After a heavy rain, the rivers run high for only 1 day		*X*	
What other problems do you encounter when you fetch water from an unprotected water source?….			

Save your answers so that at the end of training, you can check if you now understand the reasons why.

Activity #1.5 - Draw a picture of a stream that flows through your community.

Draw all of the different ways the stream is used; for example, draw a cow drinking from the stream, a car being washed next to the stream....

How do these uses affect the Quantity, Quality, and Reliability of the stream?

1.4. Although the Government of the Kingdom of Swaziland[6] - together with communities and donors - has spent a lot of effort and money in developing water schemes - *unfortunately, many of these water schemes are no longer functioning well, and therefore, are not delivering SAFE water.*

Activity #1.6 - Think about the water scheme that your community uses - or a water scheme that you are familiar with. For each of the problems listed, indicate if it is related to Quality, Quantity, or Reliability.

List of Common Problems	*Poor Quality*	*Low Quantity*	*No Reliability*
Water taps only have water in the early morning		*X*	*X*
People are adding their own private connections		*X*	
Many homesteads to not have - or do not use - toilets	*X*		
People wash their clothes by the intake	*X*		
What other problems do you encounter with your water scheme?….			

Save your answers so that at the end of training, you can check if you now understand the reasons why.

The result is that -

- **SAFE water is not available to the majority of rural homes**, **for example:**

  In the eighteen communities making up the three Tinkhundla of Mayiwane, Etimphisini, and Entfonjeni, together with Nkamanzi Umphakatsi[7] - although 31 domestic water schemes have been constructed, less than 30% of the people using these water schemes have SAFE water[8].

  At national level, approximately 20-30% of the water schemes constructed are non-functional or are not operating at full potential - due to problems of management, maintenance, affordability and water quality.[9]

[6] The need for a focused rural perspective was first realized with the creation of the Rural Water Supply Branch (RWSB) in 1976, as part of the than Water and Sewage Board of the Ministry of Works, Power, and Communications.
[7] Vusumnotfo area of operation
[8] Technical and Community Assessment and Evaluation of Water Supplies in Zone 1 - by Afrotech
[9] National Water Policy - p13

- **Many people are still getting sick from water related diseases, for example:**

  30% of the outpatients at the 5 clinics of Herefords, Mkhuzweni, Horo, Entfonjeni, and Mshingishingini are treated for illnesses caused by poor sanitation[10].

Activity #1.7 - Visually demonstrate percentages:									
Draw 10 squares on paper or on the ground (using a stick) - use it to visually demonstrate percentages by adding and removing rocks									
1 rock	1 rock	1 rock	1 rock	1 rock	1 rock	1 rock	1 rock	1 rock	1 rock
10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

[10] Vusumnotfo Zone 1 Community Assessment - Volume 1 - The Baseline Survey - by Human Resource Services

Chapter 1
Understand that the goal is SAFE water

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. In the last 10 years, what things may have negatively affected the QUALITY - QUANTITY - RELIABILITY of the water in your community?

2. If the water schemes that you are aware of, how many are fully functional?

3. Clinics report that the incident of water borne diseases increases after the first rains. What causes this?

4. Do you actively support the efforts of your Community Water Committee? Or do you mostly just complain?

5. Do you - or are you prepared to - pay a monthly user fee towards the maintenance of your water scheme?

6. Do you ever litter? Does this have a positive or negative impact on SAFE water?

7. Clinics report that the incident of water borne diseases increases after the first rains. How is this related to SAFE water?

Chapter 2
The Kingdom of Swaziland - *an overview of the policies, standards, and procedures to deliver SAFE water* - for <u>everyone</u>

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Babe Mamba

Babe Mamba is considered one of the smartest men in his community; everyone looks up to him for advice. He is a member the Inner Council. Recently he was successful to obtain funding from a donor for a water scheme project for his community.

Immediately after he told the community the good news, they started digging the trenches. Within two months, the pipes and taps were installed. However, the water scheme only worked for 16 months.

What do you think caused the project to stop working? Explain your answer.

Banele Dlamini

Banele Dlamini is an energetic young man. He has noticed a lot of unused land in his community. He started mobilizing the youth to start a farming project so as to improve their food security and income.

The youth all work hard. To improve their production even more, they want to develop an irrigation scheme for their project. However, the only water source in their community is an unprotected spring, which the cattle also drink from. The flow of this spring is 100 litres every 4 hours. There are 40 homesteads in the immediate area surrounding the spring.

Banele believes that he and his friends should be allowed to develop an irrigation scheme from this same source.

What do you think? Explain your answer.

Chapter 2
The Kingdom of Swaziland - *an overview of the policies, standards, and procedures to deliver SAFE water* - for <u>everyone</u>

Chapter Outline

2.1. The Kingdom of Swaziland's institutional framework sets national standards for the development of domestic water schemes for *Primary Water Usage*.

2.2. Within this institutional framework, Rural Water Supply Branch (RWSB) is responsible for rural water supply design standards for *Primary Water Usage.*

2.3. RWSB design standards are <u>compulsory</u> usage by all persons and agencies involved in rural water schemes for <u>Primary Water Usage</u> in Swaziland - *including the Swaziland government and funding agencies.*

2.4. RWSB design standards apply to all the different types of water schemes intended for *Primary Water Usage.*

2.5. RWSB design standards state that the development of water schemes for *Primary Water Usage* will take priority over water for agriculture.

2.6. This Community Information Guide is designed to develop understanding of the key concepts, procedures, and requirements of RWSB design standards - *so that communities, government, and funding agencies can work as a team* to achieve and sustain 100% coverage of domestic water schemes for primary usage by 2020.

Chapter 2
The Kingdom of Swaziland - *an overview of the policies, standards, and procedures to deliver SAFE water* - for <u>everyone</u>

2.1. The Kingdom of Swaziland's institutional framework sets national standards for the development of domestic water schemes for *Primary Water Usage.*

Attachment #2.1 - Overview of the <u>Institutional framework governing Swaziland's water sector</u> - and summarized below

Swaziland National Constitution -

210. (1) *Subject to the provisions of this constitution or any other law, land, minerals and water are national resources*

210. (2) *In the interest of the present and future generation, the State shall protect and make rational use of its land, mineral and water resources as well as its fauna and flora, and shall take appropriate measures to conserve and improve the environment.*

215*. There shall be no private right of property in any water found naturally in Swaziland.*

217. *Parliament may make laws – (c) regarding the use of water naturally found in Swaziland*

⇩

National Development Strategy (NDS) and **Poverty Reduction Strategy and Action Plan (PWSAP)** - the vision being *poverty eradication and economic prosperity:*

"By the year 2022, the Kingdom of Swaziland will be in the top 10% of the medium human development group of countries founded on sustainable economic development, social justice, and political stability".

⇩

Swaziland National Water Policy (Final draft, Oct, 2011)[11] - sets out the Kingdom of Swaziland's vision, intention and strategy for the development and management of its water resources.

The vision of the Swaziland water sector is "*National economic prosperity and social upliftment - through equitable, productive and optimum utilization of water resources - while ensuring environmental sustainability.*

It is a guiding principle of the Kingdom of Swaziland that all people be entitled to a minimum of 30 litres of safe and clean water per capita per day at a distance of no more than 200 metres.[12]

⇩

Water Act of 2003 - replacing the Water Act of 1967. The key factors of the Water Act (2003) that affect with the rural water supply sector are[13]:

Established the **National Water Authority** who shall:

- Establish a **Department of Water Affairs** - *of which Rural Water Supply Branch (RWSB) is now under*
- Compile a Water Resources Master Plan - **Integrated Water Resource Master Plan** (October 2011 - for public consultation) (Volume 1 - Situation Analysis / Volume 2 - Proposed Strategies and Action Plan)
- Establish **Five River Basin Authorities** - to implement management plans under the Water Resources Master Plan - including the allocation of water permits. In the meantime, a **Water Apportionment Board** is to be established for this purpose; however, it will be dissolved after the 5 River Basin Authorities have been established.
    1. Lomati River Basin
    2. Komati River Basin
    3. Mbuluzi River Basin
    4. Usuthu River Basin
    5. Ingwavuma River Basin

Membership of each River Basin Authority must include representatives from the following user sectors: domestic, agriculture, forestry, conservation and mining / industry. River Basin Authority membership has now been confirmed by legal notice; for example, membership of Lomati River Basin was confirmed by Legal Notice Number 187 of 2009.

The legal requirements associated with water allocation permits are laid out in the Water Act of 2003 - including:

- **Permits for surface water -** a permit is not required for the use of water for primary purposes - but is required for water use other than for primary purposes.
- **Permits for ground water -** a permit is required for the drilling or sinking of boreholes and wells, and the abstraction of groundwater.

[11] The full public policy consultation process for the National Water Policy has not yet been completed
[12] National Water Authority: National Water Policy - Final draft (Oct 2011)

Integrated Water Resources Master Plan (IWRMP)

Water impacts every aspect of human life.

For this reason, the overall goal of the Integrated Water Resources Master Plan is to develop and manage Swaziland's water resources in a planned and coordinated manner. This must take into account the projected requirements of the various economic and social sectors - including the environment, which depends on the availability of a sustainable supply of good quality water for domestic, agriculture and industrial uses, as well as ecosystem functioning - to meet their respective goals.

Integrated planning must therefore include:
- Horizontal issues - across different sectors; for example, irrigation and domestic use of water
- Vertical - across different levels of society; for example, homesteads and industrial use of water

As laid out in the Integrated Water Resource Master Plan[14], the criteria for allocating water will follow the down listed sequence:

1. Sustaining life, food production, and public health - *Domestic (Urban / rural and Primary purpose use)*

2. Maintaining environmental conditions - *Natural environment*

3. International obligations in terms of treaties and international agreements

4. Maintaining economic activity with user sector priorities determined by economic value, including power generation

5. Irrigated agriculture - with consideration given to the ability of particular crops to withstand reductions in water allocation.

This priority list was set taking into consideration the "value per drop of water" - i.e. the cost of providing the water in comparison to the value gained from providing the water.

Currently, all normal flow water in the rivers of Swaziland has been allocated. "Normal flow" is water that has been calculated as being water available 80% of the time during the driest month of the year, which is the month of September. The only water that can still be made available for allocation is surplus flow through harnessing in large storage reservoirs.[15]

Within the current allocations, irrigation utilizes about 95% of the surface water resources in Swaziland, mainly used for growing sugarcane - hence most of Swaziland's rivers have been fully allocated leaving no room for further socio economic development unless:
- through the construction of large dams (to store excess water arising from heavy rains),

[13] Design Manual for Rural Water Supply Systems - Volume 1: Background, Legal and Institutional Aspects; p2-5
[14] Volume 2, p13.
[15] Integrated water resources master plan - p22.

- massive application of water demand management by all water using sectors at a national scale, and
- the use of alternative sources of water.

Issues of **afforestation** (reducing of non-indigenous tree plantations planted for commercial gain) need to be looked at differently because once a forest plantation is established the trees are the first to utilize water within a catchment area. As a matter of policy in Swaziland, there must be no more expansion of the existing forest plantation in all the water stressed river basins.

Swaziland Environmental Authority Act (1992) includes:
- Powers to establish standards and guidelines relative to pollution of the air, water, and land
- To establish guidelines for the preparation of environmental impact assessments
- To control all forms of environmental pollution caused by the discharge of toxic wastes.

These guidelines make it mandatory that the proponent makes the public aware of the intended project, and that there is full public participation.

An environmental impact assessment report is a requirement for the issuance of an Environmental Compliance Certificate (ECC), without which no project - including any proposed water supply scheme - can be allowed to commence.

International agreements - as a member of SADC, Swaziland cooperates with the Protocol on Shared Watercourses in the SADC Region; SADC Regional Water Policy; SADC Regional Water Strategy; and other shared watercourse agreements.

The 5 major rivers in Swaziland all cross international basins:
1. Lomati
2. Komati
3. Mbuluzi
4. Lusutfu
5. Ngwavuma

Attachment #2.2 - Swaziland Water Act (Figure 1: Policy Conceptual framework)

What conflicts might arise if for example, water for Tourism and Recreation is developed before water for Food Security?

*Why do you think the Kingdom of Swaziland has developed an **Integrated** Water Resources Development and Management strategy?*

2.2. Within this institutional framework, Rural Water Supply Branch (RWSB) is responsible for rural water supply design standards for *Primary Water Usage.*

Cabinet Paper 96 of 1995 dated January 3, 1995 - gave the responsibility for approval of standards and designs for all domestic water supply schemes constructed in the rural areas, and for ensuring that construction meets established standards, to the Rural Water Supply Branch (RWSB).

RWSB has since developed its **Design Manual for Rural Water Supply Systems (November, 2003)**[16]

- Volume 1: Background, Legal and Institutional Aspects
- Volume 2: Design and Technical Requirements
- Volume 3: Design Procedures and Reporting
- Volume 4: Standard Drawings

Within these national standards, Rural Water Supply Branch has the responsibility to **provide approval at four points in the process:**

1. **Approval of Need for Project**
2. **Approval of Preliminary Design Report**
3. **Approval of Final Design Report**
4. **Approval of Constructed Schemes**

The **Design Manual for Rural Water Supply Systems** is to be read in conjunction with the following documents:

- Government of Swaziland ***Guidelines for Drinking Water Quality in Rural Areas*** - Prepared under the Guidance of the Sector Coordination Committee, November, 1998

- ***Procedures for the Approval of Rural Water Schemes in Swaziland*** - prepared under the guidance of the Sector Coordination Committee, November, 1998

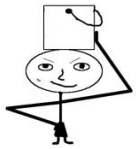
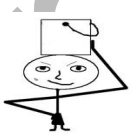
[16] RWSB's mandate includes the review and updating of its standards and procedures.

2.3. RWSB design standards are <u>compulsory</u> usage by all persons and agencies involved in rural water schemes for <u>Primary Water Usage</u> in Swaziland - *including the Swaziland government and funding agencies.*

<u>Primary Water Usage</u> is defined as:

- Domestic requirements - water intended primarily for human consumption but which has other domestic purposes such as cooking.
- Sanitation - washing of body and clothes
- The watering of animals not exceeding 30 head of cattle
- The irrigation of land not exceeding one quarter hectare (25 M x 25 M) adjoining or occupied with a homestead of not more than 10 persons i.e. average size of homestead.
- Primary use does NOT include the use of water by a local authority for distribution to the inhabitants of the area (for example, the Water Services Corporation).

It is the stated goal of the Kingdom of Swaziland that all people should have access to a minimum of 30 litres of SAFE water per person (capita) per day at a distance of no more than 200 metres[17].

 30 litres	30 litres	 30 litres	= 90 litres
Person 1 - Make	Person 2 - Babe	Person 3 - Sisi	Total for this homestead each day

2.4. RWSB design standards apply to all types of water supply intended for <u>Primary Water Usage</u>

- New water systems
- An extension of an existing water scheme
- Rehabilitation of an existing water system
- A micro water scheme- *point source supplies such as bore holes with hand pumps, or protected springs, or collection tanks with up to 4 communal standpipes*
- A macro water scheme- *powered system such as submersible pumps, gravity systems or point source systems with collection tanks supplying more than 4 communal standpipes*
- A community water system
- A private water system…

Although a permit for water usage from a River Basin Authority is not needed for Primary Water Usage, Rural Water Supply Branch's approval process and design standards are still compulsory.

[17] National Water Authority: <u>National Water Policy</u> - Final draft (Oct 2011) - p13

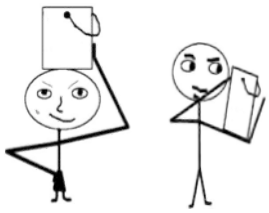
2.5. RWSB design standards state that the development of water schemes for <u>Primary Water Usage</u> will take priority over water for agriculture.

Firstly, this is because a person can only live about 3 days without drinking water, but can live up to 45 days without food

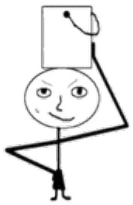
Secondly, water schemes that provide SAFE water for Primary Usage have a positive impact on **all** other home activities, for example:

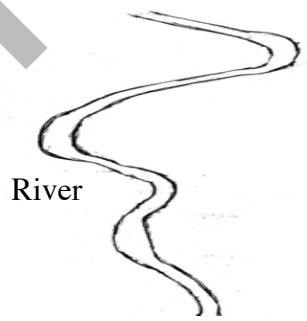
- A person who is sick due to poor quality water will find it difficult to carry out agriculture activities - yet a person who is healthy will be able to engage in farming activities.
- Domestic water development will reduce the time away from other activities - and so free up time that can be spent on developing the home and engaging in income generating activities.

On average, a homestead spends just over 9 hours collecting water per day (this includes number of trips per day x the number of people sent to collect water on each trip)[18] - for example)



Morning - 2 people walking 60 minutes one way; so round trip, each person is spending 120 minutes, which together adds up to 4 hours and 20 minutes (240 minutes)





Afternoon - 3 people walking 50 minutes one way; so round trip, each person is spending 100 minutes, which combined adds up to 5 hours (300 minutes)

Each day, this homestead spends a combined total of 9 hours fetching water!
Think of all the other activities a homestead can do with this time - and energy

Given this, the fact that domestic water has to be the priority before agriculture water needs to be understood and accepted by everyone - including the people who might not be fetching the water (*boBabe*).

2.6. This Community Information Guide is designed to develop understanding of the key concepts, procedures, and requirements of RWSB design standards - *so that communities, government, and funding agencies can work as a team* to achieve and sustain 100% coverage of domestic water schemes for primary usage by 2020.

This Community Information Guide is targeted at communities. The objective is for community members to understand the basic concepts associated with water projects, so that they can engage meaningfully with technical staff - *but not to replace the need for technical staff.*

The secondary audience is all other stakeholders, including government, donors and technocrats.

All parties involved in any and every aspect of water project development need to have a common understanding of the technical, people, financial and environmental issues and procedures outlined in this Community Information Guide.

*Activity #2.3 - If every person had access to **30 litres of SAFE water per person (capita) per day at a distance of no more than 200 metres**, what would be the benefits:*		
Benefits - to you	*Benefits - to your family*	*Benefits - to your community*

Attachment #2.4 - The Policy Process
Review The Policy Process and thereafter the steps associated with developing laws to realize the Policy. *Do you think it is important that the public policy consultation process for the National Water Policy (Final draft) be completed and this Policy be approved by Cabinet?* *What can you do to move this process along?*

Chapter 2
The Kingdom of Swaziland – an overview of the polices, standards, and procedures to deliver SAFE water – <u>for everyone</u>

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. Swaziland's goal is that by 2020 every person will have access to 30 litres of clean water per person per day within a distance of 200 meters. Using your own resources, what can you do, now, to help make this a possibility?

2. Do you agree with RWSB requiring approval at four steps in the process of constructing rural water schemes?

3. Do you have your own copy of the Constitution of the Kingdom of Swaziland?

4. Do you know how much total time it takes to collect the water used in your home each day?

Attachment #2.1 - Institutional framework governing Swaziland's water sector

Constitution of the Kingdom of Swaziland

National Development Strategy (NDS) and **Poverty Reduction Strategy and Action Plan (PWSAP)**

Swaziland National Water Policy (Final draft, Oct, 2011)

Note: The full public policy consultation process for the National Water Policy has not yet been completed.

Water Act of 2003

Swaziland Environmental Authority Act (1992)

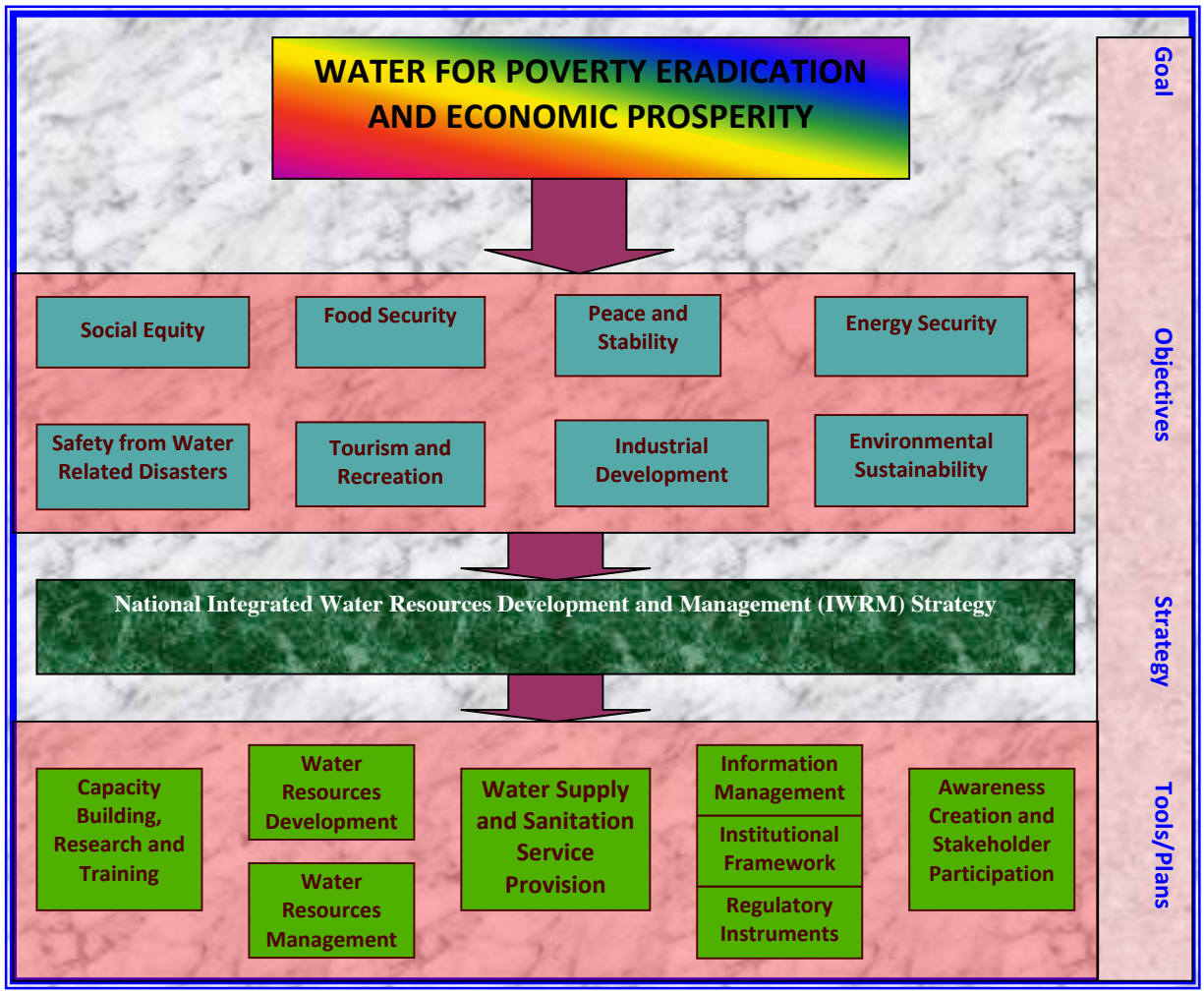
Established the **National Water Authority** who shall:

Establish a **Department of Water Affairs** - *of which Rural Water Supply Branch (RWSB) is now under*

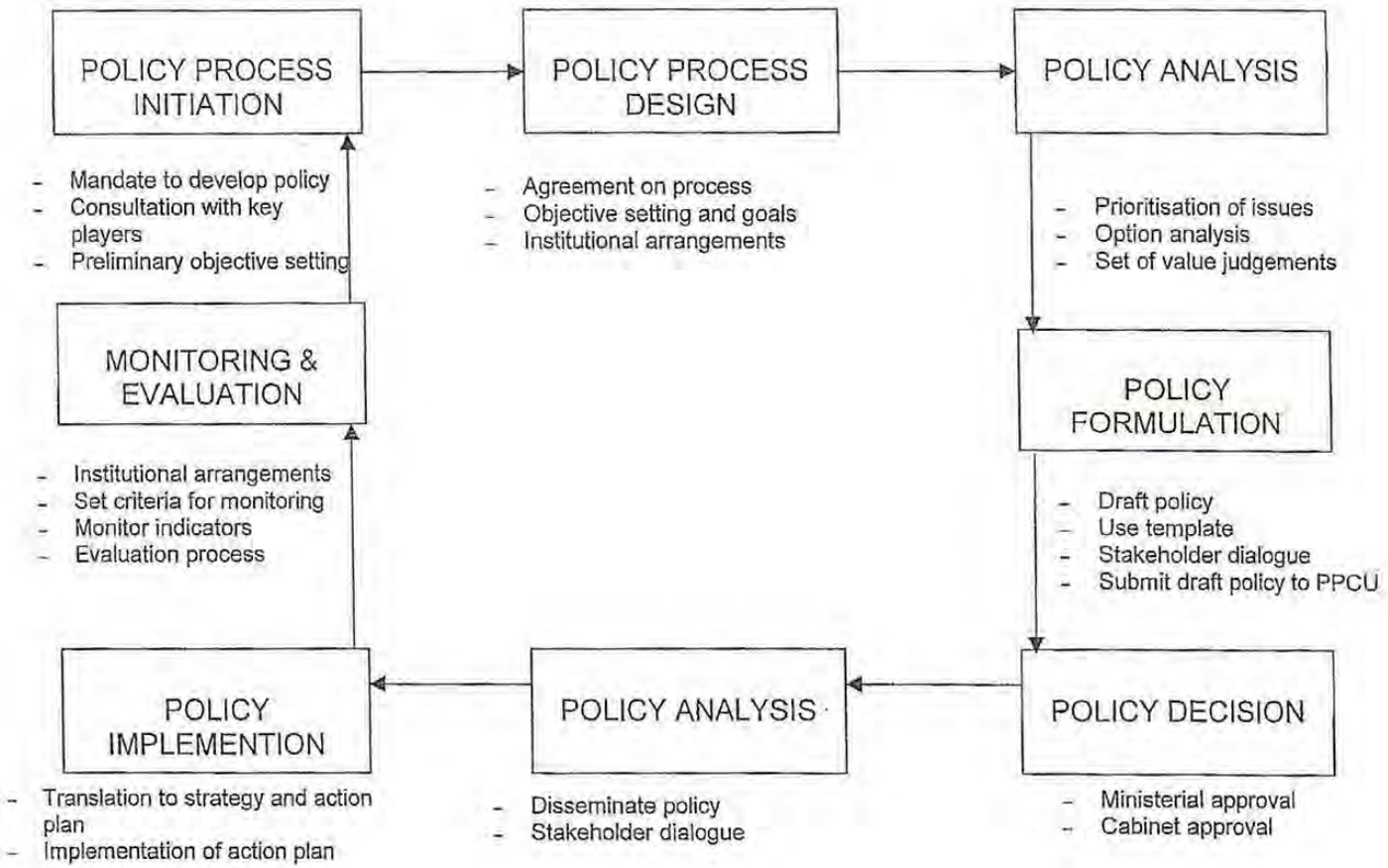
- Compile a Water Resources Master Plan - **Integrated Water Resource Master Plan** (October 2011 - for public consultation) (Volume 1 - Situation Analysis / Volume 2 - Proposed Strategies and Action Plan)
- Establish **Five River Basin Authorities** - to implement management plans under the Water Resources Master Plan - including the allocation of water permits. In the meantime, a **Water Apportionment Board** is to be established for this purpose; however, it will be dissolved after the 5 River Basin Authorities have been established.
    - Lomati River Basin
    - Komati River Basin
    - Mbuluzi River Basin
    - Usuthu River Basin
    - Ingwavuma River Basin

Rural Water Supply Branch (RWSB) has responsibility for approval of designs and plans for all domestic water supply systems constructed in the rural areas - and for ensuring that construction meets established standards - resulting in the **Design Manual for Rural Water Supply Systems (November, 2003)**

Attachment 2.2 - Swaziland Water Act (***Figure 1: Policy Conceptual Framework - p10)***



The Policy Process



The normal sequence for developing Public Policy and enforcing national standards is:

Step 1 - The Policy Process

- Policy Process Initiation - this requires Cabinet approval
- The role of the Public Policy Coordination Unit (under the Deputy Prime Minister's office) is to oversee that:
    - All Policy's remain within the framework of the Swaziland National Constitution, the National Development Strategy (NDS), and the Poverty Reduction Strategy and Action Plan (PRSAP).
    - The full public policy process has been followed - including the provision for public consultation
    - Different Policy's do not conflict with each other.
- At the end of this process, the final draft of a policy must be approved by Cabinet

Step 2 - Bill

- Drafting stage of proposed laws that are necessary to realize the Policy
- These proposed laws must be within the criteria & standards set out in the Policy

Step 3 - Act

- When a Bill is signed by His Majesty it becomes an Act
- All Acts are published in the Swaziland Government Gazette and thereafter are available to the public.

Step 4 - Enforcement

- At this stage, the Act can be enforced within the rules of law

For whatever reasons, the Water Act of 2003 was drafted and approved before the completion of the National Water Policy, which has not yet completed the full public policy process.

Chapter 3
Rural Water Supply Branch (RWSB) - *Community Mobilization requirements*

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Mr. Mamba - from town

After working in Mbabane for 20 years, Mr. Mamba went home to the rural area. He now has to fetch water from the river, instead of turning on the tap like he did in town. This is a concern to Mr. Mamba so he approached his Umphakatsi about developing a water scheme for the community.

Umphakatsi agreed that it would be nice to get water from taps like the people in town. A community meeting is held and a Water Committee formed.

The Water Committee is successful to secure the services of Rural Water Supply Branch (RWSB) and a donor. However, each homestead must first contribute E100. Some pay, but many do not. People start talking about Mr. Mamba - they say that he is just trying to become an M.P., that he is too proud to go back to the traditional ways of fetching water from the river, and that his wife does not always wear a head-scarf though she is married.

- Do some people in your community think this way?
- How would you go about convincing them otherwise?

Babe Nkosi

Babe Nkosi and several others have been elected as the new Water Committee in their community. The water scheme was started many years ago but is still not completed. After the disappearance of the previous committee, community members have long lost hope of ever getting the water from the project.

The previous committee had been complaining about lack of support from the community members, who in turn complained that they were not aware what was expected of them. After all, that is what they had elected a committee for.

- Do you think Babe Nkosi will be able to see the project to completion?
- Explain your answer.

Chapter 3
Rural Water Supply Branch (RWSB) - *Community Mobilization requirements*

Chapter Outline

3.1. Development of domestic rural water schemes in Swaziland must follow a step-by-step process that requires approval from RWSB at four points in the process.

3.2. A **Letter of Request** for the construction or rehabilitation of a rural water scheme can originate through several different channels.

3.3. After receiving a **Letter of Request**, RWSB will visit the community and meet with the Bandlakhulu.

3.4. Regardless of who or how the **Letter of Request** was brought to RWSB, the community must identify with the need for a water scheme, must have an understanding of their responsibilities, and must show evidence that they are well on the way to meeting these responsibilities.

3.5. Communities may need help in understanding and meeting their responsibilities.

3.6. The Water Scheme and Sanitation Committee (WSSC) serves as a focus point to ensure that the community meets its responsibilities.

3.7. So that the full benefit of the water scheme is realized, community sanitation structures and hygiene practices are required to be in place prior to the construction of a water scheme.

3.8. Summarized, community responsibilities towards rural water supply are associated with the three interlinking components of i) operation and maintenance, ii) sanitation structures and hygiene practices, and iii) environmental protection of community water sources.

3.9. Community mobilization will most likely take 12 months or more, the key issue is how fast the community provides tangible evidence of fulfilling its responsibilities (actions on the ground instead of just promises that they will do it).

Chapter 3
Rural Water Supply Branch (RWSB) - *Community Mobilization requirements*

3.1. Development of domestic rural water schemes in Swaziland must follow a step-by-step process that requires approval from RWSB at four points in the process.

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
Phase B	**Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures***	
Chapter 3	1) Letter of Request	
Chapter 3	2) RWSB Assessment	**RWSB #1 - Approval of Need for Project**
Chapter 3	3) Community mobilization Sensitize, awareness, and training activities with the objective 1) for communities to understand that they are the owners of the water system, and 2) for communities to develop the capacity to fulfill their responsibilities	
Chapter 4	4) Preliminary design (PD) The Preliminary design report includes the Community Readiness form (filled in by the Community Development Office (CDO) of RWSB after discussions / observations with the community)	**RWSB #2 - Approval of Preliminary Design report MOU signed between RWSB and the implementing agency**
Chapter 4	5) Final design report	**RWSB #3 - Approval of Final Design report, including Environmental Compliance Certificate**
Chapter 5	6) Fundraise for water scheme construction	
Chapter 5	7) Construction of water scheme	**RWSB # 4 - Approval of Constructed schemes, resulting in Construction Completion Certificate**
Phase C	**After the Project Development Phase - *Community Responsibilities***	
Chapter 6	8) Operation & Maintenance • Community - preventative maintenance • With possibility of some assistance from RWSB for major repairs	
Chapter 7 Chapter 8	9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water system construction.*	

3.2. A Letter of Request for the construction or rehabilitation of a rural water scheme can originate through any of the following channels:

- By a community request
- By a donor agency
- By RWSB's "reach out" programme
- By a NGO
- Through other agencies

Regardless, the **Letter of Request** must be signed and stamped by the Umphakatsi and include[19]:

- Name of the beneficiary community and region
- Letter from the community Water Scheme and Sanitation Committee (WSSC) or the community leadership requesting assistance from either an agency or RWSB
- The number of persons to be served and the projected population in 10 years time (if it is for an extension of an existing system, the number of people currently being served)
- The Institutions to be served (such as schools, clinics, Tinkhundla centres….) the number of people using these institutions; the number of household connections within these institutions.
- Scope of the proposed water scheme, emphasizing linkages with hygiene education, latrine construction, and other community development activities
- Potential sources of funds
- Statement on the community's status of resettlement

At this point in time, the community may or may not already have a Water Scheme and Sanitation Committee (WSSC) in place. If they already have one, this will be referred to as the Interim Water Committee.

3.3. After receiving a Letter of Request, RWSB will visit the community and meet with the Bandlakhulu

The purpose of this visit is to:

- Confirm if the request is community driven and if the details of the letter match with the reality on the ground - for example, to confirm that those who signed and stamped the request have the authority to do so.

- Assess that the community leaders have a basic understanding of their role and responsibilities - for example, they understand that the project doesn't rest on the shoulders of only a few community members or on RWSB.

- Conduct a quick technical walk about of the community, so as to get a feel for the potential and scope of the project, the potential water sources and coverage area, including places that are off limits - for example, burial sites

If the results of this visit are positive, RWSB will issue:

RWSB #1 - Approval of Need for Project
- After receiving a **Letter of Request**, RWSB is obligated to respond within 1 month - either yes or no or asking for more information
- The community can ask that RWSB put its response in writing

"Approval of Need for Project" is designed to avoid duplication and conflicts with other projects that might involve supplying water to the same homesteads, or from the same water source[20]

3.4. Regardless of who or how the Letter of Request was brought to RWSB, the community must identify with the need for a water scheme, must have an understanding of their responsibilities, and must show evidence that they are well on the way to meeting these responsibilities.

Community responsibilities are associated with **three** interlinking components:

1) **Operation and maintenance** (O & M) of their water scheme - demonstrated by
- A fully functioning Water Scheme and Sanitation Committee (WSSC) that was elected through proper procedures to carry out tasks in accordance with an relevant constitution that was approved at community level
- The majority of the homesteads understand the need for, and continue to contribute to Operation and Maintenance funds:
  - Construction costs - 25%, through the provision of labour, local materials, and cash contributions
  - All minor repair costs - in accordance with the policy of the RWSB, the community is responsible for conducting minor repairs on rural water supply schemes in Swaziland and the costs associated (100%), including any compensation for water minders.
  - Major repair costs - in accordance with the policy of the RWSB, the community is responsible for at least 50% of the material costs of a major repair and the full cost for O & M of any private connections.

2) Ensuring that community **sanitation structures and hygiene practices** are to the standard necessary to realize the full benefit of the water scheme - demonstrated by
- 100% of homesteads have constructed and use toilets
- 100% of homesteads engage daily in appropriate hygiene practices, including solid waste disposal

3) Ensuring that water sources are **environmentally protected** so as to provide SAFE water for the next generation

Note: RWSB #2 - Approval of Preliminary Design Report requires that the RWSB community development office (CDO) complete a Community Readiness Form. This form requires evidence that the community understands and is well on its way to meeting these responsibilities. *The Community Readiness Form will be reviewed in Chapter 4.*

3.5. Communities may need help in understanding and meeting their responsibilities.

Ideally, at this point in the process, RWSB and the Ministry of Healthy (MOH) will engage in a series of training activities aimed at 1) training communities so that they fully understand their roles and responsibilities, and 2) helping communities develop the capacity to fulfill their responsibilities.

However, due to national budget and logistic constraints, such training does not always happen or does not take place at the most appropriate time.

Communities should therefore be proactive about approaching NGOs or individuals with experience in their community to carry out training that will help them understand and meet their responsibilities.

As summarized from RWSB's "guidelines and procedures", communities shall:

- Participate in training programmes prior to, during, and after project implementation
- Participate in the project planning phase (associated with preliminary design)
- Where macro reticulated water schemes are provided, commit to remaining in the project area.
- Undertake to build homestead pit latrines as a prerequisite for the completion of water scheme interventions
- Participate fully in the selection of the WSSC and support the WSSC
- Provide unskilled labour or cash or both to the value of not less than 25% of the investment cost
- Take ownership of and responsibility for O & M of the water scheme and raise an O & M fund, including any compensation to water minders.

3.6. The Water Scheme and Sanitation Committee (WSSC) serves as a focus point to ensure that the community meets it responsibilities.

RWSB "guidelines and procedures" state that a WSSC is elected by community members to act as a focal point in mobilizing and coordinating the community to collectively plan, manage, and maintain their water schemes and sanitation facilities.

Ideally, RWSB and the Ministry of Health (MOH) will carry out a 1 day sensitize / awareness training for the community at large aimed at:

- Reviewing the guidelines regarding the key issues that should be included in the constitution for the Water Scheme and Sanitation Committee Constitution (WSSC)
- Explaining the roles and responsibilities of the WSSC and the selection process

At the end of this day, the community elects the WSSC that will replace the "interim committee". The community may either re-elect the existing committee or elect a totally new committee. Given that RWSB and the MOH have no direct influence over the election of the WSSC, this activity is conducted under the authority of the Umphakatsi,

Ideally, after the selection of the WSSC, RWSB and the Ministry of Health (MOH) will carry out a series of trainings for the WSSC, together with key community representatives:

3 training sessions of 5 days each
- 5 days during planning process (preliminary design)
- 5 days during construction period
- 5 days post project regarding operation and maintenance

Key community representatives should include a cross section of relevant sector players from the community (women, associations, leaders….) and a geographical representation (especially if the community is zoned i.e. Sigodzi)

Experience has shown that understanding of participants is greatly improved when training includes WSSC members from other communities who are at different stages in the process i.e. peer mentoring

In accordance with the WSSC constitution, the WSSC should oversee the collection of Operation and Maintenance (O & M) funds at the earliest possible time.
- The amount is usually set at SZL 100 / homestead - however this needs to be adjusted to cover the costs that the community is responsible for.
- The critical issue is “the number of homesteads who have paid” rather than the “amount of money in the bank account” - for example, if the M.P. pays for others, the balance in the bank account may benefit but this reduces community ownership
- Operation and maintenance costs continue after the construction phase so a “monthly user fee” will be required.
- The WSSC should deposit funds in a bank account designated specifically for the operation and maintenance of the water scheme.

The role of the WSSC can be summarized as follows:
- Interface with sector agency or organizations as the beneficiary community
- Convene meetings to discuss and resolve problems
- Brief the community on concerns affecting the water scheme
- Organize community contributions towards O & M of scheme.
- Keep records of payments and expenditures and report to the community
- Report to Chief and Inner Council on project progress
- Ensure the water scheme is properly operated and maintained, including supervising water minders
- Promote the construction of pit latrines by every homestead

Alignment with national standards:

Section 4.6. of the National Water Policy confirms the policy statements and proposed strategies to address issues of stakeholder participation and capacity building. The role of women in water management is addressed as a specific requirement - ***“The Water Sector shall strive to achieve gender balance in the development and management of water resources.”***

A communities' WSSC constitution can only provide for **Primary Water Usage** (as defined in the National Water Policy) - **or less than Primary Water Usage**.

For example, if water is limited or the community wants to extend coverage to a larger area, they might need to remove the ¼ HA farming provision provided under the definition of ***Primary Water Usage***. However, no community can go beyond the definition of ***Primary Water Usage***.

*Attachment #3.1 - Review the guidelines for Constitution for Community Water Supply Project (*Ref: Rural Water Supply Branch Design Standards - Volume 3, Section 2, Annex A)

3.7. So that the full benefit of the water scheme is realized, community sanitation structures and hygiene practices are required to be in place prior to the construction of a water scheme.

A water scheme (pipes, taps) will reduce the time and effort spent collecting water, but without sanitation structures and hygiene practices, the health benefits will not be realized.

Therefore, the majority of the community must understand and carry out
- Hygiene practices
- Latrine construction and use of - *the Ministry of Health, Environmental Health Department requires 80% coverage i.e. 80 of 100 homesteads have constructed a toilet*
- Solid waste disposal practices

Ideally, the MOH should carry out a 5-day Participatory Hygiene and Sanitation Transformation (PHAST) training for the community at large. The objective of this training is so that communities understand the underlying principles and benefits of hygiene practices and sanitation structures.

After PHAST, the community should start on the construction of toilets and rubbish pits
- Ideally, there should be 100% toilet coverage prior to the construction of a RWSB scheme
- However, RWSB will start on a water scheme if there is at least 80% coverage
- By already having good coverage of toilets, a community's application to RWSB will be well more likely receive a faster response.

Prior to applying to RWSB, a community can motivate for assistance from the Ministry of Health (MOH) for assistance in the construction of toilets. This can be done through their closest Health Centre (clinic, centre, hospital) who will refer them to the Environmental Health Officer[21].

When funding is available, the MOH may supply -
- Vent pipe
- 2 bags of cement for the 1 x 1 M slab
- 2 iron sheets
- Blocks for lining of pit (if needed, depending upon the type of soil)

The MOH is not obligated to provide these supplies; however, when funds allow, as a strategy to support communities who have shown they are motivated, the MOH does from time to time provide these supplies.

3.8. Summarized, community responsibilities towards rural water supply are associated with the three interlinking components of i) operation and maintenance, ii) sanitation structures and hygiene practices, and iii) environmental protection of community water sources.

Community responsibilities are associated with **three** interlinking sectors	National standard requirements
1) Operation and maintenance of their water scheme - as evidenced by A fully functioning Water Scheme and Sanitation Committee (WSSC) that was elected through proper procedures to carry out tasks in accordance with its constitution that was approved at community level The majority of the homesteads understand the need for, and continue to contribute to, Operation and Maintenance funds: • ***Construction costs*** - 25%, through the provision of labour, local materials, and cash contributions • ***All minor repair costs*** - in accordance with the policy of the RWSB, the community is responsible for conducting minor repairs on rural water supply schemes in Swaziland and the costs associated (100%), including any compensation for water minders. • ***Major repair costs*** - in accordance with the policy of the RWSB, the community is responsible for at least 50% of the material costs of a major repair and the full cost for O & M of any private connections.	Guidelines for - Constitution for Water Scheme and Sanitation Committee (WSSC) • Elected by 60% of the community • Term of office 3 to 5 years. • Gender balance in WSSC The WSSC constitution can only provide for **Primary Water Usage** (as defined in Water Policy) - **or less than Primary Water Usage** (for example, if water is limited or the community wants to extend coverage to a larger area, they might need to remove the ¼ HA farming provision provided under the definition of ***Primary Water Usage***. However, no community can go beyond the definition of ***Primary Water Usage***. Constitution signed by all people required to do so Designated bank account for WSSC Collection procedures laid out in constitution are being followed At times, RWSB will **<u>consider assisting</u>** with major repairs <u>where schemes have been constructed to standard</u>.
2) Ensuring that **sanitation structures and hygiene practices** are to the standard necessary to realize the full value of the water scheme- as evidenced by • 100% of homesteads have constructed and use toilets • 100% of homesteads engage daily in appropriate hygiene practices, including solid waste disposal	Construction of the water scheme can begin after 80% of the homesteads have constructed a toilet
3) Ensuring that water sources are **environmentally protected** so as to provide SAFE water for the next generation (refer to Chapter 8)	No national standards articulated, however there are already various laws and traditional considerations addressing for example burning of grazing land… however these need to be enforced

3.9. Community mobilization will most likely take 12 months or more, the key issue is how fast the community provides <u>tangible evidence</u> of fulfilling its

responsibilities (actions on the ground instead of just promises that they will do it).

This evidence will help fast track the application through the next steps in the RWSB process and make it easier for external sources to consider funding.

Activity #3.2 - Ask participants to review the photos at the end of this Chapter.
For each photo, does the picture represent "a People or a Technical or a Money Problem"? *If you were a donor, would you provide funding to these situations?*

Chapter 3
Understand that the goal is SAFE water

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. Do you think that RWSB's step-by-step process is useful or not? Explain your answer.

2. How often do you attend meetings called by the WSSC in your community?

3. What characteristics do you think people should have to be elected to be on the WSSC? What characteristics have you previously used to elect people?

4. If one person, all by himself, were to build a water scheme for your community, would you like this? Explain your answer.

5. Would you be happy if government fully took over the construction and maintenance of rural water schemes, in exchange for increased taxes?

CONSTITUTION FOR COMMUNITY WATER SUPPLY PROJECT

Community Name: _____

Region: _____

Address: _____

Area: _____

Date Established: _____

Contact Person: _____ Tel: _____

Bank Name: _____

Branch: _____

Bank Balance: _____

OBJECTIVES AND GOALS

The goal is to work as an Association during the implementation and after the installation of the water supply project. Together as a Community Association, we will maintain this system from this date forward.

REGULATIONS FOR THE CONSTITUTION

- All officials of this Community must be elected by 60% majority vote by the members.
- All officials elected will sign their names to uphold all rules and regulations of this Constitution.
- Local Chiefs and Indunas will be made aware of all activities of this Community and must sign stating they have been informed and they support all activities of the Community.
- All maintenance personnel must be elected by 60% majority vote by the members.
- All amendments to this Constitution must have 60% majority vote by the members.
- All fees set in this Constitution, must have 60% majority support by the members.
- All elected posts mentioned in this Constitution will be for 3 to 5 years terms.
- At anytime, a vote of confidence can be called by 60% of the members.
- If the vote is yes (a no confidence vote), the community will hold new elections within the month.
- All members must have access to a copy of this Constitution.
- All members must sign stating that they are aware of all rules and regulations of this Constitution and abide by all of these rules and regulations.

RULES OF THE COMMUNITY

- All members must attended all meetings or be fined E.....
- All members are expected to pay E.....to join this Community.
- Receipts will be given for all fees collected by the water and sanitation Committee.
- All members are expected to keep their receipt for proof of payment.
- Joining fees have to be set from Recommendations of RWSB in the amount of E.....
- All fees must be deposited into the maintenance fund.
- All members are expected to attend and meet all community work efforts or be fined.
- All members are expected to pay fines or forfeit all rights to the use of the water system.
- All members are to assist in the efforts of maintenance, during construction of the project at the affordable cost of the Community.
- Pay for water consumed from metered private connections

COMMUNITY RESPONSIBILITIES

- Complete all trenching to RWSB standards.
- Complete all backfilling to RWSB specifications.
- Transport all materials as needed.
- Security of all materials.
- Fenced structures should be kept clean and maintained as necessary.
- If other duties are found to be necessary by RWSB, RWSB will inform the committee and the community will be responsible for these duties.
- It is the responsibility of the community to be fully aware of the rules and regulations of this Constitution.
- It is the responsibility of the community to pay the cost of the water minder for maintaining the water supply system; the community members are also responsible for the material or parts to be used for any repairs.
- The Community is responsible for the purchase of the tools to be used by themselves during construction and for maintenance work.
- Any person or family found damaging any part of the water system will be liable for these damages by the water and sanitation committee.
- It is the responsibility of the community members to elect a disciplinary committee to handle all problems created by community members.

- All problems will be reported to the local chief for the traditional courts to decide on further punishment.
- It is the responsibility of the community auditors to resolve any queries regarding mismanagement of community funds. The treasurer will provide detailed records of all fees collected.
- Allow water meter readers access to water meters situated on private connections.

The treasurer will also provide all records on any transaction for which the community money was used. Any queries that cannot be resolved must be reported to the local police and local chief for prosecution.

DUTIES OF THE MAINTENANCE TEAM

- Repair all broken pipes, taps, tanks, fence, and any attached to the water system which may cause the water system not to operate properly.
- Advise the committee of possible problems with the water system of the community which could endanger the water system as a whole.
- Supervise all community work efforts and report to RWSB depot.
- Monitor all future connections to the existing water system.
- Read all water meters and complete meter reading records.

GENERAL UNDERSTANDING OF AMENDMENT

- All internal community problems must be addressed immediately. If the community cannot solve the problems, the community must accept a solution from RWSB.
- Before RWSB comes for construction purposes, a camping site should be arranged.

RWSB RESPONSIBILITY IS AS FOLLOWS:

- Liaising with donors on projects
- Designing
- Implementing Project
- Guiding community water and sanitation committee, assisting on formulation of project Constitution, and training of community maintenance team.
- Delivering material to site
- Controlling the community work force

It will be the general understanding between the community and RWSB that if any of these defined conditions are not met there will be the possibility of project cancellation. It will also be the general understanding that all rules and regulations of the Constitution that have been broken by the community will lead to cancellation of the project. All conditions have been read and understood by all community members and water and sanitation committee.

Chairperson: _____ Date: _____

Secretary: _____ Date: _____

Treasurer: _____ Date: _____

Chief: _____ Date: _____

COMMITTEE POSITIONS AND DUTIES:

Chairperson Name: _____

It is the responsibility of the chairperson to head all meeting. It is the responsibility of the chairperson to speak for the committee and the members at all meetings. It is the responsibility of the chairperson to liaise with RWSB on all funding and work efforts. It is the responsibility of the chairperson to up-hold all rules and regulations of this Constitution.

I, _____swear to up-hold the Constitution to the best of my ability and carry out all chairperson responsibilities.

Signature: _____ Date: _____

Co-Chairperson Name: _____

It is the responsibility of the Deputy Chairperson to assist all efforts of the Chairperson especially when the chairperson especially when the chairperson is unable to attend meetings.

I, _____swear to up-hold the Constitution to the best of my ability and carry out all chairperson responsibilities.

Signature: _____ Date: _____

Secretary Name: _____

It is the responsibility of the secretary to record all minutes of every meeting held by the Association. It is also the responsibility of the secretary to work with the committee and assist in all efforts of the committee.

I, _____swear to up-hold the Constitution to the best of my ability and carry out all my responsibilities.

Signature: _____ Date: _____

Treasurer Name: _____

It is the responsibility of the treasurer to collect all feed and fines and to deposit the money into the maintenance fund. It is also the responsibility to work with the committee and assist in all efforts of the committee. Receipts must be given for all funds collected. Must record all funds collected and make these recordings available to community auditors upon request.

I, _____ swear to up-hold the Constitution to the best of my abilities. I also swear to protect all funds collected to the best of my ability.

Signature: _____ Date: _____

Committee Members

It is the responsibility to the committee members to assist the Chairperson decides policy and resolve problems.

Name: _____

Signature: _____ Date: _____

Name: _____

Signature: _____ Date: _____

Community Auditors

Name: _____

Name: _____

LOCAL LEADERS PLEDGE OF SUPPORT

I, _____, Chief of this area, hereby pledge my support for this Association. I am aware of all efforts being conducted in this community. I have read the Constitution and will assist in any way I can.

Signature: _____ Date: _____

I, _____, of this community hereby pledge my support for this Association. I am aware of all efforts being conducted in the community. I have read the Constitution and will assist in any way I can.

Signature: _____ Date: _____

COMMUNITY ASSOCIATION MEMBERS

All members are required to sign their names stating that they are fully aware of all rules, responsibilities, and regulations in this Constitution. All members are called upon to swear to up-hold the Constitution and abide by all its rules and regulations and support their elected officials.

Homestead	Number of people at homestead	Full name	Signature of Head
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			

Chapter 4
RWSB *Preliminary Design and Design requirements*

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Community X

5 years ago Community X constructed their water scheme. It had 20 communal standpipes. However because the Chairman of the WSSC worked so during the construction phase, 1 standpipe was put direct at his homestead. Four other families also paid for private connections. Now 8 more families would like to do the same.

- If they are allowed to do so, how will this affect the Quantity, Quality and Reliability of the water for the community at large?

Community Z

15 years ago 10 homesteads in Community Z protected a small spring that provides water to 2 stand pipes. Each homestead has been able to draw 50 litres of water each day. As their children are now building homes and having grandchildren, they have since added 3 more stand pipes.

- Do you agree with their actions? Explain your answer

Who do our children belong to?

Tekatakho Primary School received funding for a water project. The water was for the school only. Parents thanked the donor and all who helped to secure the funding. During project construction some parents took their children to other schools further away, because they said the work of digging the trenches was too hard.

Have you ever witnessed this?
Do you support the action of these parents?

Chapter 4

RWSB *Preliminary Design and Design requirements*

Chapter Outline

4.1. Construction of domestic rural water schemes in Swaziland must follow a step-by-step process that requires RWSB approval of both the Preliminary Design (PD) and Final Design.

4.2. Preliminary Design is a step-by-step process that starts by calculating the Demand for water and the Supply of water.

4.3. Calculating the Demand for water requires:
- 4.3.1. Setting a design period
- 4.3.2. Suggesting the extent of the supply area
- 4.3.3. Establishing community boundaries
- 4.3.4. Determining the location and number of homesteads
- 4.3.5. Counting the current population and estimating the future population
- 4.3.6. Determining the levels of service and the service level distribution, both now and in the future
- 4.3.7. Taking into account the maximum daily demand, the peak flow, and the number of users per water point
- 4.3.8. Factoring in all other demands on water

4.4. Calculating the Supply of water requires:
- 4.4.1. Identifying all of the potential water sources available to the suggested supply area
- 4.4.2. Measuring yield
- 4.4.3. Taking into consideration topographic restraints
- 4.4.4. Measuring water quality

4.5. The next step in Preliminary Design is to determine and assess ALL possible configurations that will balance WATER DEMAND with WATER SUPPLY - *within the criteria laid out in the National Water Policy and Integrated Water Resources Master Plan.*

4.6. Given that technical, environmental, people, and financial issues all need to be taken into account, Preliminary Design ALWAYS requires compromises.

4.7. Preliminary Design is about determining the best configuration that will balance the Water Supply with the Water Demand, so as to provide the most benefit for the least disadvantage.

4.8. The Preliminary Design process is critical for the successful outcome of any water scheme, yet for a variety of reasons, most communities do not actively engage in it.

4.9. The Preliminary Design Report must follow RWSB's outline, include the Community Readiness Form, and be submitted to RWSB for approval, prior to developing the detailed design.

4.10. Government reserves the right to require a permit of usage that should be applied for only after the Preliminary Design is approved and prior to developing the detailed design.

4.11. A Final Design Report must be prepared and submitted to RWSB for approval.

4.12. Depending upon the type of scheme, an Environmental Compliance Certificate may be needed.

4.13. Government may sign a Memo of Understanding with an implementing agency to oversee the Preliminary Design and Design process.

4.14. From the Letter of Request to Approval of the Final Design, it is not unusual for it to take one, but more likely, two years.

4.15. Low cost practices can decrease WATER DEMAND and increase WATER SUPPLY.

Chapter 4
RWSB *Preliminary Design and Design requirements*

4.1. Construction of domestic rural water schemes in Swaziland must follow a step-by-step process that requires RWSB approval of both the Preliminary Design (PD) and Final Design.

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
Phase B	**Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures***	
Chapter 3	1) Letter of Request	
Chapter 3	2) RWSB Assessment	**RWSB #1 - Approval of Need for Project**
Chapter 3	3) Community mobilization Sensitize, awareness, and training activities with the objective 1) for communities to understand that they are the owners of the water system, and 2) for communities to develop the capacity to fulfill their responsibilities	
Chapter 4	4) Preliminary design (PD) The Preliminary design report includes the Community Readiness form (filled in by the Community Development Office (CDO) of RWSB after discussions / observations with the community)	**RWSB #2 - Approval of Preliminary Design report MOU signed between RWSB and the implementing agency**
Chapter 4	5) Final design report	**RWSB #3 - Approval of Final Design report, including Environmental Compliance Certificate**
Chapter 5	6) Fundraise for water scheme construction	
Chapter 5	7) Construction of water scheme	**RWSB # 4 - Approval of Constructed schemes, resulting in Construction Completion Certificate**
Phase C	**After the Project Development Phase - *Community Responsibilities***	
Chapter 6	8) Operation & Maintenance • Community - preventative maintenance • With possibility of some assistance from RWSB for major repairs	
Chapter 7 Chapter 8	9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water system construction.*	

4.2. Preliminary Design is a step-by-step process that starts by calculating the Demand for water and the Supply of water.

Step 1 - Calculate **DEMAND** - *how people hope to use the water i.e.) THEIR WISH LIST*

Step 2 - Calculate **SUPPLY** - *gather information on all water sources accessible to the area*

Step 3 - **Determine all possible configurations** - *i.e. all the different possibilities that will balance Supply and Demand*

Step 4 **- Preliminary Design** - *what configuration provides the most benefit - within the realities of financial, environmental, technology and people issues - for the least disadvantages?*

Activity #4.1 - Visually demonstrate by using a scale, or drawing a scale
• *While going through the contents of this chapter, use the scale to visually show how each issue will either increase or decrease the Supply and Demand.* • *Use the scale to visually demonstrate how the final design has to be a configuration that ensures that Supply > Demand.*

Information about both Demand and Supply must be based on **facts** - for example, instead of estimating the total number of people, this should be known; and the flow rate of each potential water source should be measured, not guessed.

Preliminary Design must also take into consider:

Financial issues	For example - even if the construction costs of supplying water from a borehole might be cheaper, does this community have the capability to pay the pumping costs? For example - would the savings in construction costs allow RWSB to construct a second water scheme for another community?
Technical issues	For example - is a slow sand filter the most effective way to clean the water in this particular situation?
People issues	For example - does this community have the capacity to operate and maintain a scheme that requires additional pumping?
Environmental issues	For example - will the location of the intake contribute to more erosion? For example - although this community has enough water for private connections, only 10 of the 100 homesteads has a toilet structure.

Preliminary Design ALWAYS requires compromises. A community will never get everything they are hoping for i.e. THEIR WISH LIST.

4.3. Calculating the Demand for water requires:

4.3.1. Setting a design period - Currently, RWSB uses a 10-year design period, taken from the year in which the scheme is to be constructed.

The restriction of planning for a 10-year period is to prevent some schemes being built to cater for water supply to a few communities for an extended period***. Instead, a 10-year design period spreads funds to a wider range of communities (national needs before community wants).***

This does not mean that a constructed system has a service life of 10-years. The actual service life of a water scheme will depend entirely on the level of maintenance and the population growth rate.

4.3.2. Suggesting the extent of the supply area - After the Water Supply and Sanitation Committee (WSSC) is selected they will suggest the extent of the supply area in consultation with the benefiting community. Institutions and commercial users within this area will be incorporated on a case-by-case basis.

This does not guarantee that the supply area suggested by the WSSC will be the final service delivery boundary. At this stage in the process, communities need to understand that the suggested supply area reflects only their hopes and wishes. The outcome of the Preliminary Design process will give an estimated service delivery boundary, which will be further defined by other considerations such as funding.

4.3.3. Establishing community boundaries - Within the suggested supply area, community boundaries (Chiefdoms and Sigodzi) should be marked on an ortho-photo map of 1:10,000 scale.

When doing so the following types of social structures should also be marked on the map:
- Shops
- Dipping tanks
- Social structures such as preschools, schools, clinics, churches
- Business areas
- No-go areas like burial sites and grazing land

Activity #4.2 - Ortho-photo map of 1:10,000 scale
Have available an ortho-photo map of 1:10,000 scale *Also show Goggle Earth and a range of maps as this will help participants see the degree of information about their community available from maps and mapping*

4.3.4. Determining the location and number of homesteads - within the suggested supply area

- Mark the location of homesteads on an ortho-photo map of 1:10,000 scale - *or use a Global Positing Unit (GPS) later downloaded onto a map*
- Number and name the homesteads - record the name of each homestead, in a manner that will provide a Master List as this information will also be needed for the collection of operation and maintenance funds.

- It is suggested that the following information be collected and compiled in a Master spreadsheet or list:
    - Head of Homestead
    - Person in Charge
    - Number of Kitchens
    - Confirmation of Chiefdom - *Chiefdom information is best collected at two levels, i) related to the geographic location of the homestead, and ii) related to the Chiefdom of the person, as indicated on their PIN*
    - Number of people who stay at the homestead
    - Number of people who regularly visit the homestead (this gives an indication of people who may move back, for example, someone working in Mbabane).
    - Note: To avoid confusion, for females, it is best to record both the Parental and Marital surnames.

4.3.5. Counting the current population and estimating the future population

- ***Present population*** - either an exact count of people or calculate on an average of 10 people per homestead (this is the figure used by RWSB)

- ***Estimated future population*** - the present population x an estimated growth rate (present and future)***.***

  Current estimated growth rates used by RWSB (revised by RWSB after each census) are:
  - If no urban centre within 5 km - use growth rate of 2.9%
  - If urban centre is located within 5 km - use growth rate of 4.5%

  The different growth rates are based on experience i.e.) once a water scheme has been provided in a community, people are more likely to stay and additional people are more likely to move in, particularly if the community is located close to an urban centre (It is cheaper to live outside of an urban centre).

4.3.6. Determining the levels of service and the service level distribution, both now and in the future.

Water demand increases according to the level of service:

Level of service	Daily water demand Litres / person / day
Hand-pump	15 litres / **unit** / day
Communal standpipe	
Walking distance of 1,000 M or more	10 litres / person / day
Walking distance of 500 - 1,000 M	15 litres / person / day
Walking distance of 250 - 500 M	20 litres / person / day
Walking distance of less than 250 M	30 litres / person / day
Private connections - yard tap	45 litres / person / day 450 litres / home / day
Private connections - house connection	80 litres / person / day 800 litres / home / day
Schools	15 litres / student / day
Boarding school	45 litres / student / day
Institutional houses (teachers, nurses)	500 litres / house / day
Clinics	15 litres / patient / day 80 litres / bed / day
School gardens - ***non permaculture style***	2,000 litres / hectare / day
Store	15 litres / visitor / day 15 litres / employee / day
Church	15 litres / person / day
Chief's Kraal	600 litres / homestead / day
Inkhundla Centre	2,000 litres / Centre / day

Service level distributions - RWSB standards allow for a set % of the population to have house and yard connections, as indicated:

Connection type	% of population served
Communal standpipes	50% of the total homesteads
Yard connection - *provided the connection is paid for by the homestead*	30 % of the total homesteads
House connection - *provided the connection is paid for by the homestead*	20% of the total homesteads

However, before allowing this, a community must understand that after the construction period, every time a homestead upgrades from a communal standpipe to a House / Yard connection - even if that homestead pays for their own connection - *this will change the balance between the WATER SUPPLY and the WATER DEMAND for the entire system.*

Walking distance associated with communal standpipes - the walking distance is defined as the distance from the homestead to the water point as normally walked. RWSB standards design for the following walking distances:

Type of scheme	Micro	Macro
Walking distance - *current planning*	1,000 M	200 M
Walking distance - *for full coverage, as per Government's goal*	200 M	200 M

4.3.7. Taking into account the maximum daily demand, the peak flow, and the number of users per water point -

- ***Maximum daily demand*** - for rural water schemes in Swaziland, this should be equal to the average daily demand. This assumes little or no variation in water usage throughout the year.

- ***Peak flow*** - is the peak demand due to many consumers simultaneously using water at specific hours of the day. The peak hourly demand determines the required capacity of the distribution system.

  In rural areas - the majority of water is collected from 6 a.m. to 8 a.m. and again from 3 p.m. to 7 p.m. i.e.) when all taps are in use simultaneously

Distribution systems in rural water schemes in Swaziland should be designed to cater for a peak flow that results from 15 litres per minute per standpipe - in conjunction with the average daily flow rate calculated for each commercial and institutional user:

1 tap supplies an area of 200 M radius at 15 litres / minute (0.25 litres / second)

In Swaziland rural water schemes, no other peak factors should be applied to determine the peak flow within a distribution system.

Number of users per water point - the number of users per tap should be restricted to 70 people. Given this, on average, there will be about 5 to 8 homesteads within a 200 M radius of standpipes.

Where two taps are required, they must be at separate locations and not provided on the same standpipe (so as to reduce the time spent standing in line at the water tap).

4.3.8. Factoring in all other demands on water -

- ***Irrigation*** - demand is calculated within the definition of Primary Water Usage only

- ***Live stock demand -*** demand calculated within the definition of Primary Water Usage only

Remember - RWSB standards define ***Primary Water Usage*** as the use of water for:
- Domestic requirements - water intended primarily for human consumption but which has other domestic purposes such as cooking.
- Sanitation - washing of body and clothes
- The watering of animals not exceeding 30 head of cattle
- The irrigation of land not exceeding one quarter hectare (25 M x 25 M) adjoining or occupied with a homestead of not more than 10 persons i.e. average size of homestead.
- Primary use does NOT include the use of water by a local authority for distribution to the inhabitants of the area (for example, the Water Services Corporation).

Exception) SWADE has been granted a bulk allocation so domestic water schemes developed under the mandate of SWADE may have a provision for irrigation beyond this definition. However, this is the exception rather than the rule.

- ***Water losses -*** a 20% loss allowance has been factored into the unit water consumption rates used by RWSB. This allowance covers standard maintaining tasks such as the flushing of pipelines and storage tanks.

Beyond this, anytime there is considerable leakage or unauthorized usage along the system - either people tapping into the system on their own or using water for irrigation beyond what is allowed under Primary Water Usage, the water demand can raise by 30 - 50%. The result will be that the Water Demand will become great than the Water Supply.

4.4. Calculating the Supply of water requires:

4.4.1. Identifying all of the potential water sources available to the suggested supply area - all water sources available to the suggested supply area should be located and assessed.

Communities should not pre-select but instead they should be free to show the technical person all of the possible water sources. Accessible in close proximity to the community may be an advantage, but is not the only factor to take into consideration. For example, a close by water source of poor quality water may be more expensive to develop compared to a clean water source further away.

4.4.2. Measuring yield - Water yield is calculated from flow rate. It is a measure for quantity and reliability.

- ***Quantity -*** the capacity of the source must be sufficient to cater for the future water demand, taking into consideration population projections. In some situations, it is possible to join several water sources into one intake.

- ***Reliability of the source -*** what is the flow of the source over a 12-month period? What storage is required to ensure that flow will meet demand throughout the year, and throughout a day (in Swaziland, the lowest flow rate is in September - historical flow rate is also important as this reflects the normal differences in rainfall received each year)

A water scheme is designed on the estimated yield of the water source so it is essential to have a high confidence in this estimation.

This estimated yield must be based on seasonal variations that cover at least a 12-month period. Flow rates should be done in April (end of the summer rains) and September (end of the dry months).
- Streams - flow rates should be measured using a V notch installation
- Borehole - after the borehole has been drilled, a pump tested is required (if the borehole was drilled a year or more previous, another pump test must be done before designing)

Ideally, the historical flow rates observed by the older people in the community should also be taken into consideration.

4.4.3. Taking into consideration topographic restraints - Topographic restraints such as deep valleys, rock outcrops, marshy areas, and sensitive areas such as graveyards within the supply area should also be indicated on the ortho-map.

4.4.4. Measuring water quality - quality of the water must be measured as part of the Preliminary Design process

Currently, water quality testing is done by Rural Water Supply Branch (RWSB) laboratory and Water Services Cooperation laboratory. However it is critical that the person collecting the samples uses the correct bottle, knows the proper procedures to do so, and that samples are brought for testing within the required time period after collection. For this reason, both laboratories prefer to collect the samples themselves.

Attachment #4.3 - Example) Rural Water Quality Results Sheet for Besutfwini 2

- ***Are treatment options affordable for the community*** - although treatment options are available, are these affordable to the community - both in terms of cost and management capabilities?

- ***Sustainable water quality -*** the water source should be in an area where it can be protected from future developments that might pollute the catchment area.

  The catchment area is all the land above the water source from which rain water flows downhill into the water source. Examples of contamination include cattle grazing.

In general, the order of preference for water schemes is:

Type of water source	Advantages	Disadvantages
1 - Springs	Generally requires little or no treatment (other than sand filtration) Often gravity feed	Dependent on yield Not always available
2 - Boreholes	Generally requires little or no treatment	Drilling costs Operation costs
3 - Surface water	Should be used only in situations where by demand requires a larger quantity of water and treatment is feasible - for example, in town under the management of Water Services Corporation	Requires treatment

4.5. The next step in Preliminary Design is to determine and assess ALL possible configurations that will balance WATER DEMAND with WATER SUPPLY - *within the criteria laid out in the National Water Policy and Integrated Water Resources Master Plan.*

In doing this, the following factors need to also be taken into consideration:

Level of operation and maintenance that the scheme will require	For example - does the community have the ability to pay for the operating costs required of this type of scheme? Does this community have the capacity to carry out the required maintenance for this type of scheme?
Reliability of the water source	For example - are the historical flow rates and low level (Sept) flow rates reliable enough for a water scheme?
Quality of water source	For example - is the required treatment within the financial and technical capacity of the community to maintain?
Ecological considerations	For example - can the down stream flow requirements still be meet? Will the construction of the water scheme at the water point suggested increase erosion?

Design criteria embedded in the National Water Policy and Integrated Water Resources Master Plan include:

- **Cost Recovery** - the extent to which monthly user fees are able to generate the necessary revenue to recover costs of provision *i.e. monthly user fees are for paying for the costs associated with delivery of water (repairs to pipes and taps, pumping costs), and not for paying for the water itself.*

- **Least cost planning** - process of planning that aims to find the least expensive configuration of meeting a demand for water for any particular use

- **Integrated water resources management** - a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare i.e. “the value gained per drop of water used”

- **Water demand management -** the use of price, quantitative restrictions and other devices (for example, leakage detection and control) to reduce the demand for water

- **Integrated water resources utilization -** refers to the need to balance all aspects of water usage (refer to Chapter 2).

4.6. Given that technical, environmental, people, and financial issues all need to be taken into account, Preliminary Design <u>ALWAYS</u> requires compromises.

It is necessary to keep an open mind about ALL options - even those options that a community did not originally think about.

No design is without its advantages and disadvantages - for example) while the community originally might have preferred a Macro system, perhaps several Micro systems might be the better option?

<table>
<tr><td colspan="2">Micro systems -
• Point source supplies such as bore holes with hand pumps, or protected springs, or collection tanks with up to 4 communal standpipes.
• Maximum walking distance of 1,000 M</td><td colspan="2">Macro systems -
• Powered system such as submersible pumps, gravity systems, or point sources with collection tanks supplying more than 4 communal standpipes.
• Maximum walking distance of 200 M</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td><td>Advantages</td><td>Disadvantages</td></tr>
<tr><td>Easier to maintain as fewer people</td><td></td><td>Coverage of possibly all community</td><td>More complicated to design and maintain</td></tr>
<tr><td>Cheaper to construct</td><td>Coverage of homesteads less</td><td></td><td>People issues are greater</td></tr>
</table>

Of critical importance is that once constructed, the scheme ***matches with the community's capacity to operate, maintain and manage for many years to come.***

Community water scheme options should be seen as a continuum, phasing in higher levels of service <u>in relationship to growing community capacity and the ability - and willingness - to pay</u>

Attachment #4.4 - Review RWSB Table 1.4 <u>Community water supply options</u>

It is important to understand government's priority is communal standpipes within 200 M for everyone. Donors target their support to meet the **basic needs** of the majority, instead of the **wants** of a smaller group.

To moving along the continuum from unprotected traditional sources to house connections, you community can:

- Increase the Quantity, Quality, and Reliability of the water sources in your community through maintaining ground cover (ref to Chapter 8), and
- Increase the capacity of your community to operate and maintain community water supplies.

4.7. Preliminary Design is about determining the best configuration that will balance the Water Supply with the Water Demand, so as to provide the most benefit for the least disadvantage.

Balance WATER DEMAND with WATER SUPPLY Within the national standards For the most operational simplicity And the most functional and efficiency of maintenance

4.8. The Preliminary Design process is <u>critical</u> for the successful outcome of any water scheme, yet for a variety of reasons, most communities do not actively engage in it.

Challenges associated with community engagement during Preliminary Design include:

- Most people do not understand the requirements of the preliminary design process and therefore how critical this stage is.
- The questions asked during preliminary design can raise expectations in the community - by gathering certain information, some people believe that "this will now be done".
- Preliminary design requires the services of professionals that cost money or take time (remember that RWSB has to provide services to all of Swaziland).
- Some community members withhold information during the preliminary design process - thinking they can influence the outcome in ways that will bring more benefit to themselves
- Community members become frustrated with the time and effort that the preliminary design process takes - with little tangible results to show for their effort and time
- Many community members do not engage effectively in the preliminary design process - until they see pipes on site, and than they start to say all the things they should have said during the preliminary design process - but now it is too late.

How do you know that you don't know if you don't know?
This Community Information Guide serves as a strategy to help realize the <u>Kingdom of Swaziland's National Water Policy statement</u> - *Swaziland shall create an environment that enables all stakeholders (government, civic organizations, private sector and NGOs) to play a meaningful role at all levels of the management of water resources in the country*[22] To "***participate meaningfully***" all stakeholders must have an understanding of the key concepts, procedures, and requirements associated with sustainable management of water resources at community level - *within the requirements of the Kingdom of Swaziland.*

4.9. The Preliminary Design Report must follow RWSB's outline, include the Community Readiness Form, and be submitted to RWSB for approval, prior to developing the detailed design.

Attachment 4.5 - Review RWSB's required outline for the Preliminary Design (PD) Report
- *RWSB Design Standards: Volume 3 section 3.*

Attachment 4.6 - Review RWSB's - The Community Readiness Form - this must be attached to the Preliminary Design Report, together with the constitution for the WSSC.

4.10. Government reserves the right to require a permit of usage that should be applied for only after the Preliminary Design is approved and prior to developing the detailed design.

Currently, permits are not required for the use of water for primary purposes.

Permits are required for - 1) the use of water for other than primary purposes, 2) Drilling or sinking of boreholes and wells, 3) Abstraction of groundwater (as per the Water Act of 2003).

4.11. A Final Design Report must be prepared and submitted to RWSB for approval.

The Final Design Report includes a summary of the detailed design process *and includes design drawings and either a tender document or a material list.*

Attachment #4.7 - Review required outline for RWSB's Design Report
- *RWSB Design Standards: Volume 3 section 3.*

4.12. Depending upon the type of scheme, an Environmental Compliance Certificate may be needed.

The **Swaziland Environmental Authority Act (1992)** has the power to:
- Establish standards and guidelines related to pollution of the air, water, and land
- Establish guidelines for the preparation of environmental impact assessments
- Control all forms of environmental pollution caused by the discharge of toxic wastes.

These guidelines make it mandatory that the proponent makes the public aware of the intended project, and that there is full public participation. ***An environmental impact assessment report is a requirement for the issuance of an Environmental Compliance Certificate (ECC), without which no project - including any proposed water supply scheme - can be allowed to commence.***

Attachment #4.8 - Example of an Environmental Clearance Certificate (ECC) issued by SEA

4.13. Government may sign a Memo of Understanding with an implementing agency to oversee the Preliminary Design and Design process.

Both the Preliminary Design and Design process require an investment of time, effort and money. When carried out by technical professionals and staff experienced in community development, the process should build a relationship of trust with the community that benefits the process and thus the overall outcome.

Given this, switching between implementing agencies during the process for no good reason can be disruptive to the process.

For this reason, Government may sign a Memo of Understanding with an implementing agency to work with a community through the Preliminary Design and Design process.

This also ensures that a community does not "shop around" for an agency that does not bother itself with RWSB design standards and procedures.

4.14. From the Letter of Request to Approval of the Final Design, it is not unusual for it to take one, but more likely, two years.

The critical factor is how fast the community understands and full fills their responsibilities, how effectively the community engages with the technical people, and the capabilites of the technical staff.

However, even when these issues are all in place, Preliminary Design and Design are both still process that take time. Rushing through them will result in a water scheme that has continual problems.

4.15. Low cost practices can decrease WATER DEMAND and increase WATER SUPPLY.

Communities can use a wide variety of low cost practices that will take the pressure off their community water scheme.

4.15.1. Decrease their water demand - water demand refers to all of the ways a community needs / wants to use water. This includes water for agriculture use.

Yet all normal flow water in the major rivers of Swaziland has already been allocated[23], the rainy season is on average 5 of 12 months (42% of the year), and traditionally Swazi's did not group into villages. Coming these factors, it is not realistic to hope that every homestead will have (or have access to) irrigated fields. However, we can still:

- **Use farming practices that reduce the amount of water needed, for example:**
  - ***Conservation agriculture*** - reducing the tillage of soil reduces water loss, improves soil structure, and increases fertility (by protecting the organisms that break down organic matter into nutrients that roots can absorb).
  - ***Mulching*** - reduces water loss through evaporation (the traditional method of planting pumpkin with maize was an ideal example of "green mulching")

- ***Composting*** - increases soil texture so that the soil acts as a sponge, retaining water better.

- ***Watering directly to the roots*** (instead of watering the stems and leaves) - through the use of buried water bottles or drip irrigation. This saves water, promotes root development, and reduces diseases.

- **Reuse water** - for example, water used for washing dishes can be reused to water fruit trees. There are simple ways to filter gray water and of course, everyone should be careful to use only biodegradable washing products.

4.15.2. Increase the water supply -

- ***Maximize rainwater harvesting*** - most people appreciate the benefit of rainwater tanks yet few people collect rainwater to the maximum potential possible.

Attachment #4.9 - Rainwater harvesting calculations
• *Take the measurements of a roof and carry out the calculations. This will give you the maximum potential rainwater that can be collected from that roof.* • *The formula factors in variables that might reduce the full potential collection, as it uses the average annual rainfall and multiplies by 80% (x 0.8), instead of 100%.* • *From this exercise you will be able to accurately calculate the size and number of rainwater tanks that you can put on each roof.* • *This may still not be enough to get you through the entire dry season, but it will certainly extend the months you have water available.*

- ***Increase the amount of rainfall that stays in Swaziland*** - In Chapter 8, we will explain why up to 80% of the rainfall received in Swaziland is not staying in Swaziland.

Chapter 4
RWSB – Preliminary Design and Design Requirements

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. Your community is at the beginning stages of developing a water scheme. Babe Hlophe, who is a very vocal community member, suggests that the community does not need a qualified technical person, as this will cost a lot of money. What advice would you give Babe Hlophe?

2. Six months before the next elections, someone hoping to get elected purchases pipes and tells the community where to start digging. Would you join in the digging?

3. Make Dlamini's homestead is in the suggested supply area. However, after the Preliminary Design is finished, her homestead is outside the project area. How would you handle this situation?

4. Do you have the patience to actively engage in the process of water scheme development, knowing that the whole process may easily take several years?

5. Have you ever withheld useful information from a water committee or an engineer?

DEPARTMENT OF WATER AFFAIRS
MINISTRY OF NATURAL RESOURCES & ENERGY

P. O. Box 6201
Mbabane, H100
Swaziland

Tel: + 268 404 2929
Fax: + 268 404 2019

Potable Water Quality Results Sheet

Lab#
Location: Besutfwini 2.
Request Agency: Vusumnotfo NGO
Source: River

Date of Sampling: 11 /02/14
Date of analysis: 12/02/14

Parameters		WHO Guideline		Comments
PH		6.5.....8.5	7.23	Acceptable
TURB	Turbidity	25NTU	13	Acceptable
COL	Colour	15TCU	66	Not Acceptable
COND	Electric Conductivity	Not mentioned	34	Not Mentioned
SO_4	Sulfate	1000mg/l	6	Acceptable
CL-	Chloride	250mg/l	-	Not Done
NO_3	Nitrate as Nitrogen	50mg/l	7.5	Acceptable
NO_2	Nitrite	3mg/l	0.0295	Acceptable
Fe	Iron	0.3mg/l	0.08	Acceptable
Mn	Manganese	0.5mg/l	0.4	Acceptable
F-	Flouride	1.5mg/l	Nil	Acceptable
ALK	Alkalinity	500mg/l	35	Acceptable
HCO_3	Bicarbonate	Not mentioned	21.4	Not Mentioned
HARD	Hardeness	500mg/l	Nil	Acceptable
TDS	Total Dissolve Solids	1500mg/l	19	Acceptable
TC	Total coliforms	0/100mg/l	>100	Not Acceptable
FC	Faecal Coliforms	0/100mg/l	27	Not Acceptable

Ministry of Natural Resources and Energy, Laboratory of Rural water supply .DWA.

The Total Coliforms and Feacal Coliforms and the Colour in the water samples were found to be above the acceptable limit for the W.H.O. Potable Water Quality Standards, see the table above. Under normal circumstances both Total Coliform and Feacal Coliforms should be Nil or less

than one in potable water. The presence of the Total Coliforms in potable water indicates the possible presence of pathogenic (disease causing bacteria) and the presence of Faecal Coliforms indicates contamination that poses a potential health hazard. Disinfection using (HTH) Chlorine could be the necessary remedy or filtration using the slow sand filters may minimize the contamination. As for the colour it should be measured at 15 TCU.

Meshack Dlamini
Water Chemist

Table 1.4: Community water supply options

Step	Type of service	Water source	Quality protection	Water use (l/c/d)	Energy source	Operation & maintenance needs	Costs	General remarks
5	House connections	Groundwater[1] Surface water Spring	Good, no treatment Needs treatment Good, no treatment	100 – 150	Gravity Electric Diesel	Well trained operator; reliable fuel and chemical supplies; many spare parts; wastewater disposal	High capital costs High O & M costs Except for gravity schemes	Most desirable service level, but high resource needs
4	Yardtaps	Groundwater[1] Surface water Spring	Good, no treatment Needs treatment Good, no treatment	50 – 100	Gravity Electric Diesel	Well trained operator; reliable fuel and chemical supplies; many spare parts;	High capital costs High O & M costs Except for gravity schemes	Very good access to safe water; fuel and institutional support critical
3	Standpipes	Groundwater[1] Surface water Spring	Good, no treatment Needs treatment Good, no treatment	10 – 40	Gravity Electric Diesel Wind Solar	Well trained operator; reliable fuel and chemical supplies; many spare parts	Moderate costs and O & M costs. But low O & M costs on gravity scheme.	Good access to safe water; cost competitive with hand pumps at high pumping lifts
2	Hand pumps	Groundwater[1]	Good, no treatment	10 – 40	Manual	Trained repairer Few spare parts	Low capital and O & M cots; collection time	Good access to safe water; sustainable by villagers
1	Improved traditional sources (partially protected)	Groundwater[1] Surface water Spring water Rainwater	Variable Poor Variable Good, if protected	10 – 40	Manual	General upkeep	Very low O & M costs; (buckets, etc.); collection time	Improvement if traditional source was badly contaminated
0	Traditional sources (unprotected)	Surface water Groundwater[1] Springs Rainwater	Poor Poor Variable Variable	10 – 40	Manual	General upkeep	Low O & M costs; (buckets, etc.); collection time	Starting point for supply improvements

Source: Appropriate Technology Group, 1991

[1] That comply with the acceptable water quality requirements

PRELIMINARY DESIGN REPORT

CONTENTS

Also to be Attached:

WSSC Constitution
WSSC names and contact details
Letter from Umphakatsi

ASSESSMENT FOR COMMUNITY READINESS

COMMUNITY PARTICULARS

Name of community .....

Inkhundla .....

Region .....

Name of Chief .....

Name of Indvuna .....

Has the community been resettled? .....

REQUEST INFORMATION

Source and date of initial request .....

In your opinion does this request reflect the wishes of the majority of

the community? .....

Why?

.....

.....

.....

Number of homesteads .....

Estimated population .....

Number of schools .....

Number of clinics .....

RDA? (YES/NO) .....

Date of follow up request .....

COMMUNITY PROBLEMS/PRIORITIES

What does the community perceive as its needs/problems?

(a) .....

(b) .....

(c) .....

(d) .....

What does the community perceive as the most important development projects, in order of priority?

(a) .....

(b) .....

(c) .....

(d) .....

Can a water supply and sanitation project help solve any of the needs/problems?

YES?NO? .....

How/why? .....

.....

.....

.....

Has the community been involved in any projects that required community participation? YES/NO .....

If so, how was the participation organised?

.....

.....

.....

.....

.....

What was the nature of the projects in which the community participated before?

.....

.....

.....

Did the community contribute anything towards the implementation of these projects?

YES/NO? .....

If so, how were the contributions made? In cash or kind? Specify.

.....

.....

Was there any other external contribution to this project? YES/NO?

.....

How long did it take the community to complete these projects? Why do you think it took that amount of time to complete?

Project	Period	Reason for time taken

Were there any problems experienced in this project? YES/NO? .....

If so, describe the nature of the problems.

.....

.....

.....

.....

.....

How were these problems solved?

.....

.....

.....

Who had requested the previous projects?

.....

.....

Have there been any Government of Swaziland agencies assisting in previous projects? YES/NO? .....

If so, elaborate.

Project	Agency

Are the previous projects still operating in the community? YES/NO? .....

If not, explain why?

.....

.....

.....

.....

.....

.....

.....

What other projects are currently operating in the area?

Projects	External contribution	No external contribution

How were these projects identified and prioritised?

.....

.....

.....

Will the community still be able to contribute towards the new project? YES/NO?.....

If not, why?

.....

.....

Are there any active community committees/organisations in the area? YES/NO?.....

If yes, what are they?

(a).....

(e) .....

(f) .....

(g) .....

(h) .....

Do these committees co-ordinate with one another? YES/NO? .....

Are there any local artisans in the area? YES/NO? .....

List the major community activities in the area in any year?

Activity	Time of year

What is the major source of income in the community?

.....

.....

.....

.....

Is the income regular i.e. monthly or seasonal?

Regular .....

Seasonal .....

What are the most common diseases of the area?

.....

.....

.....

.....

How do you think the diseases can be prevented?

.....

.....

.....

What is the means of excreta disposal? .....

Why is this method used?

.....

.....

.....

What is the source of water supply?

.....

Is it protected? YES/NO .....

What is the estimated distance between the source and the homesteads?

.....

OVERALL ASSESSMENT OF COMMUNITY READINESS

High/Medium/Low .....

Reasons

.....

.....

.....

.....

If the community is apparently not ready, what are its requirements for demonstration of readiness?

.....

.....

.....

.....

PARTICULARS OF ASSESSOR

Name: .....

Designation: .....

Date: .....

DESIGN REPORT - TABLE OF CONTENT

CONTENTS

SWAZILAND ENVIRONMENT AUTHORITY

RHUS Office Park
Lot 195, Karl Grant Street
Mbabane

P.O.Box 2602
Mbabane, Swaziland
Tel: 2404 6960/7893 Fax: 2404 1719
Email: reception@sea.org.sz or ceosec@sea.org.sz
www.sea.org.sz

3rd March, 2014

Our Ref: SEA/PRJ/ 5.01

The Director
Vusumnotfo Community Based Organization
P.O Box 229
Piggs Peak

Tele/Fax: 2 431-4236
Mobile: 7624-8272

Dear Sir

RE: ENVIRONMENTAL CLEARANCE FOR THE PROPOSED CONSTRUCTION OF A CLEAN WATER SUPPLY PIPELINE FOR EMVEMBILI LUTHERAN PRIMARY SCHOOL IN THE HHOHHO REGION

We refer to your letter dated 06th February , 2014 submitted with the above subject for categorization and subsequent site inspection undertaken thereafter. In view of the scale, nature and associated environmental impacts of the proposed project we have assigned the project category one classification. As per the Environmental Audit, Assessment and Review Regulations, 2000 projects under this category are unlikely to cause significant environmental impacts if duty of care is always observed. You are therefore authorized to implement the proposed project subject to the following conditions;

a) Seek the advice and guidance of the Department of Water Affairs in implementing the project,
b) Ensure that the abstraction of water from the stream does not affect the ecology of stream,
c) Avoid pollution of the stream particularly during construction of the Catchment Intake Dam,

d) The project complies with all the country's building regulations, especially during the construction of the Catchment Intake Dam,
e) Safety and health precautions should be observed at all times,
f) Minimize impacts on the ecosystem. Habitats outside the designated areas must not be disturbed in any way. In this regard you are advised to consider using the old pipeline route instead of establishing a new one,
g) There should be minimal inconvenience to the neighboring residents,
h) The proponent should ensure that tree clearing is done responsibly and that protected tree species are avoided,
i) The introduction of any alien plants during landscaping and rehabilitation should be avoided,
j) You are further advised to remove any alien invasive plant species within, and in the immediate vicinity of the project site and along the pipeline route,
k) The project proponent should ensure that waste generated during construction and upon operations of the project is managed properly,
l) All work areas should be maintained and kept in neat and tidy conditions and fully rehabilitated on completion,
m) All disturbed land should be rehabilitated as soon as possible after the disturbing force has been removed,
n) This authorization does not supersede any other legal requirement that need to be met by this development,
o) Any unforeseen environmental issues arising during the implementation of the project should be reported to SEA immediately.

We look forward to your cooperation in this regard.

Yours sincerely

Stephen M. Zuke
EXECUTIVE DIRECTOR

RAINWATER HARVEST SYSTEM

Step – by- step

Step 1

Measure the area of the roof (catchment area)

Method for measuring roof catchment area
**The safest and simplest method thus far is the roof "footprint" method, which is described below:*

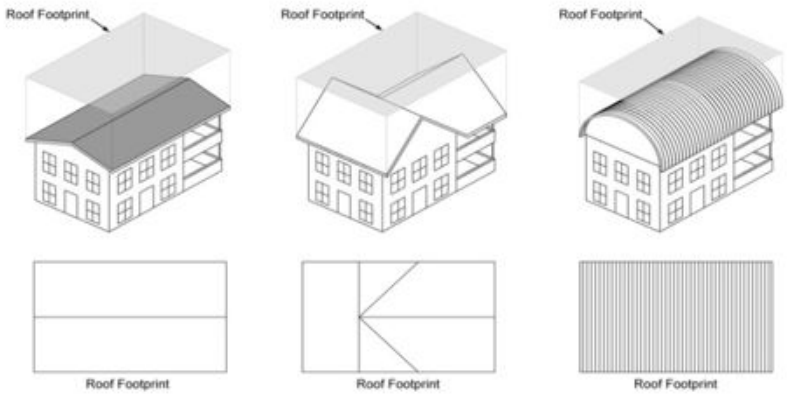


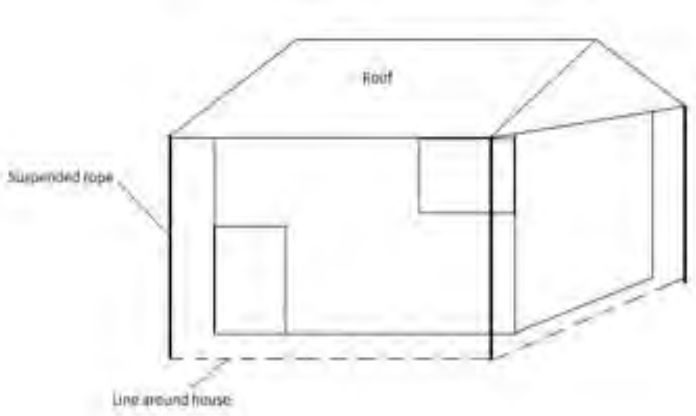
Figure 1: Roof footprints for buildings with various roof shapes.

Materials required:

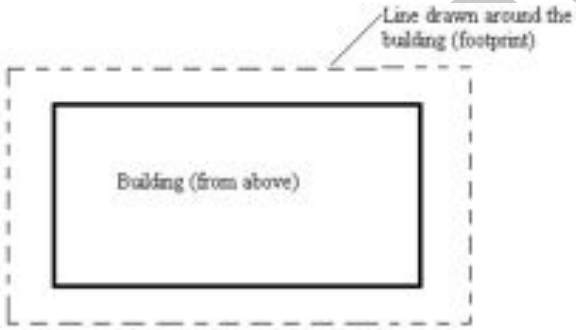
- Measuring tape
- Pieces of rope
- Step ladder
- Pen and paper
- Calculator (*optional)

Procedure

- Hold the rope vertically at the corners of the building from the outermost edge of the roof to the ground in order to be certain of how far the overhang extends.
- Use the rope as a guide to draw a line around the building to represent the overhang. **(See illustration below).**



- There should be lines marked on the ground a short distance from the buiding along the walls, in order to represent the roof "footprint".



- Measure the length and width of the "footprint". Record the values using the pen and paper.
- Using a calculator or pen and paper, multiply these dimensions (length X width) in order to obtain a value for the area (in m^2).

Step 2

Find the value for average annual rainfall. From a weather station or the internet, etc.

*Divide this value by **1000,** so that the value is in metres.*

Step 3

Use the Formula:

Roof catchment area X Average annual rainfall X 0.8 = Expected rainfall harvest

Multiply the value obtained by 1000.This is the estimated amount of rainwater that can be expected annually, **in Litres.**

Chapter 5
RWSB - *Project funding and Construction* requirements

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Community B

Community B had a water scheme that has been operating very well for about a year. Water was coming out of the tap of each standpipe fast enough for the whole community to get 30 litters per person per day. One day Sipho was on his way to school and saw a pipe slightly emerging from the ground.

Days passed by and the pipe seemed to be emerging a bit more each day so he decided to tell his mother about it. She immediately went to cover the pipe with dirt. Another boy had previously seen the same thing on a different spot. His father also went to cover the pipe.

One morning when Sipho went to collect some water from the stand-pipe, nothing came out but a hissing sound of air. His mother went to the reservoir on the hilltop to see if there was water in it. She saw a huge chocolate brown mess boiling somewhere in the middle of the reservoir, which told her that water was coming from below. She rushed back to ask other members of the community to come and help her fix the problem.

- What do you think is wrong with the water scheme? How do you suppose this can be fixed?

Babe Mtsetfwa

Babe Mtsetfwa is a Member of Parliament. He is a really nice man and people like him. He holds meetings once a week with the community where he listens to the people's views and helps them in anyway that he can. In one meeting a young man suggested the need to construct a community water scheme. He also mentioned an opportunity for a funding grant that included a 15% contribution from the community.

Once the young man finished, the house gave him a round of applause and nods of agreement. The MP gave it a little thought and then stood up. "Good words young man" he sounded his approval, "I understand how much people in our community need a water scheme so for that reason, since we have all been reminded that there are people in our community who can not afford to pay the required 15%, I will help fill up the missing sum." A roar of excitement filled the room in a defining crescendo.

- Do you think this project will be a success? Explain your answer.

Chapter 5
RWSB - *Project funding and Construction* requirements

Chapter Outline

5.1. Construction of domestic rural water schemes in Swaziland must follow a step-by-step process that requires RWSB approval of both Final Design and Constructed Schemes, resulting in a **Construction Completion Certificate**

5.2. Although external funding for the construction of water schemes can come from a variety of sources, it is aimed at "all people having access to a minimum of 30 litres of SAFE water per person per day at a distance of not more then 200 metres".

5.3. Regardless of the source of external funding, the national standards require communities to contribute at a set level.

5.4. External Funding can be provided as in-kind, technical or financial support.

5.5. Support provided is Restricted. This means that it is linked to an already determined design and supply list, and construction must be completed within a set timeframe.

5.6. Preliminary Design, Design and Fundraising require time and money.

5.7. As a general rule, the more a project costs, the more effort and time it will take to secure funding.

5.8. Once funds are secured, a water scheme is constructed in sections

5.9. Poor quality construction will negatively impact operation and maintenance.

5.10. Poor quality construction may result in the scheme not delivering SAFE water.

5.11. National standards require qualified tradesman to be on site to supervise community labour.

5.12. Regardless of who funds and who constructs a scheme, upon completion, RWSB is mandated to inspect the scheme, resulting in a Construction Completion Certificate

Chapter 5
RWSB - *Project funding and Construction* requirements

5.1. Construction of domestic rural water schemes in Swaziland must follow a step-by-step process that requires RWSB approval of Final Design and Constructed schemes, resulting in a Construction Completion Certificate

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
Phase B	**Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures***	
Chapter 3	1) Letter of Request	
Chapter 3	2) RWSB Assessment	**RWSB #1 - Approval of Need for Project**
Chapter 3	3) Community mobilization Sensitize, awareness, and training activities with the objective 1) for communities to understand that they are the owners of the water system, and 2) for communities to develop the capacity to fulfill their responsibilities	
Chapter 4	4) Preliminary design (PD) The Preliminary design report includes the Community Readiness form (filled in by the Community Development Office (CDO) of RWSB after discussions / observations with the community)	**RWSB #2 - Approval of Preliminary Design report MOU signed between RWSB and the implementing agency**
Chapter 4	5) Final design report	**RWSB #3 - Approval of Final Design report, including Environmental Compliance Certificate**
Chapter 5	6) Fundraise for water scheme construction	
Chapter 5	7) Construction of water scheme	**RWSB # 4 - Approval of Constructed schemes, resulting in Construction Completion Certificate**
Phase C	**After the "Project Development Phase" - *Community Responsibilities***	
Chapter 6	8) Operation & Maintenance • Community - preventative maintenance • With possibility of some assistance from RWSB for major repairs	
Chapter 7 Chapter 8	9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water system construction.*	

5.2. Although external funding for the construction of water schemes can come from a variety of sources, it is aimed at "all people having access to a minimum of 30 litres of SAFE water per person per day at a distance of not more then 200 metres".

For example)
- Donors - direct, or through NGOs, or through donor's issuing service contracts through tenders
- Government - direct, or through NGOs, or through government issuing service contracts through tenders
- Combination of donors and Government

Regardless of the source of funding:
- All external funding is aimed at "all people having access to a minimum of 30 litres of SAFE water per person (capita) per day at a distance of not more than 200 metres"
- RWSB standards and procedures are to be followed.

As a general rule, private connections need to be funded in full by communities.

Attachment #5.1 - An Example) Invitation to Tender for the construction of rural water supply and sanitation schemes.

5.3. Regardless of the source of external funding, the national standards require communities to contribute at a set level[24].

Communities shall assume a fair share of the construction costs in the form of contributions to capital costs - set at not less than 25%. Usually the 25 % community contribution is further broken down to required 15% through cash and 10% through community labor.

In doing so, for community ownership, it is critical that EVERY homestead contributes something, instead of a few homesteads contributing a lot.

Communities are to assume ownership of operation and basic repairs, including:
- All minor repairs
- Replacement costs of pipes and fittings - note that all pipes and fittings have a life span so will need to be replaced at some future point. The lifespan of pipes is further reduced if maintenance tasks are not carried out to standard.
- RWSB will **consider assisting** with major repairs where schemes have been constructed to standard, using a guideline of 50:50 split.

If is often easier for a community to collect the initial start up funds for construction than to collect monthly user fees. Communities need to develop strategies that will effectively address this challenge.

Such strategies need to include a combination of 1) education, 2) procedures for enforcing rules, 3) practical methods such as putting locks and water meters on taps.

5.4. External Funding can be provided as in-kind, technical or financial support.

In-kind - is support provided in forms other than money; examples include:
- Pipes purchased
- Delivery of supplies
- Community labour - community labour must be given a realistically value to (most donors have a set rate they use for the value of community labour) and verified; for example)

Saturday, September 24, 2011					
Name	Homestead	Time In	Time Out	SZL Value	Signature

Technical - for example, the services of an engineer

Financial - when support is provided in the form of money.

5.5. Support provided is Restricted. This means that it is linked to an already determined design and supply list, and construction must be completed within a set timeframe.

It is critical that communities understand that the time for their input is in the Preliminary Design & Design Stage, NOT the funding and construction stage - as this is too late.

For all sources of funding, the National Standards have to be followed. This holds true regardless if the funding is obtained through government, from government, or through an NGO or international agency.

5.6. Preliminary Design, Design and Fundraising require time and money.

It takes a lot of effort and time to secure funding - so if for example a donor provides SZL100,000 for a water project, some of these funds may go towards the implementing agencies administration, transport, and time in carrying out the Preliminary Design and Design.

A challenge is that any donors will only consider funding a project after the Final Design is completed, yet the steps to develop a water project from the Letter of Request through to the Final Design require the services of a professionally qualified engineer and other costs such as transport, phone calls, and maps.

There is no simple solution to this situation. However, communities can positively contribute to this reality by ensuring that from the on start, they clearly understand and fulfill their responsibilities in a timely manner.

Communities also need to assess the energy and time required to secure project funding in comparison to their own effort. Particularly for a micro scheme, it might take less effort and time if bit-by-bit, each homestead contributes their own resources for the construction of the scheme.

5.7. As a general rule, the more a project costs, the more effort and time it will take to secure funding.

If the time to secure funding takes too long, the design may need to be revisited; for example, if the population has now increased by a lot of people, or new homesteads have been established.

The settlement practices (or lack of) in Swaziland complicate the construction of domestic water schemes at community level. For this reason, resettlement should have taken place (and be adhered to) prior to the Preliminary Design.

Communities also need to quickly fulfill their community mobilization responsibilities of toilet construction, and contributing towards operation and maintenance funds.

5.8. Once funds are secured, a water scheme is constructed in sections:

Section	Function
Intake	Takes water from the source into the water scheme
Power source	Power source options include: • Gravity feed • Pumps - hand, electrical, solar, diesel, play pump The type and size of pump is specific to the pumping requirements - *i.e. the location, depth and amount of water that needs pumping over a set period of time.*
Transmission line	Takes water from the intake to the treatment facility
Treatment facilities	If the water is not to the quality standard for drinking raw (most is not), a treatment facility is needed. Treatment options include: • Roughing filters • Slow sand filters - *the process of water filtering slowly through sand cleans the water (provided the sand particulars are of the required size, the sand filtration containers are sized for the volume of water, and the sand is cleaned out regularly)* • Other treatment methods like chemicals
Storage facility	Stores water and may also be used to increase the pressure flow into the distribution line
Reticulation - distribution line and distribution points	Distribution line - *the pipe network that transports water from the storage tank to the taps.* Distribution points - *the taps and drainage around each tap*

5.9. Poor quality construction will negatively impact operation and maintenance.

Throughout construction, quality control is vital so as to ensure that the completed scheme will last for the design life intended without incurring excessive operation and maintenance costs. Common problems include:

5.9.1. Incorrect laying of pipes -

There are 3 different types of pipes most often used in community water schemes:
- HDPE (black plastic pipes) - purchased in rolls - flexible - *cheapest in cost per M*
- uPVC (blue plastic pipes) - brittle - purchased in lengths
- GMS (metal pipes) - purchased in lengths - most expensive

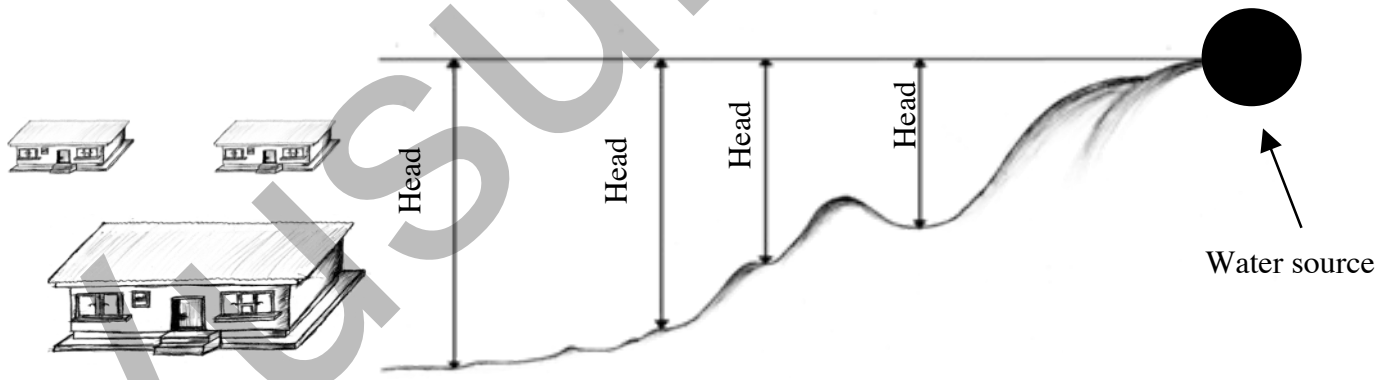
Each type of pipe has ***different uses*** - for example, GMS pipe is used under a road as it can withstand the pressure of vehicles, or in rocky areas where the pipe cannot be buried.

Each type of pipe comes in ***different sizes*** (dimensions). Dimension is related to the flow of water through the pipe i.e. a larger size pipe allows more water to flow through at one time (but is also more expensive).

Both HDPE and uPVC pipes also come in ***different classes*** (thickness of walls. Class is related to pressure i.e. in hilly conditions, pipes of a higher class must be used as these can withstand more pressure (but are also more expensive).

Class 18 pipes can withstand 18 bars of pressure
Class 2 pipes can withstand 2 bars of pressure

The pressure that water will have inside a pipe is based upon the "head" from the water source i.e. the more "head" the more pressure inside the pipe



Activity #5.2 - Have available a sample of each type of pipe and several different classes.
An inexperienced person cannot always "see" the class of a pipe, however the class should be stamped on the pipe. *Pipes that are also stamped with SABC are more expensive but this is your guarantee that they meet the quality of the class (a Class 10 pipe should withstand 1.5 times the pressure i.e. 10 x 1.5 = 15 bars of pressure)* *If you do not specifically order SABC pipes, you will often be giving pipes of questionable quality.*

5.9.2. Incorrect mixing of material - The mixing ratio influences the strength of the cement, so cement needs to be mixed using different ratios depending on if it is used in a water storage tank or a standpipe.

Many people do not know this, and it is also tempting for people to cheat on the mixing ratio. For this reason, a qualified supervisor needs to be on site.

5.9.3. Ground conditions -

- **Survey where to dig** - the small ups and downs in the pipe line can cause pressure points in the pipe, which will disrupt optimum water flow

- **Depth of trenches** - these need to be 1 full spade deep (depth of both the handle and the blade of a spade) to provide adequate protection from fire (1 M deep under a ploughed field, 75 cm deep under an area not ploughed).

- **Levelness of trenches** - the bottom of the trench must be level otherwise even a small rock will over time cause a leak in the pipe

- **Back filling and compaction of trenches** - must be done to a certain standard in order to protect the pipes well.

5.9.4. Fittings -

- Pipes need to be cut on the straight, not the diagonal, and also be joined properly - otherwise the joint will leak, reducing the amount of water at the taps.

5.10. Poor quality construction may result in the scheme not delivering SAFE water.

For example:

- Uneven trenches will cause leakage - reducing the **Quantity** of water
- Poorly fitted pipes will allow contamination - reducing the **Quality** of the water
- A poorly designed and constructed intake will allow dirt into the intake, which will clog up the pipes, therefore slowing the flow of water through the pipes - reducing the **Reliability** of the water

5.11. National standards require qualified tradesman to be on site to supervise community labour.

Rural Water Supply Branch (RWSB) Design Standards: Volume 3, Section 5.8	
Function	**Qualified tradesman required**
Site management	General foreman
Pipe laying	Plumbers
Concrete works	Bricklayers
Electrical works	Electricians
Leveling	Surveyor

5.12. Regardless of who funds and who constructs a scheme, upon completion, RWSB is mandated to inspect the scheme, resulting in a Construction Completion Certificate

The site handover by the agency constructing the water scheme to Rural Water Supply Branch (RWSB) should only take place once the following activities are completed:

- ***Final inspection of works*** - in the presence of Rural Water Supply Branch (RWSB)
- ***Snag list compiled*** - a list of the small things that may need repairing. These need to be corrected before Rural Water Supply Branch (RWSB) can issue the Construction Completion Certificate.

Retention - it is standard contracting procedure for the funding or implementing agency to withhold 10-15% of the payment due the contractor for a 1-year period. This is to ensure that any problems arising will be fixed. The rules governing some funding does not always allow this, but you should still ask because it is good practice.

After RWSB #4 - Approval of Constructed Scheme is issued (this should include the Construction Completion Certificate), Rural Water Supply Branch (RWSB) will commission the scheme to the community.

If a Approval of Constructed Scheme and Construction Completion Certificate is not issued, in the future, Rural Water Supply Branch (RWSB) may not be able to assist the community in any major repairs.

Chapter 5
RWSB - Project Funding and Construction Requirements

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. In your own words, can you explain why is it important to use specific pipes for specific parts of a water scheme?

2. Digging trenches for water pipes is most often one of the tasks assigned to community members. How would you motivate community members to dig the trenches to the standard required?

3. If you needed a bricklayer to build a strong base for the water tank, who would you suggest should be hired, a well known local bricklayer with no recognized qualifications and will not demand a lot of money? or a SCOT graduate who will want to be paid according to his qualifications?

4. RWSB requires that communities make a financial contribution of 15% in order to qualify for funding. This contribution can be in any form provided the value is equivalent to the 15%. How would you motivate your community to meet this requirement?

5. A troublesome member of your community (and every community has at least one such person), wants to make changes to the design after construction has already started. Explain how you would handle this situation.

6. Your community is in the process of purchasing equipment for the construction of a water scheme. One of the community members knows a guy who can provide all the necessary supplies at a bargain. What would be your reasons for agreeing or not agreeing to use this supplier?

INVITATION TO TENDER FOR THE CONSTRUCTION OF RURAL WATER SUPPLY AND SANITATION SCHEMES

C512/14202: Construction of Vusweni/Mbhasheni Water Supply and Sanitation – Phase 2

Tenderers are invited from locally registered Contractors for the Construction of a Rural Water Supply Scheme. Only firms that can clearly demonstrate that they have previous experience and capacity in executing similar works will be considered. The qualification process will include the evaluation of personnel capabilities, equipment capabilities, financial standing previous expirience and current work load.

Bonafide tenders should comprise the following:

- A completed set of Tender Document
- A tenderer's valid tax clearance certificate (for Government Tender)
- A copy of the General Receipt as proof of purchase
- One copy of the completed tender document
- A valid Trading Licence
- E5000,00 Tender deposit in a form of a Bank Guarantee
- Labour Compliance Certificate from the Ministry of Labour
- VAT Registration Certificate

Tender Documents will be available from 8:00am to 4.00pm from Monday, 16th June 2014 to Thursday, 19th June 2014 and may be collected from:

Microprojects Programme
Suite 102, Dlan'ubeka House, Corner of LaLufadlana & Mdada Streets
Mbabane
Tenderers are advised to pay a **E500.00** (Five Hundred Emalangeni only) non-refundable amount at the Government Revenue Office and should use code 233/1201/04199/G51299 when making payment. Companies are advised to consult Microprojects Unit office on the availability of tender documents prior to payment. **The unit will not be liable for the refund in the event one pays for unavailable tender documents.**
The Compulsory site inspection is scheduled thus;

LOT IDENTIFICATION	DATE AND TIME OF SITE INSPECTION	MEETING PLACE
(C512/14202): Construction of Vusweni/Mbhasheni Water Supply and Sanitation	20th June 2014 10;30 hours	Msumpe stores (Ntfonjeni)

Please note that Tenderers who will not attend site inspections will not be evaluated.

- Date and place of tender submission: Tuesday, 8th July 2014 at the Office of the Employer
- Time for submission ..: 10.00 Swaziland time
- Opening.....: 10.05 Swaziland time

Completed tenders should be delivered in a sealed envelope to the Microprojects Office and the envelope should only show the Project Name, Project Number and addressed to:

The Coordinator
Microprojects Programme
First Floor Dlan'ubeka Building
P.O. Box 2122
MBABANE

Any action or tendencies that will be interpreted as an attempt to interfre with or influence the tendering process will result in immediate disqualification of the Tenderer. Enquiries should be addressed to Mr. Makhosi Dlamini at Tell: 2404 0199, Fax: 2404 0516, Cell: 7605 3816. Contracts will be awarded lot by lot but Microprojects Programme does not bind itself to accept the lowest or any tender.

ON95198

Chapter 6
RWSB - *Operation & Maintenance* requirements

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Sand filter

A community of 50 homesteads puts a lot of effort into developing a water scheme. RWSB provides the design, which includes a sand filter. After two years, the water starts to come slower through the pipes. The community decides the best course of action is to by pass the sand filter.

- After by passing the sand filter, will the water flow through to the standpipes faster?
- Is this a good thing or not? Please explain

Community D

Community D received a grant for the design and construction of their water system. In order to receive this grant, the community had contributed SZL100 per homestead and dug the trenches.

After the scheme was completed, the WSSC started to try and collect the SZL 5 per homestead each month for operation and maintenance.

There are 35 homesteads in all. Some community members would not agree to this, accusing the WSSC of trying to rob them of their money. One of the community members said “In fact, there is no need for this because we received a donation for the construction of this scheme.”

- If you were on the WSSC, how would you handle this situation?
- If you were not on the WSSC, how would you handle this situation?

Chapter 6
RWSB - *Operation & Maintenance* requirements

Table of Contents

6.1. The operation and maintenance of domestic rural water schemes in Swaziland is primarily a community responsibility.

6.2. The WSSC should develop a decentralized approach to operating and maintaining the community water scheme.

6.3. Maintenance, including preventative tasks, and repairs and replacements of pipes and fittings, needs to be planned for.

6.4. Even though water may still be coming out of the taps, poor quality operation and maintenance will result in the scheme not delivering SAFE water.

6.5. RWSB's goal is that communities are trained at set points in the process of constructing water schemes.

Chapter 6
RWSB - *Operation & Maintenance* requirements

6.1. The operation and maintenance of domestic rural water schemes in Swaziland is primarily a community responsibility.

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
Phase B	**Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures***	
Chapter 3	1) Letter of Request	
Chapter 3	2) RWSB Assessment	**RWSB #1 - Approval of Need for Project**
Chapter 3	3) Community mobilization Sensitize, awareness, and training activities with the objective 1) for communities to understand that they are the owners of the water system, and 2) for communities to develop the capacity to fulfill their responsibilities	
Chapter 4	4) Preliminary design (PD) The Preliminary design report includes the Community Readiness form (filled in by the Community Development Office (CDO) of RWSB after discussions / observations with the community)	**RWSB #2 - Approval of Preliminary Design report MOU signed between RWSB and the implementing agency**
Chapter 4	5) Final design report	**RWSB #3 - Approval of Final Design report, including Environmental Compliance Certificate**
Chapter 5	6) Fundraise for water scheme construction	
Chapter 5	7) Construction of water scheme	**RWSB # 4 - Approval of Constructed schemes, resulting in Construction Completion Certificate**
Phase C	**After the "Project Development Phase" - *Community Responsibilities***	
Chapter 6	8) Operation & Maintenance • Community - preventative maintenance • With possibility of some assistance from RWSB for major repairs	
Chapter 7 Chapter 8	9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water system construction.*	

Evidence that a community has taken ownership of this responsibility includes:

- A fully functioning WSSC that was elected through proper procedures, to carry out tasks in accordance with a constitution that reflects RWSB guidelines and was approved at community level

- Regular collection, and proper management of, Operation and Maintenance funds:
  - ***Construction costs*** - 25%, through the provision of labour, local materials, and cash contributions
  - ***All minor repair costs*** - in accordance with the policy of the Rural Water Supply Branch (RWSB), the community is responsible for conducting minor repairs on rural water supply schemes in Swaziland and the costs associated (100%), including any compensation for water minders.
  - ***Major repair costs*** - in accordance with the policy of the Rural Water Supply Branch (RWSB), the community is responsible for at least 50% of the material costs of a major repair and the full cost for O & M of any private connections.

6.2. The WSSC should develop a decentralized approach to operating and maintaining the community water scheme.

Although the WSSC has the overall responsibility for operating the water scheme, they should delegate specific tasks to specific people. This is because no one person - or even the WSSC - has the skills or the time to do all the below listed tasks.

Supervisor role	WSSC - overall responsibility for the operation and maintenance of the water scheme			
Service role	Water minders	Zone leaders - 1 per tap	Treatment work	Plumbers
	Start / stop procedures for pumps Check level of indicator at storage reservoir Monthly water meter readings Start / stop procedures of diesel engine sets	Control of water distribution standpipes - hours of supply, rationing, payment collections, leakages	Workings of roughing filters, slow sand filter, intake weirs….	Leaking pipes and tapes

When delegating tasks, it is critical to match specific skills with specific roles - for example, a person with plumbing experience / qualifications is needed to fix leaking pipes, while someone with book keeping experience is needed to record the accounts.

6.3. Maintenance, including preventative tasks, and repairs and replacements of pipes and fittings, needs to be planned for.

6.3.1. Preventative maintenance tasks – these are quick, easy non-technical tasks within the capacity of a community member with no formal technical training. When these tasks are performed regularly, **80%** of the maintenance problems of a water scheme will be prevented!

Preventative maintenance tasks can be listed according to the section of a water scheme, together with how often and when each task should be performed:

Section	Example of preventative maintenance tasks **(not a complete list)**
Intake	Clean out - open the cover and screen, remove any rubbish • After every heavy rain • Before rains start • Twice per month Walk around the intake to see that a dead animal hasn't fallen in
Power source	Carry out regular, detailed inspections of all working parts.
Transmission line	Maintain access along the pipe line so that you can easily walk the line for visual inspection Fire breaks - keep bush clear above and along the pipe line Over time and due to rains, the pipe line will become uncovered, after which cows will hook on the exposed pipe causing damage - so exposed pipe needs to always be covered Walk the entire length of the transmission pipeline at least once or twice a month, visually inspecting the ground above the pipe. If the grass is growing very well in one section, this may indicate a leaking pipe.
Treatment facilities	Do not by pass the slow sand filter - instead clean it out regularly. Otherwise it is the same as fetching water from an unprotected, open source. Depending upon your treatment, purchase the necessary chemicals and mix according to the directions. Always keep stock on hand. One glass of dirty water is enough to get you sick.
Storage facility	Empty and scrub out on a regular basis

Reticulation - distribution line and distribution points	Walk the distribution line at least once or twice a month, visually inspecting the ground above the pipes and around the taps. Ensure that all leaky or broken taps are fixed

During the construction phase, communities should ask the agency assisting with the construction to draft a preventative maintenance list specific to their water scheme.

This list should form the basis of training with as wide group of community people as possible - and should be used by the WSSC to develop a systemized management plan.

6.3.2. Replacements - all pipes and fittings have a life span, meaning that after this time period, the pipes and fittings will need to be replaced (even if preventative maintenance has been taking place). If preventative maintenance has not been taking place to the standard required, the estimated life span will be reduced

The WSSC should keep a list of the lifespan of the components of the water scheme - replacement of these items should not come as a surprise!

Attachment #6.1 - Review RWSB Tables[25]
- *Table 2.1 Typical range of service life of water supply system components*
- *Table 2.3 Service life of water supply system components*

6.3.3. Repairs - even with preventative maintenance and replacements carried out in a timely manner, sometimes through no fault of anyone, an item needs fixing. This situation can be reduced by preventative maintenance and timely replacements - but it will still exist to some degree and therefore must be planned for.

When schemes have been constructed to standard, RWSB will from time to time consider assisting with major repairs, using a guideline of 50:50 split of costs.

Replacements and repairs need to be planned for through the collection of user fees
i.e.) a pregnant woman should not be surprised when 9 month's later her baby is borne!

6.4. Even though water may still be coming out of the taps, poor quality operation and maintenance will result in the scheme not delivering SAFE water.

For example -

Quantity - if taps washers are not replaced taps will start leaking, thereby reducing the quantity of water available FOR EVERYONE

Quality - if intakes are not cleaned out after a heavy rain, debris may get into the pipes, reducing the water quality FOR EVERYONE.

Reliability - if rationing of water is not controlled at standpipes, the water demand (through usage or wastage) will become greater than the water supply, there by reducing the reliability of the water FOR EVERYONE.

Another way to control water demand is to link water usage to payments.

Poor maintenance will reduce the Water Supply flowing through the pipes
And
People pressures will increase the Water Demand

Resulting in Water Demand being greater than Water Supply -
and the water scheme will no longer function

6.5. RWSB's goal is that communities are trained at set points in the process of constructing water schemes.

RWSB is in the process of developing an operations and maintenance training manual specifically for water minders and pump attendants;

In the meantime, given RWSB's limitations in funding, staffing, and logistics, timely training, to the standard necessary, does not always take place.

Given this reality, communities need to be proactive about sourcing the training they need to carry out their responsibilities to the standard required to operate and maintain their water scheme.

If from the start of developing their water scheme they have the attitude of "community ownership", they will find that their active engagement in the process from Community Readiness through to Construction will have developed their capacity quite a lot.

Operation and Maintenance tasks should be documented and new people trained regularly, so that enough people within a community have the capacity to help carry out operation and maintenance tasks to the standard required.

Once a good operating and maintenance system is set up, the requirements and skills can be passed on through the community, rather than the community always waiting for government or others to conduct training.

Chapter 6
RWSB – Operation and Maintenance Requirements

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. During a WSSC meeting, the chairperson asks for volunteers to help maintain the water scheme (Water Minders). Would you volunteer for this position? Explain your answer.

2. Do you think Water Minders should be paid?

3. Have you ever walked from the water source along the pipeline to the tap closest to your house? Do you know the maintenance tasks associated with the water scheme in your community?

4. The Chairperson of the WSSC in your community has started to sell water to people who bring their buckets to him. As your community is fortunate to have a gravity feed water scheme with plenty of water, there is still enough water for the taps. What is your opinion on this situation? And why?

5. The standpipes in your community only give water in the early morning, for a few hours. What might be some of the reasons for this?

6. Babe Mafutha connects a pipe to the intake of the community water scheme so that he can get water for his dying crops.
   - How does this affect the system?
   - How would you handle this situation?

Table 2.1: Typical range of service life of water supply system components

Component	Service life (Years)
Pump	10 – 15
Pipeline – cast iron	45 – 50
Pipeline – plastic	15 – 20
Pipeline GMS	20-30
Dams and intakes	40 – 50
Borehole	20 – 25
Treatment plant	20 – 25

Source: Okun and Ernst, 1987 (Excluding GMS)

The following service lives are recommended for use in Swaziland:

Table 2.3: Service life of water supply system components

Component	Service life (Years)
UPVC pipes and fittings (Underground)	20 – 35
Pumps, engines	5 – 10
Engines with regular maintenance	15 – 20
Concrete construction	50
Steel reservoirs	20 – 35
Afridev hand pump	2 - 5 years
Bushpump [1]	2 months - 10 years

It is important to note that the above lifespan assumes an acceptable level of maintenance. Where maintenance is not carried out then the above service lives will be significantly reduced.

[1]The large variation in the lifespan of the bushpump is due to the wide range of installation depths. Deep installations are required to pump at higher pressures and at a lower flow rate, hence wear and tear is accelerated.

Chapter 7
Keeping water SAFE -
Community Sanitation Structures and Hygiene Practices

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

The Fountain of Life

The local community had finally achieved its long-standing dream of constructing a water scheme. They can now wash their clothes and water their kitchen gardens without worrying about water running out. The water looks and tastes clean, "it's so refreshing," they say.

Those whose homes are closer to the mountains can even take their cattle to drink in the new "fountain of life". The community member's lives have improved and their animals are even fresher.

- What do you think of this story? Explain your answer.

Woman A and Woman B

Woman A is washing baby napkins at a water source at the top of the hill. Woman B is collecting water for domestic use. Woman B and her entire family later got sick with diarrhea from utilizing the water she collected.

- Even before constructing a water scheme, is there a way to prevent this from happening to you? Explain how

Chapter 7
Keeping water SAFE -
Community Sanitation Structures and Hygiene Practices

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7.1. In reference to domestic water schemes, keeping water SAFE is primarily a community responsibility.

7.2. Sanitation structures make hygiene practices easier but do not replace such practices.

7.3. Hygiene requires the four components of personal cleanliness, sanitation structures, waste disposal and SAFE water.

7.4. Personal cleanliness will reduce diarrheal diseases by 44%

7.5. Pit latrines, if constructed to VIP standard and used correctly, will improve the sanitation of a homestead.

7.6. Waste disposal is an important component of hygiene.

7.7. Always, water must be protected from contamination.

7.8. If you do not have access to SAFE water, you need to always purify your water.

7.9. Good hygiene needs to be practiced by all members of a community otherwise everyone's health will be negatively affected (public health).

7.10. Information about hygiene is readily available at community level - *the challenge is for every one of us to practice good hygiene, every day.*

Chapter 7
Keeping water SAFE -
Community Sanitation Structures and Hygiene Practices

7.1. In reference to domestic water schemes, keeping water SAFE is primarily a community responsibility.

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
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Chapter 7 Chapter 8	**9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water scheme construction***	

A water scheme (pipes, storage tanks, taps….) will reduce the time and effort spent collecting water, but without sanitation structures and hygiene practices, positive health benefits will not be realized.

It is the responsibility of communities to ensure that sanitation structures and hygiene practices are in place, so as to realize the full benefit from a water scheme, as evidenced by:
- 100% of homesteads have a toilet constructed to VIP standard, and it is used correctly
- 100% of homesteads engage daily in appropriate hygiene practices, including solid waste disposal

7.2. Sanitation structures make hygiene practices easier but do not replace such practices.

Sanitation structures include pit latrines, toilets, and rubbish bins…. Although development efforts tend to concentrate on constructing sanitation structures - *on their own, such structures do not automatically benefit our health.*

Rather, sanitation structures make it easier for a person to practice hygiene - *but only if the sanitation structures are constructed to standard and used correctly, and at all times.*

Hygiene practices are possible without sanitation structures - *although such practices will take more time and effort.*

7.3. Hygiene requires the four components of personal cleanliness, sanitation structures, waste disposal and SAFE water.

Hygiene requires all four of the following components:
- Personal cleanliness
- Sanitation structures
- Waste disposal, and
- SAFE water

Good hygiene practices will improve health by reducing the incident of many diseases, including: Hookworm - Bilharzias - Dysentery - Tapeworm - Cholera - Diarrhea - Typhoid fever - Scabies

The hygiene practices that children observe adults carrying out daily - **or not** - are the practices that they are likely to maintain as adults and pass on to their own children.

7.4. Personal cleanliness will reduce diarrheal diseases by 44%

While a properly constructed and maintained water scheme will reduce diarrheal by 25% - *on its own, hand washing with soap will reduce diarrheal diseases by 44%.*

Attachment #7.1 - Reduction in diarrheal morbidity per invention type
Of the 6 interventions listed, what one is the cheapest? *Of the 6 interventions listed, which one is the most effective?*

Attachment #7.2 - Photo of a Tippy Tap
• *A tippy tap is easily constructed with scrap material - note the soap hanging in the used nylon stocking!* • *A tippy tap is better than a washing basin because you are not sharing the water* • *A tippy tap also makes hand-washing fun for young children.* • *With or without a water scheme, a tippy tap can be used to promote hand-washing*

Hand washing with soap should always be done at the following times:
- ***Before you touch food*** - the area where you prepare your food should also be wiped clean each time before you prepare food.
- ***After using the toilet*** - *placing a tippy tap next to a pit latrine is a fun way to promote this*
- ***Before you eat*** - *every time*
- ***Before you feed a baby*** - *a baby is particularly vulnerable to diarrhea so at all times you must take extra care*

7.5. Pit latrines, if constructed to VIP standard and used correctly, will improve the sanitation of a homestead.

When people urinate and defecate in the bush, the rains wash the fecal material into the water sources. This is why the incident of water borne diseases goes up after the first rains.

This fecal material will also wash into the water source feeding a community water scheme. For this reason, even if you are getting water from a tap, open defecating will contaminate your water supply.

The Ministry of Health (MOH) requires **at least 80%** of the homesteads to have a pit latrine constructed to standard, prior to the construction of a water scheme.

Pit latrines must be constructed to VIP standard otherwise they will not achieve their intended objective. The Essential requirements are:

Essential requirements of a VIP Pit Latrine	
Location of the pit latrine	Environmental Health officer should help you select where to locate the pit, so that the ground water is not contaminated
Size of the pit and lining	Size - based on the estimated number of people who will use it • A pit size of 1 M wide x 1 M long x 3 M deep will last a homestead of 10 people for 10 years of daily use. Lining of the pit - depending on the type of soil, it is best to line the pit with blocks that are off set to allow drainage
Slab	Must be constructed with reinforcement
Vent pipe - painted black, with a fly screen on top	Flies from inside the pit will see the light at the top of the pipe, when they fly up to the light they will get trapped by the fly

	screen - ***this ONLY works if the seat is kept closed!*** Painting a vent pipe black means that it will heat up in the sun. Because hot air rises, this will pull the odors out of the pit - ***this ONLY works if the seat is kept closed!***
Seat - must have a lid that can easily be closed	The seat is for ease of use (in some countries people prefer squatting). When not being used, the seat must be closed (or covered with a plank) - at all times! This is so that: • The vent pipe / fly screen can work. • The hot air can pull the smell out through the vent pipe. • If you do not close the toilet lid every time after use, the flies that touched poop will come out and touch your food. Then you get sick. **Vala simbhonyo semthoyi nawucedza kuwusebentisa sonkhe sikhatsi khona timphungane tingatungena khona bese. Tiphuma titsintsa kudla lokungakubangela kugula, mhlambe uphatfwe sifo semsheko.**
Non Essential requirements of a VIP Pit Latrine	
Roof, wall, and door	The function of the roof, wall, and door is to give protection from the weather and privacy. For this reason, you can use any material, provided it serves these functions. Experiment, be creative - *use well constructed mud and stick, use glass bottles to lighten the toilet, use poles to hold up the roof (instead of the walls - this will make it easier to move the structure if you need to….)* Doors are often exposed to the weather so do not last long. For this reason it may be more effective to put a privacy wall (even of reeds) instead of a door.
You should put only the following materials in the pit - urine, feces, toilet paper, and newspaper. Material that is not biodegradable must not be put down the pit. Doing so will slow down, or even stop, the decomposition process. Even sanitary material will slow down, or stop, the decomposition process. Internationally, there is a growing trend to develop reuse-able sanitary supplies. Some of these examples are very simple to sew (even by hand). These are cheaper and more environmentally appropriate than the sanitary supplies purchased at shops.	

The Ministry of Health (MOH) requires **at least 80%** of the homesteads to have a pit latrine constructed to VIP standard, prior to the construction of a water scheme. When conducting a survey of the toilets in your community, you may want to use this assessment chart:

No evidence of a toilet	0%
Essential requirements of a VIP Pit Latrine	
A pit has been dug - *it is of the correct size (depth, width, length) - it is lined with off set blocks*	20%
There is a reinforced slab - *with a hole for the seat and a hole for the vent pipe*	30%
The VIP aspects of the pit latrine are observable and constructed to standard - • *Vent pipe - black, with fly screen on top* • *Seat with closable lid*	80%
Non Essential requirements of a VIP Pit Latrine	
Privacy - *regardless of the material / method used to construct, the walls and door provide privacy*	90%
Shelter - *regardless of the material / method used to construct, the roof provides shelter from the rain*	100%

When it fills up, a pit latrine needs to be emptied out or moved, with the old pit being covered up (remember to plant a tree on top!). The MOH will be able to estimate how long it will take to fill up, based upon the size of the pit and the number of people regularly using it.

A pit latrine can be emptied in several different ways:

- **"Honey Wagon"** - a "honey wagon" has a hose that sucks out the matter from the pit and transports it for disposal in a sewage system. Contact an Environmental Health Officer to arrange for a "honey wagon".

- **Reuse** - alternatively, construct a pit latrine in a manner that allows you to easily collect the decomposed waste, so that you can make use of it by putting it on your fields. Although currently, this is not common in Swaziland, it is very common in many parts of the world. There are several different ways to do this:

  Dividing wall - a pit latrine can be constructed with a wall that divides the pit and the structure into two parts. One side is kept locked; the other side is used until the pit is full - at which time it is locked and the other side is used again. The side that is not being used will fully decompose over a period of 1 to 2 years, after which you can take the "compost" and spread it on the fields.

  Dry sanitation - this is when the seat of a pit latrine is constructed in a manner that automatically separates the wet urine from the drier feces. The urine can be used immediately for agriculture (it is mainly nitrogen). Feces that is dry has a much reduced smell, and after some time, can also be used for agriculture.

7.6. Waste disposal is an important component of hygiene.

Unfortunately, it is not uncommon for people in Swaziland to litter. Yet littering reduces the hygiene of your community.

Attachment #7.3 - Review Keep our Environment Clean

Attachment #7.4 - Review Buhleni rubbish photo
• *What is the underlying problem that you see in this photo?* • *What example does this give your children?*

Before putting material into rubbish bins, you should:

- **Reduce** what you buy - ask yourself the question "is this item a Need or a Want?"

- **Reuse** what you have - first clean out containers so that they do not attract rats, than separate them according to type of material. You will be surprised at how often you can reuse what you previously were buying new things for, or throwing away. For example, instead of buying bottled water, when you leave home get in the habit of refilling a bottle of water to take along with you.

- **Recycle** what you can - today a lot of material can be sold, for example, glass, metals, tins… find out the places where you can bring material for recycle, or start such a place in your own community.

Separate Risk material and Decomposable material from other material.

- ***Risk material*** - for example - pads, nappies, injections, bandages….
  For risk material you should ideally dig a separate pit (just like the pit for the latrine) with a removable manhole cover. Make the manhole cover heavy enough so that small children cannot lift it.

- ***Decomposable material*** - organic material, for example - food scraps, paper, plant material…. Learn how to make compost and keep worms, as these methods will decompose this material into fertilizer for your garden and fields.

7.7. Always, water must be protected from contamination.

At all times, water needs to be protected from contamination. Common causes of contamination are when:

- Animals are allowed to defecate around water sources.
- Soil is washed into the water source (soil erosion).
- Waste material of any kind is dumped in or near a water source.
- Water schemes are not designed, constructed and maintained properly. For example, if the intake is not designed well, rubbish will get into the pipes; if the pipes are not joined well, dirt will get into the pipes; if drainage at each tap is not constructed well, soap may get into the standpipes. For this reason, even water that comes out of a tap may be contaminated.
- Water is not stored properly. For example:
    - If the container used to store water does not have a lid, a child might wash her hands in the water reserved for drinking and thus contaminate the water with germs or soap.
    - Water should always be stored in a container with a tight fitting lid that is kept closed at all times.
    - Containers used for fetching water need to be cleaned between refills with either JIK or soap.
    - If reusing containers, people need to know what was originally stored in the container. It is common to use reuse industrial containers without having the full details of what was originally stored in the container. Plastic in particular will continue to hold the small micro particles so using such containers might be harming your health or contaminating your water.

Attachment #7.6 - Go through Handout How to keep our water clean
• *Where water is found* • *When water is collected and carried home* • *Where water is stored*

7.8. If you do not have access to SAFE water, you need to always purify your water.

Although HIV positive people, young children and elder are more vulnerable, water related diseases can affect anyone.

Attachment #7.7 - Water Related Diseases and Their Causes
• *Did you know that these diseases were all water related?* • *Have you had any of them?*

For this reason, if you do not have access to SAFE water, you need to always purify your water.

Options for home water treatment include:

- ***Boiling* -** water can be boiled and covered the night before for use the following day. Be sure that water fully boils for 10 minutes.

- ***Ceramic filters* -** filter water through the very small pours in ceramic filters.

- ***Solar disinfection* -** disinfection occurs by pasteurization when left in the sun for over six hours (best if you put the water in 2 litre clear plastic containers so that the sunlight penetrates through the bottle). The sun can be intensified if you place the bottle on metal.

- ***Jik* -** add 1 cap full of Jik to 25 litres of water, wait overnight before using the next day.

- ***Purchasing commercial water purification tablets and use as instructed* -** for example, water guard.

- ***Slow sand filter* -** you mimic the sand filtration of a water scheme in a smaller container. Water filters through a 30 cm layer of sand with gravel base and is cleaned in the process.

If you do not have access to SAFE water, make purifying water part of your daily routine. It takes just one drink of contaminated water to make a person sick - so set up a routine and always have purified water readily available.

7.9. Good hygiene needs to be practiced by all members of a community otherwise everyone's health will be negatively affected (public health).

The concept of PUBLIC HEALTH refers to the fact that diseases spread. So the hygiene practices of one homestead will affect the health of every other person, even the people with good hygiene habits.

For this reason, communities are responsible for ensuring that **hygiene** practices are to the standard necessary to realize the full value of the water scheme. The goal of every community should be:

- 100% of homesteads have a toilet constructed to VIP standard, and it is used correctly
- 100% of homesteads engage daily in appropriate hygiene practices, including solid waste disposal

7.10. Information about hygiene is readily available at community level - *the challenge is for every one of us to practice good hygiene, every day.*

Resource people within your community include - Rural Health Motivators, MOH Environmental Health Officers, clinic staff, and MOET schools (the government curriculum includes topics on hygiene starting in Grade 1 through to Form 5).

Are we listening? Are we doing what they tell us to do?
Or are we OK with getting sick?

Chapter 7
Keeping water SAFE -
Community Sanitation Structures and Hygiene Practices

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

---

1. Do you believe that having a water scheme in your community is enough to stop diarrhea? Please explain.

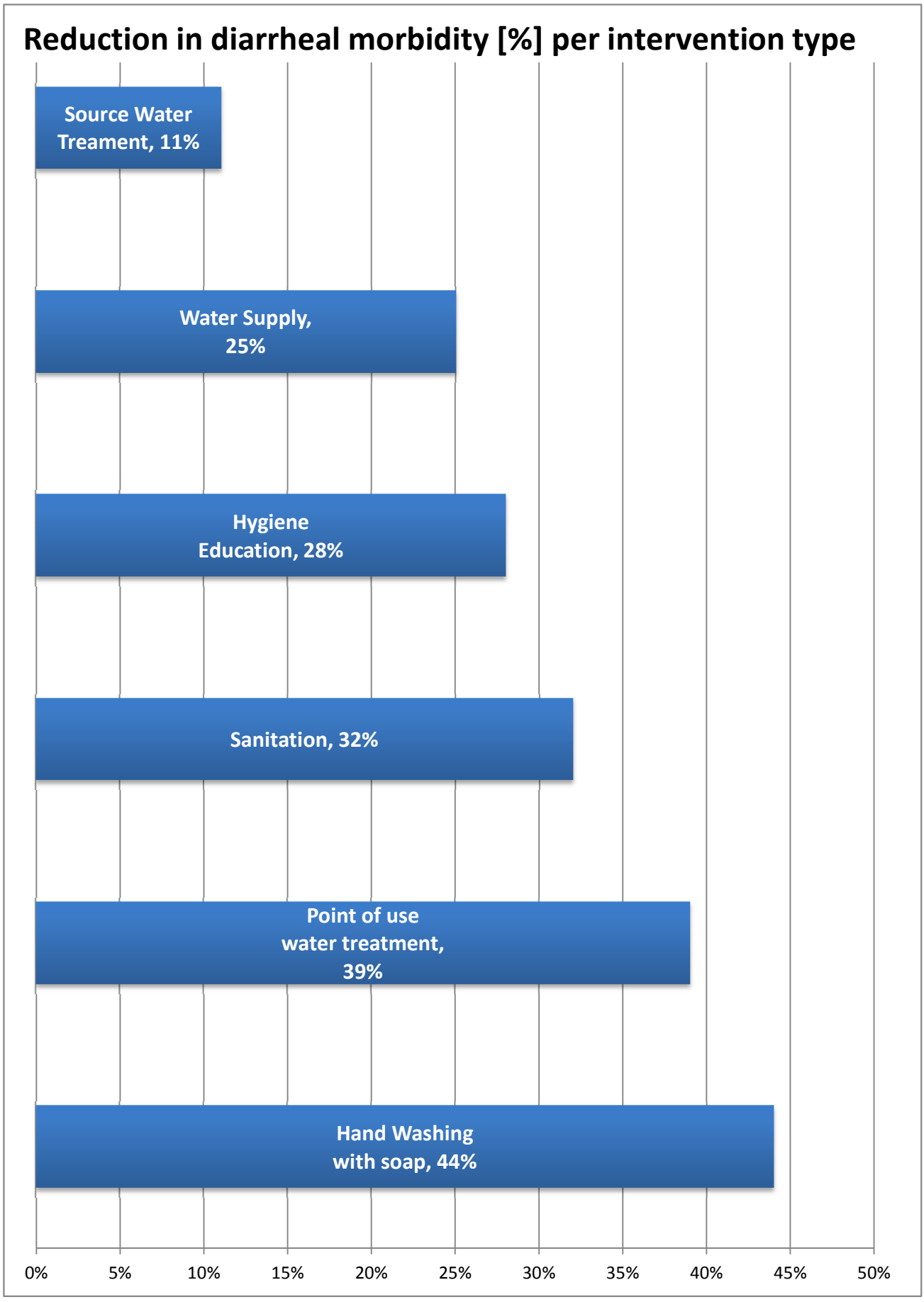
2. How does relieving yourself in the nearby bushes affect your environment?

3. Can you name any possible risks you expose yourself to when you drink from a running river? What about at the very beginning of the river, are you still exposed to the same risks? Is there a difference and why?

4. Do you throw paper and plastics out the window when you are in a car or public transport? Is this a good hygiene practice? What example does it set for children watching?

5. Suppose there are 300 homesteads in a community and only 120 have toilets, one of which is your homestead. How would you go about trying to convince the other 180 homesteads to construct toilets?

6. Many people are comfortable urinating in the bush but are uncomfortable using urine in their fields. What is the difference between these two actions?


Reduction in diarrheal morbidity [%] per intervention type
Source Water Treament, 11%
Water Supply, 25%
Hygiene Education, 28%
Sanitation, 32%
Point of use water treatment, 39%
Hand Washing with soap, 44%
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
50%

KEEP YOUR ENVIRONMENT CLEAN

GCINA INDZAWO LOHLALA KUYO IHLOBILE

5 IMPORTANT REASONS WHY YOU SHOULD STOP LITTERING

TIZATFU LETIMCOKA LETENTA KUTSI UYEKELE KUNGCOLISA

- The litter you drop is absorbed into water and rivers and eventually you drink it!
  Lukungcola lokulahlako: Kungena emantini emifuleni uphindze ukunatse!

- The litter you drop may be consumed by your prize domestic animal or cattle resulting in painful death by choking!
  Lokungcola lokulahlako : kungadliwa yimfuyo, lokungabanga kutsi tife kabuhlungu ngenca yekuhishwa!

- The litter you drop distracts from the natural beauty of your country is unsightly and ugly to tourists who contribute immensely to the economy, and poverty allevation!
  Lokungcola lokulahlako: kulimata lobuhle bemvelo yelive, akubukeki, kubi ngisho nasestivakashini letiletsa umnotfo tecedze nebuphuya balelive!

- The litter you drop and illegal dumping is in contravention of the law and global laws governing the proper disposal of waste, instituted to protect environments and reduce global warming!
  Lokungcola lokulahlako naletinye tinhlobo tekungcolisa tiphambene nemtsetfo lowengamele kulahlwa kwetibi ngendlela lefanele, letihlose kuvikela imvelo nekunciphisa kugucuka kwesimo selitulu mhlaba wonkhe! (global warming)

- The litter you drop today will impact negatively on generations to come, your children and grandchildren, please think about them!
  Lokungcola lokulahlako namuhla: kutawubanga umonakalo esitukulwaneni lesitako, nakubantfwabakho, nebatukulu bakho. Ngako-ke secela ubacabangele!

PLEASE DON'T LITTER


KEEP
CLEAN
Tel: 404 6960
404 4315

HOW TO KEEP OUR WATER CLEAN

WHERE WATER IS FOUND

DON'T	DO
– Let animals bathe, urinate or pass stools in or near water. – Let people wash clothes or throw rubbish into water – Let people use a dirty container to draw water	– Where there is more than one place to get water, try and keep the cleanest one for drinking water. – Where there are taps and hand-pumps with safe water try to use them. – Always use a clean container – clean on the drinking on the inside and clean on the outside – for drinking water. – Practice water harvesting using clean containers.

WHEN WATER IS COLLECTED AND CARRIED HOME

DON'T	DO
– Use a dirty container. – Let things fall into the water, or put braches of trees or other things into the water. – Touch the water with dirty hands.	– Always use a clean container for drinking water. – Cover the container. – Ensure that water sources are at least 30m away from a latrine.

WHERE WATER IS STORED

DON'T	DO
– Let flies, dust, dirt or other objects fall in. – Put dirty cups, hands or ladles into it. – Let a sick person share the family drinking cup or put left over water back into the storage container.	– Always use a clean container for storing water. – Keep the storage container covered so that nothing can fall in. – Always use a clean ladle for taking water. – Keep separate water storage container and ladle for people who are ill.

Water Related Diseases and Their Causes

Diseases

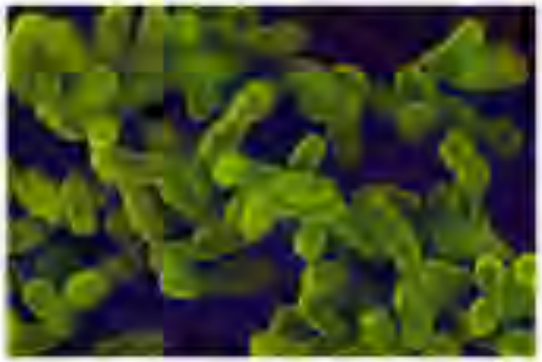
- Diarrhea
- Arsenicosis
- Fluorosis
- Schistosomiasis
- Intestinal Worms
- Guinea Worm
- Hepatitis
- Cholera
- Malaria
- Trachoma
- Typhoid

Bacteria

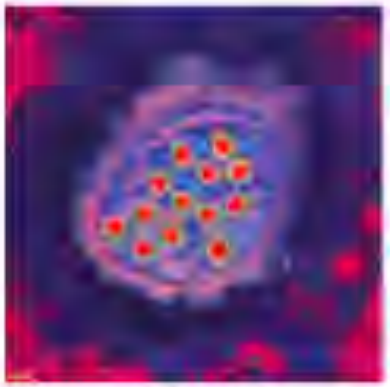
- *E. coli*
- *Salmonella typhi*
- *Shigella spp.*
- *Yersinia enterocolitica*

Viruses

- Hepatitis A/E virus
- Adenovirus
- Enterovirus
- Rotavirus



E. coli bacteria



Hepatitis A Virus

Chapter 8
Keeping water SAFE - Community Environmental Practices

STORIES - *the purpose of these stories is to stimulate discussion*

Read and discuss the stories before going through the chapter content.
After, revisit and re-examine the stories - are your answers the same?

Mkhulu Sibandze and His Grandchildren

Mkhulu Sibandze is roasting some meat with his three grandsons. Mkhulu Sibandze starts telling stories about when he was a young boy. This made the grandsons laugh because they couldn't imagine Mkhulu Sibandze ever being a young boy!

However, Mkhulu Sibandze said "but even you will get old some day!" - although the grandsons did not really believe this will happen, they asked Mkhulu to continue telling them stories.

Mkhulu said that when he was a little boy, the grass was very tall in the grazing land, the cattle ate well throughout the winter, and the water in the rivers was plentiful. In fact, after a heavy rain you often had to wait for 7 days before you could cross the river.

Sipho, the oldest of the grandsons said "Mkhulu, how could the grass be tall when today the grazing land is mostly guava and not grass?"

- Why do you think the grazing land has switched from grass to guava and *chromolanena*?
- Do you think there is any link between this and high water now only lasting for 1 day after a heavy rain?

Make Gamedze and Make Mkhonta

Make Gamedze always uses a spade to remove the grass around her house because she wants her homestead to look beautiful, and because she believes that this will keep away snakes and other loathsome crawling creatures.

On the other hand, her neighbor Make Mkhonta prefers to just trim the grass around her homestead. She is also a beekeeper so she plants flowers to make her home beautiful and for her bees to feed on its nectar.

- What affect do Make Gamedze's actions have on the environment? Explain your answer.
- What affect do Make Mkhonta actions have on the environment? Explain your answer.

Chapter 8
Keeping water SAFE - Community Environmental Practices

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8.2. Communities who understand the Water Cycle will find it easier to carry out activities in ways that protect and enhance their water sources.

8.3. People do not have control over how much rain their community receives - *but they do have control over <u>what happens</u> to the rain that their community receives.*

8.4. If there is not adequate ground cover, of the rain your community receives, only 5% will infiltrate - *while 80% will be lost to run off and 15% to evaporation.*

8.5. Human practices can have either a negative or positive affect on ground cover - *thereby either decreasing or increasing the amount of water available to your community.*

8.6. The Quality, Quantity, and Reliability of the water available in your community can additionally be reduced by other human practices.

8.7. Because Water flows downhill - a “water community” is different from a traditional community (or even the boundaries of a country).

Chapter 8
Keeping water SAFE - Community Environmental Practices

8.1. Communities have the responsibility to ensure that their water sources are environmentally protected - *as this will ensure SAFE water for their children.*

Refer to	Overview of step-by-step process	RWSB Approval required at 4 points in the process
Phase B	**Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures***	
Chapter 3	1) Letter of Request	
Chapter 3	2) RWSB Assessment	RWSB #1 - Approval of need for project
Chapter 3	3) Community mobilization Sensitize, awareness, and training activities with the objective 1) for communities to understand that they are the owners of the water system, and 2) for communities to develop the capacity to fulfill their responsibilities	
Chapter 4	4) Preliminary design (PD) The Preliminary design report includes the Community Readiness form (filled in by the Community Development Office (CDO) of RWSB after discussions / observations with the community)	RWSB #2 - Approval of Preliminary design report MOU signed between RWSB and the implementing agency
Chapter 4	5) Final design report	RWSB #3 - Approval of Final design report, including Environmental Compliance Certificate
Chapter 5	6) Fundraise for water scheme construction	
Chapter 5	7) Construction of water scheme	RWSB # 4 - Approval of Constructed schemes, resulting in Construction Completion Certificate
Phase C	**After the "Project Development Phase" - *Community Responsibilities***	
Chapter 6	8) Operation & Maintenance • Community - preventative maintenance • With possibility of some assistance from RWSB for major repairs	
Chapter 7 **Chapter 8**	**9) Community Responsibilities towards keeping their water SAFE - *before, during, and forever after water scheme construction***	

Although government or a donor can assist with purchasing pipes and fittings, this does not automatically mean that there will be water to flow through these pipes.

Every community has older people who remember water sources, wetlands, and springs that no longer have water. There are many water schemes whose water source has dried up.

8.2. Communities who understand the Water Cycle will find it easier to carry out activities in ways that protect and enhance their water sources.

The Water Cycle describes the natural movement of water.

Attachment #8.1 - Water cycle

Q1) Look at the diagram of the water cycle, can you describe each of the steps in the cycle?

1. **Evaporation** - is when water goes into the air (when water goes into the air from plants it is called Transpiration)
2. **Condensation** - is when water in the air forms clouds
3. **Precipitation** - is either in the form of rain or snow
4. **Infiltration** - is when water soaks into the ground, moving through the soil layers into the ground water
5. **Run off** - is when water does not soak into the ground but instead runs down hill
6. **Surface water** - as run off goes down hill, according to the slope of the land, it joins first into streams, which join into rivers, which may become lakes, and eventually all surface water flows into the ocean
7. **Underground water** - is water that has infiltrated through the soil and is held in underground rock formations (aquifers) i.e. “natures dam”.
8. **Wind** - moves water that is stored in the air to other places, contributing to cloud formation

Q2) Look at the diagram of the water cycle, can you match each of these water sources to the water cycle?

1. **Stream / river / lake** - formed from run off, however, the slope of the land and the volume of rain may make it flow through your community so quickly that it is not easily used.
2. **Borehole -** from ground water (rain water that has infiltrated into the ground)
3. **Catchment dam -** from run off
4. **River dam** - from blocking a river
5. **Spring -** any point where the water table (the highest level of the ground water) intersects the surface of the ground.

6. **Wetland -** formed when a spring (ground water) intersects with an area larger than an "eye", thereby becoming a marshy area

Note: Springs tend to be in mountainous or hilly areas. The point where the spring issues water is called the "eye". The spring "eye" can be visible at the surface or it may have to be excavated. There may also be more than one "eye".

8.3. People do not have control over how much rain their community receives - *but they do have control over <u>what happens</u> to the rain that their community receives.*

Historically, Swazi's settled in one place (a homestead, a community) instead of continually moving around to follow the rain (nomadic).

Therefore, communities are at a **Fixed-point** - which means that the only rain they receive "is the rain that falls over the area of land they are located at".

Three things happen to the rain that your community receives. It either:
1 - Runs off, or
2 - Evaporates, or
3 - Infiltrates into the ground

Infiltration recharges the ground water. Groundwater is what supplies the boreholes and springs - both of which are the preferred water sources for domestic water schemes.

8.4. If there is not adequate ground cover, of the rain your community receives, only 5% will infiltrate *- while 80% will be lost to run off and 15% to evaporation.*

Raindrops hitting the ground have impact (even during a normal rain, more so during a heavy rain).

Attachment #8.2 - Power of the Raindrop photo.

Walk around to view drip lines below roof overhangs - can you see the see the impact of the raindrop?

Even on a cement skirt, you will see a line in the cement - just from the impact of raindrops!

Nature's way to cushion the impact of the raindrop hitting the ground is **ground cover.** Ground cover **softens the impact of raindrops** on the soil. Softening the impact of raindrops on the soil reduces the bounce of the raindrop. Reducing the bounce of the raindrop **slows the speed of the raindrop**, thereby allowing the raindrop to **infiltrate** into the ground.

However, when rain falls on ground that does **not have adequate ground cover**, there is nothing to cushion the impact of the raindrop. Instead, the impact of the raindrop hardens the ground, thereby reducing infiltration and increasing runoff. The impact of the raindrop also **detaches soil particles,** contributing to erosion.

Attachment #8.3 - Diagram: Impact of Rainfall on Soil with no ground cover

Water loss -

- Soil with inadequate ground cover will not be able to cushion the impact of the raindrops, which is needed for infiltration to take place.
- Instead, 80% of the rain will be lost through run off - for example, if you receive 30 ml, 24 ml will quickly flow out of your community

Soil erosion -

- Soil particles detached by the impact of raindrops will be **transported** as part of runoff.
- This reduces the amount of topsoil available for farming - thereby reducing the fertility of the soil.

Reduction of base flow in rivers -

- Detached soil will eventually get deposited into water sources.
- This reduces the base flow of the water source (the amount of water normally found in a stream or river).

Reduced quality of water -

- High levels of siltation will reduce the quality of water sources
- Run off carries into the rivers and dams what ever it found on the surface (urine, feces, sand and soil, human rubbish….)

Increased maintenance of water schemes -

- Detached soil often gets into water pipes.This increases the problems of maintenance of water schemes
- It also reduces the flow of water through the pipes.

8.5. Human practices can have either a negative or positive affect on ground cover - *thereby either decreasing or increasing the amount of water available to your community.*

8.5.1. Human practices that negative affect ground cover include:

Human practice	How it reduces ground cover
Over grazing	If there are too many animals on a piece of land they will eat the grass faster than the grass can re-grow
Burning of the grazing area	Burning every year or before the rains have started destroys the grass but favors the bush (bushes store food in their woody stems so after a fire they can re-grow faster than grass).
Poorly constructed roads - *location of road and drainage of road*	Rain will quickly run off roads that have not been constructed on the appropriate contour (too steep) or that do not have properly constructed drainage.
Clearing the yard	Removing the grass or other ground cover within a homestead results in the building structure becoming damaged around the bottom.

	The evidence of this can be seen at most schools and homesteads, as the soil around the structure is eroded below the plaster line. Poor water infiltration results in increased water flow around the home, resulting in unattractive gullies and more standing water, which becomes a hygiene problem as it attracts flies.
Cutting of trees	Trees can be pruned for firewood but cutting of trees that are still growing reduces ground cover because the roots of large trees stabilize the soil under and around it.
Poor cultivation / farming practices	Poor cultivation and farming practices include turning the soil or leaving the soil exposed. The aim of these miss-guided practices is to increase crop growth by reducing competition with other plants. Yet increasing ground cover (through both dry and green mulch) will retain soil moisture and increase soil fertility, thereby solving these two problems at once.

8.5.2. These practices reduce infiltration and increase run-off, which negatively affects the amount of water available to your community:

A catchment dam	Will fill up with more soil than water (run off contributes to soil erosion).
A river dam	Will silt up with soil and therefore no longer have space for water
A bore-hole	Because of less infiltration, the ground water is not being recharged - so over time, the water table will become lower. Once the water table is below the depth of the bore-hole, the bore hole is said to have "run dry".
A spring	Because of less infiltration, the ground water is not being recharged - so over time, the water table will become lower. Once the water table has lowered below the point where the spring intersects the ground surface, the spring is dried up. This pattern usually starts during the dry season but after several more years, the spring may even dry up all year round.
A water scheme	At the intake into the scheme, soil will get into the pipes - reducing the quantity flowing through the pipes, reducing the quality of the water flowing through the pipes, and increasing the maintenance of the scheme.
Are these situations familiar to you?	

8.5.3. Human practices can also have a positive affect on ground cover - thereby increasing the amount of water available to your community.

Ground cover is any type of material that reduces the impact of the raindrop hitting the ground while still allowing for infiltration. Examples include vegetation, mulch, crushed stone….

Therefore, human practices that protect and promote ground cover will increase infiltration, thereby increasing the amount of water available in your community.

As an added advantage, infiltration also cleans the water (the small openings between soil particulars screen the water as it passes through).

Activity #8.4 - Other than plant cover, can you think of 5 other methods to ensure adequate ground cover (the methods must provide ground cover but allow for infiltration of water)?
1 - 2 - 3 - 4 - 5 -

Attachment #8.5 - Vusweni grazing land
Look at the section of the photo with short grass - • *What is happening to most of the rain that falls on this section of the land?* • *Is this a drought?* • *Is this situation a donor problem?* *Look at the section of the photo with the tall grass -* • *What is happening to most of the rain that falls on this section of the land?* • *Why might this section of grass be so much taller than the other section of grass?*
We can concentrate on our problems or we can repeat our successes.

8.6. The Quality, Quantity, and Reliability of the water available in your community can additionally be reduced by other human practices.

Point Source contamination - for example, pollutants such as untreated sewage, pesticides and fertilizers that get into water sources - either through the air, rainwater run off, or seepage.

Attachment #8.6 - Point Source Contamination of Water
• *Review the different causes of point source contamination* • *Are any of these happening in your community?* • *If yes, what can <u>you</u> do about it?*

Poor sanitation and hygiene practices - for example, littering that flows into rivers, urinating where ever, carelessly disposing of car oil.

Poor management of forests - for example, permitting commercial forests to encroach within 30 M on either side of a watercourse

Alien vegetation - for example**,** *Chromolaena* significantly increases water consumption, thereby reducing water resources available for humans[26]

Activity #8.7 - Based upon your observation -
Does Chromolaena grow more easily in: • *Land that has already been overgrazed? Or* • *Land that is still producing tall grass?* *What came first in Swaziland - overgrazing? Or Chromolaena?*

Climate change - it is now generally accepted that there is a slow rise in the average temperature around the world and that this phenomenon will tend to increase the severity of natural events (such as more storms).

Swaziland, which on a global scale receives below average rainfall, might become more arid. Floods may become more severe when they happen, both in terms of peaks and in terms of volume of sediment transport.[27]

While many of the factors contributing to climate change are outside the scope of a rural Swazi community, maintaining ground cover will help mitigate climate change - and we all can do this, starting within our own homes.

8.7. Because Water flows downhill - a "water community" is different from a traditional community (or even the boundaries of a country).

Water naturally flows downhill. Therefore a river basin is the area of land in which water flows into the same river system.

Water flows from the furthest point (on the upper boundaries of the basin) to the lowest point. Within this drainage area, surface water and groundwater systems are closely related (the base flow of most rivers is highly dependent on groundwater i.e. continual recharge of rivers).

Within a river basin, smaller hills form drainage areas referred to as "catchment areas."

Activity #8.8 - Provide a visual demonstration of a river basin using play-dough or other modeling material.

Within a river basin, water and environmental issues are closely connected. So your practices affect the water for your neighbor, and your neighbor's practices affect your water.

For this reason, the Swaziland Water Act of 2003 established River Basin Authorities.

Swaziland lies in three international river basins - *rivers rise in the Eastern Highlands of South Africa, flow through Swaziland, and then discharge into the Indian Ocean in Mozambique*	River Basin Authorities provided for in the Swaziland Water Act of 2003.
1 - Inkomati Basin	1 - Lomati River Basin 2 - Komati River Basin
2 - Umbeluzi Basin	3 - Mbuluzi River Basin
3 - Maputo Basin	4 - Lusutfu River Basin 5 - Ngwavuma River Basin

Activity #8.9 - Discuss these questions:

- *In your area, is the "water community" the same as the traditional community?*
- *If not - does this situation cause any challenges?*
- *Given that the Lomati River starts in Swaziland before flowing into South Africa and Mozambique, do you think it is correct that Swaziland signed a treaty with these countries that governs the combined useage of the Lomati river?*

The answers to these questions are the rational for the Integrated Water Resources Management Plan (IWRMP) mentioned in Chapter 2

Chapter 8
Keeping water SAFE - Community Environmental Practices

SELF REFLECTION -
If you want to change your community, you need to start with yourself.

Are you part of the **problem** to the water problems in your community?
Or
Are you part of the **solution**?

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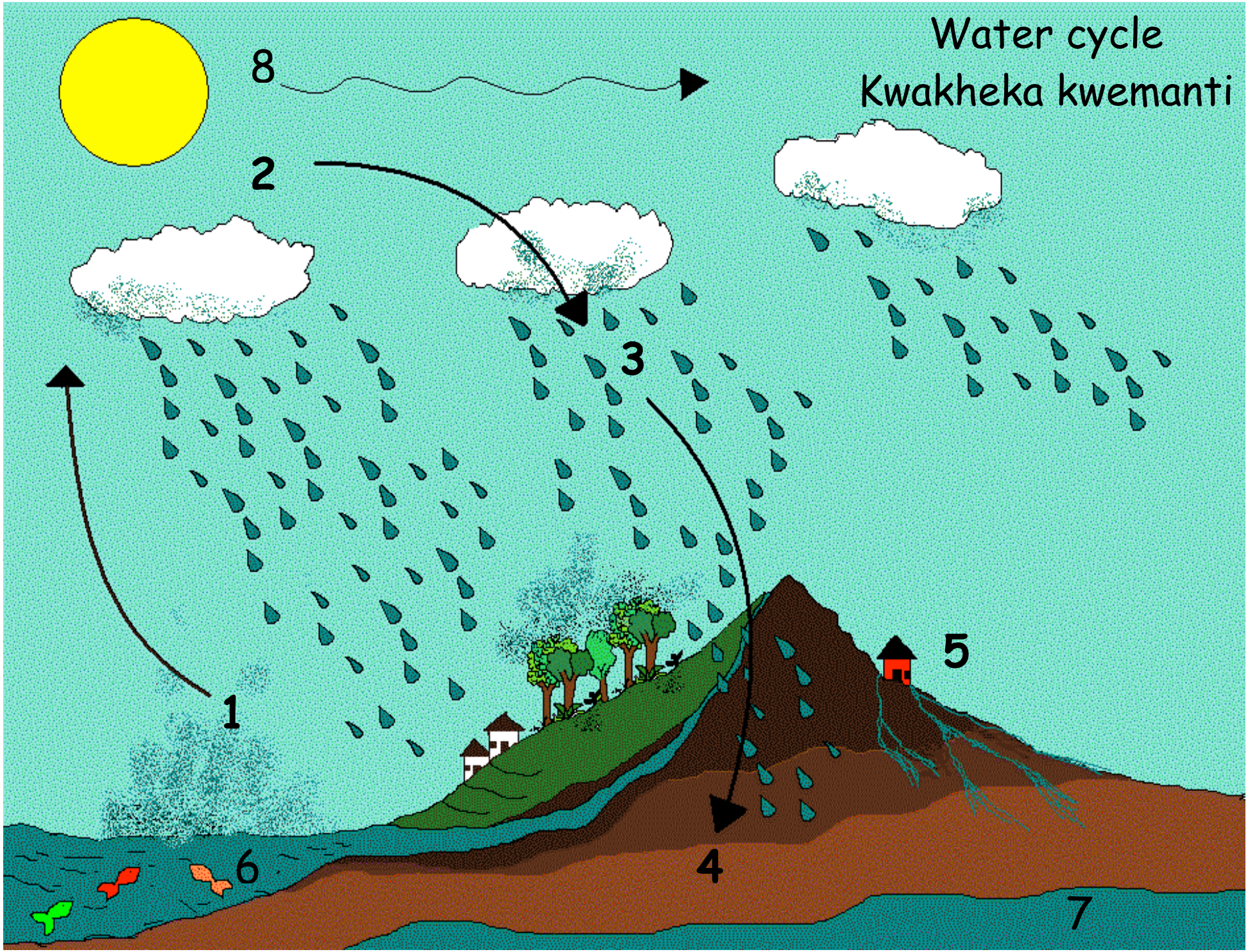
1. How much uncovered ground do you have around your homestead? How about in your community? What plan can you develop to correct this situation?

2. What advice would you give to farmers on overgrazing when you think about how this affects the rise and fall of the water table beneath us?

3. Most school children in Swaziland attend 5 years of agriculture classes (2 at primary and 3 at secondary).
   - In your opinion, is there evidence of this training at homestead level?
   - What advice would you give to this situation?

4. Think about your community -
   - When it rains, how much topsoil is carried into the rivers and onto the road?
   - Will this topsoil be replaced in time for your children to grow crops?

5. Ask older people in your community about the rivers when they were younger:
   - For how long after a heavy rain did the rivers run high?
   - What colour was the water in the river after a heavy rain?
   - How are their answers different from today?


Water cycle
Kwakheka kwemanti
8
2
3
1
5
6
4
7

Water cycle
Kwakheka kwemanti

1 - Evaporation - kuphakama kweMswakama
2 - Condensation - kugucuka kweni swakama - kubangemanti
3 - Precipitation - litulu / imvula
4 - Infiltration - jungena kwemantiemhlabalsini
5 - Run off - kwendlula kwemanti
6 - Rivers - umfula
7 - Underground water table - emanti langaphansihwemhlaba
8 - Wind - umoya

Power of water

The two diagrams (Figure 3.3 and Figure 3.4), below illustrate the effect when there is no plant cover for the soil and when there is plant cover.

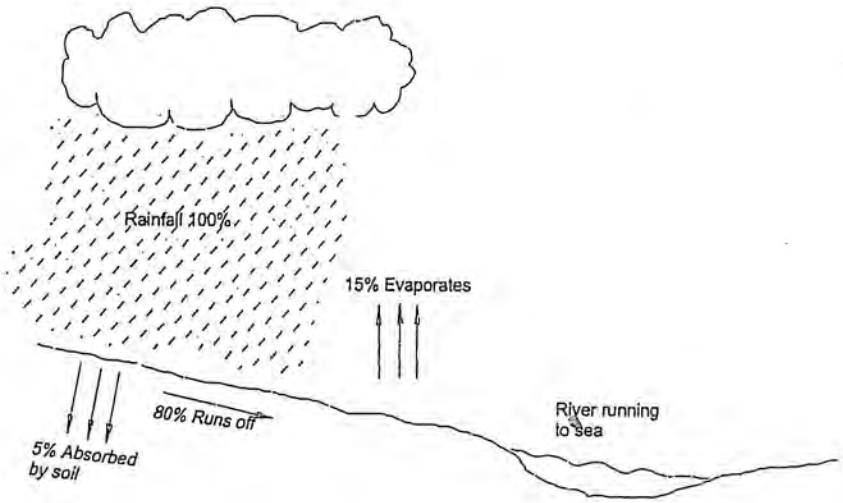


Figure 4.3: The impact of rainfall on soil with no plant cover

Approximately 95% of the rain that falls on soil with no plant cover, flows off the surface to rivers and streams. The presence of vegetation retains the water and assists with the recharge of groundwater aquifers.

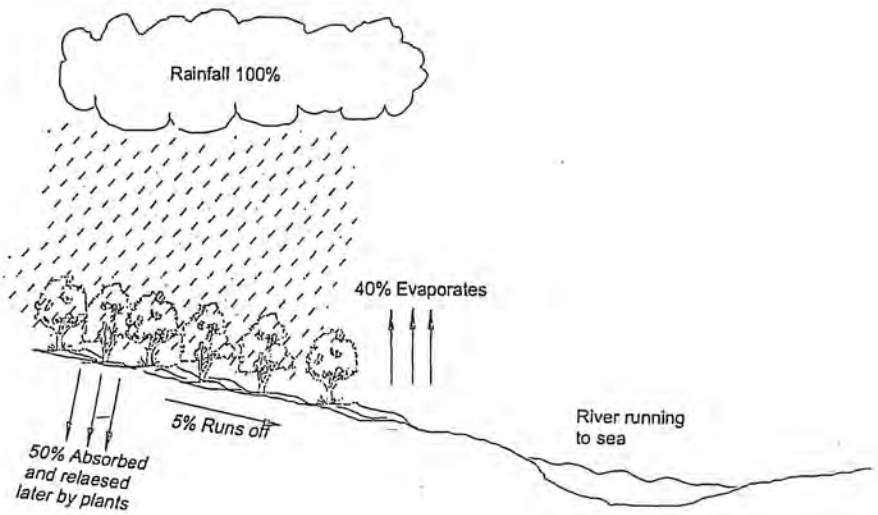
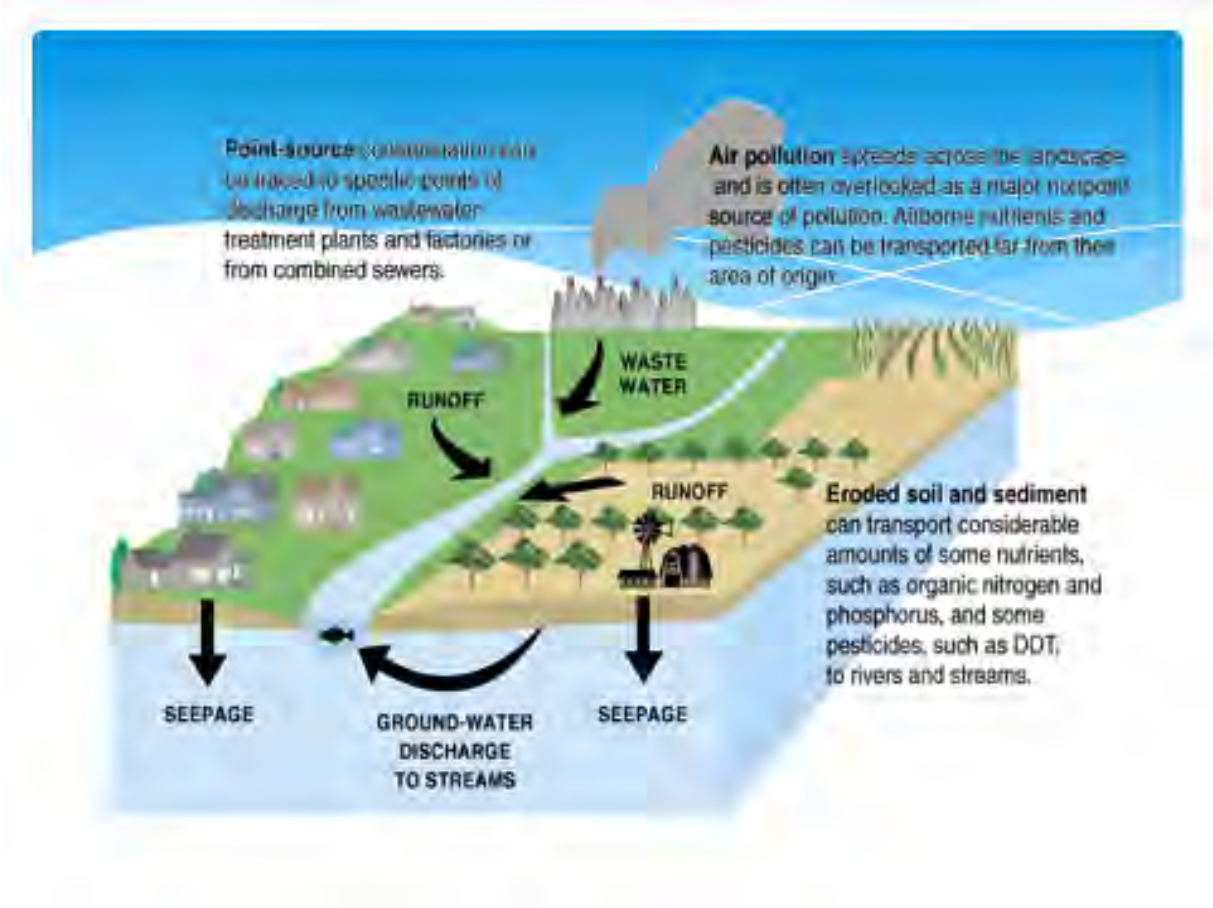


Figure 4.4: The impact of rainfall on soil with plant cover



Point Source Contamination of Water[1]

[1] Reference - National WASH Forum Water Quality Presentation - by Nompumelelo Ntshalintshali, SCDO, Depart of Water Affairs

Handout
Overview: Rural Water Supply Branch's (RWSB) required standards and procedures for developing rural domestic water schemes

	Step-by-Step "Water Scheme Development" Process	Comments
Project Development and Construction Phase - *Rural Water Supply Branch's (RWSB) required Standards and Procedures*		
1	**Letter of Request** • Letter of request from Umphakatsi. Must have the stamp and all information as required by RWSB.	At this point in time, the community may or may not already have a water committee i.e. Interim committee
2	**RWSB Assessment** **RWSB #1 - Approval of need for project** • RWSB is obligated to respond within 1 month - either yes or no • The community can ask that RWSB to put its response in writing.	RWSB meets with the Bandlakhulu: • To confirm if the request is community driven and if the details of the letter match with the reality on the ground i.e. confirm authority of the request • To assess community leaders understanding of their role and responsibilities i.e. that project doesn't rest on shoulders of only a few community members or on RWSB • To carry out a quick technical walk about of the proposed project to get a feel for the potential and scope of the project, the potential water sources and coverage area - include places that are off limits, for example, burial sites
3	**Community mobilization** Below, listed in the ideal order to undertake, assuming that funds and logistics allow	Objective - 1) communities understand that they are the owners of the water system, 2) communities develop the capacity to fulfill their responsibilities
-	Participatory Hygiene and Sanitation Transformation (PHAST) training • 5 days • For the community at large	Due to budget and logistic constraints, this training does not always take place If it was always possible to ensure that PHAST training could take place, the election of the WSSC should ideally take place after this training
-	Sensitize / awareness training • 1 day • For the community at large	Ideally, training should be carried out by RWSB and MOH together but this is not always possible due to budget and

	• Roles and responsibilities of the water committee • Selection process • Go through the guidelines of what should be included in the constitution for the Water Supply and Sanitation Committee Constitution (WSSC) At the end of the day the community elects the WSSC that will replace the "interim committee" - there is nothing stopping the community from reelecting the existing committee or electing a totally new committee.	logistical constraints WSSC constitution can only provide for Primary Water Usage (as defined in Water Policy) - or less than Primary Water Usage (for example, removal of ¼ HA farming provision if water is limited or if community wants to extend coverage….) Neither RWSB or the MOH has any direct influence over the election of the WSSC - rather this activity is under authority of the Umphakatsi
-	Training of WSSC - together with key community representatives Ideally, 3 training sessions of 5 days each • 5 days during planning process • 5 days during implementation period • 5 days post project M & E	Ideally, training should be carried out by RWSB and MOH together but this is not always possible due to budget and logistical constraints Key community representatives should include a cross section of key sector players from the community (women, associations, leaders….) and that there is a geographical representation (especially if community is zoned) Understanding of participants is greatly improved when training includes WSSC members from other communities who are at different stages in the process i.e. peer mentoring
-	Community construction of toilets and rubbish pits • Ideally, there should be 100% toilet coverage prior to start of a RWSB scheme (constructed during design period). • However, RWSB will start on a water system if there is at least 80% coverage • By already having good coverage of toilets, a community's application to RWSB will be well motivated.	Communities can motivate for assistance from the Ministry of Health (MOH) for construction of toilets prior to applying to RSWB The closest Health Centre (clinic, centre, hospital) will refer the community to the Environmental Officer (recently, MOH changed name from Public Health Officer to Environmental Officer) At times the MOH can supply - • Vent pipe • 2 bags of cement (1 x 1 M slab and to start on walls) • 2 iron sheets • Blocks for lining of pit if needed (type of soil) - however, walls can also be of

		mud & stick…. The MOH is not obligated to provide these supplies; however, when funds allow, as a strategy to support communities who have shown they are motivated, the MOH has provided these supplies.
-	Operation and Maintenance (O & M) funds • The amount is usually set at SZL 100 / homestead.	The critical issue is "the number of homesteads who have paid" rather than the "amount of money in the bank account".
4	**Preliminary design (PD)** Preliminary Design Report must include: • Community readiness form - completed by the WSSC, with assistance as needed • Constitution of the WSSC • Preliminary design • Map - including a list of all the homesteads, and marked on the map • Umphakatsi letter (from #1 or a new one) **RWSB #2 - Approval of Preliminary design report** • RWSB is obligated to respond within 1 month - either yes or no • The community can ask that RWSB to put its response in writing.	The Preliminary Design can be carried out by either RWSB or another agency - in conjunction with the WSSC. Regardless, the PD must follow the format laid out in RWSB's Design Manual for Rural Water Supply Systems The Preliminary design process includes identifying the land for the water intake, water treatment…. Thereafter the community must apply for use of said land for water system within the appropriate structures / processes To ensure that all of the critical technical and community issues have been addressed, before the Preliminary design is approved by RWSB, it must be verbally presented to the community (through the WSSC) for their comments. Regardless if RWSB or another agency prepares the PD - a verbal presentation of the PD report must be given to an internal technical committee within RWSB, resulting in • Approval by RWSB, or • Send back for specific corrections
5	**Final design report** **RWSB #3 - Approval of final design report** • RWSB is obligated to respond within 1 month - either yes or no • The community can ask that RWSB to put its response in writing.	The Final Design Report can be carried out by either RWSB or another agency. Regardless, it must follow the format laid out in RWSB's Design Manual for Rural Water Supply Systems. Currently, RWSB designs for a 10-year period. **Regardless if carried out by RWSB or**

		another agency - a verbal presentation of the report to an internal technical committee within RWSB must take place • Approval • Send back for specific corrections
6	**Fundraise for water system construction** • Community contributions • Government sources of funding • External sources of funding	Regardless of the sources of funding, RWSB's approval at 4 stages in the process is required, as is adherence to their design standards. Therefore, one should not fundraise from external sources before RWSB Approval #3 has been granted. However, from the very start, community contributions should be encouraged. The amount of community contributions and toilet coverage will also motivate fundraising from external sources.
7	**Construction of water system** Site handover of the project to the RWSB should only take place once the following activities have been conducted • Final inspection of works in presence of RWSB • Snag list compiled (list of small things that need repairing - have to correct before final certificate issued) **RWSB #4 - Approval of Constructed schemes i.e. Construction Completion Certificate** • RWSB is obligated to respond within 1 month - either yes or no • The community can ask that RWSB to put its response in writing.	Ideally, before the start of construction, the community should have in place: • Toilets - 80% of all homesteads have constructed a toilet • O & M fund - 80% of all homesteads have paid their SZL 100 (need 80% of homesteads to pay, not just X amount of money) Retention - it is standard contracting procedure for the funding or implementing agency to withhold 10-15% of payment due contractor for a 1 year period - to ensure that any problems are fixed
After the "Project Development Phase" - *Community Responsibilities*		
8	**Operation and Maintenance (O & M)** Community - with possibility of some assistance from RWSB for major repairs	Community needs to understand - and plan for - O & M prior to construction of system Monthly user fees are to cover the expenses of <u>delivering</u> the water from the source to the taps - not for the water.

9	**Community Responsibilities towards keeping their water SAFE**	Before, during, and forever after water scheme construction

1. **Operation and maintenance** of the water scheme - as evidenced by
- A fully functioning Water Supply and Sanitation Committee (WSSC) that was elected through proper procedures to carry out tasks in accordance with its constitution that was approved at community level
- The majority of the homesteads understand the need for, and continue to contribute to Operation and Maintenance funds:
  - Construction costs - 25%, through the provision of labour, local materials, and cash contributions
  - All minor repair costs - in accordance with the policy of the RWSB, the community is responsible for conducting minor repairs on rural water supply schemes in Swaziland and the costs associated (100%), including any compensation for water minders.
  - Major repair costs - in accordance with the policy of the RWSB, the community is responsible for at least 50% of the material costs of a major repair and the full cost for O & M of any private connections

2. Ensuring that **hygiene and sanitation** practices are to the standard necessary to realize the full value of the water system - as evidenced by
   - 100% of homesteads have constructed and use toilets
   - 100% of homesteads engage daily in appropriate hygiene practices, including solid waste disposal

3. Ensuring that water sources are **environmentally protected** so as to provide SAFE water for the next generation

Although training related to these topics is usually carried out during 2) Community Mobilization, from the start, communities need to understand these as ongoing responsibilities that need to be continually addressed before, during, after construction of a water system.

Ongoing community capacity building training - when the WSSC is replaced, there is a challenge of training the WSSC members.

- One solution is to set the WSSC Constitution so that WSSC members rotate out 2 at a time, leaving behind several members who can train the new members.

- Another solution is community Training of Trainers (TOT). Both the MOH and RWSB have previously carried out this activity and have manuals available for community direct training and TOT training - but funding is limited.

- Communities can also make use of individuals with experience to carry out training within their communities - for example, retired people with direct experiences in these topics.