Sustainable Community Management of Urban Water and Sanitation Schemes (A Training Manual)

MAMLAKA YA MAJI SAFI NA MAJI TAKA
DAWASA

30 years
wsp
water and sanitation program

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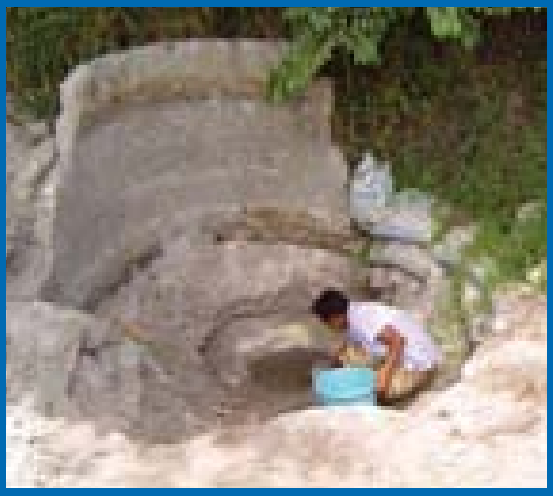

Empowering communities to improve water and sanitation services

MAMLAKA YA MAJI SAFI NA MAJI TAKA
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30 years wsp water and sanitation program

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Abbreviations

CLO	Community Liaison Office
CWSSP	Community Water Supply and Sanitation Project
DAWASA	Dar es Salaam Water and Sewerage Authority
DAWASCO	Dar es Salaam Water and Sewerage Corporation
NRW	Non Revenue Water
O & M	Operations and Maintenance
TZS	Tanzanian Shillings
WSP	Water Services Provider
WSS	Water and Sanitation Services
WUA	Water User Association

Preface

The aim of this capacity building programme is to improve the efficiency and positive impact of urban, community-managed water and sanitation schemes. The manual was originally developed in collaboration with the Dar es Salaam Water and Sewerage Authority's (DAWASA) Community Water Supply and Sanitation Program (CWSSP); but some of the material is applicable to other urban communities who may need to improve their management practices and increase the likelihood of a sustainable operation.

The material is especially relevant for communities who have a relationship with the main water services provider and who are also committed to hiring an Operations Manager. The Operations Manager should be a paid employee and his/her performance should be reviewed by the beneficiaries.

The material included in this manual is intended to provide a trainer with the tools and information to build management capacity in the target communities. Although the manual is geared for trainers, it has also been designed to serve as a reference tool for communities who may wish to review the material on an on-going basis.

The manual covers technical issues such as operations and maintenance activities—but also has a strong focus on institutional, managerial and financial issues. The seven modules are meant to equip communities with the tools to eliminate or reduce the major constraints in managing infrastructure and providing services. The manual also aims to clarify the roles and responsibilities of all stakeholders.

The target audience for the training is the communities who are actually managing WSS schemes. However, others who support these schemes (government, planners and donors) will also find the manual useful for helping to ensure that communities have the appropriate skills to manage their infrastructure schemes.

The courses in this training manual are based on participatory training methodologies, an important feature of which is to draw on the experiences of all the participants, under the guidance of an experienced facilitator. The participants will likely range from those with extensive experience to those with no experience managing a water supply and /or sanitation scheme. However, where possible, the trainer should encourage sharing of ideas and experiences throughout the training.

1 Course Introduction

Module 1 Objectives

By the end of this lesson, the trainees should be familiar with:
(i) the objectives of the training course; and
(ii) the concept of sustainability.

Target Trainees:

- Executive Committee members
- Water Users Association
- Operations Manager
- Accountant
- Technician

Methodology(ies): introductions, discussion, lecture

Materials : flip chart, markers/pens, handouts of course outline

Time Required: 30 minutes

Note to the trainer: After welcoming the group and going through a round of introductions, ask the participants– what are your expectations for this course?

Record their answers on a flip chart.

1.1 General objective of the training course

To empower communities with the management, technical, financial and institutional skills to manage their WSS schemes in an effective and sustainable manner.

Note to the trainer: Next the group should discuss the word sustainability that is often used. What does it mean? Ask the participants for their understanding of the word sustainability. Why is sustainability important? After they have answered, share and discuss the following explanation of sustainability.

A system is said to have achieved sustainability when:[1]

(a) It is functioning and being used;

(b) It is able to deliver an appropriate level of benefits (related to quality, quantity, convenience, comfort, continuity, affordability, efficiency, equity, reliability, health);

(c) It continues over a prolonged period of time (which goes beyond the life cycle of the equipment);

(d) Its management is institutionalized (goes beyond the key people involved now and will continue once those people are not involved);

(f) Its operation, maintenance, administrative and replacement costs are covered at local level (through user fees for example);

(g) It can be operated and maintained at the local level with limited but feasible external support (for technical assistance, training and monitoring); and

(h) It does not affect the environment negatively.

[1] *IRC International Water and Sanitation Centre, website: http://www.irc.nl/page/7584*

Factors which influence sustainability[1]

Institutional and legal framework

Support - Adequate legislation - Resource development

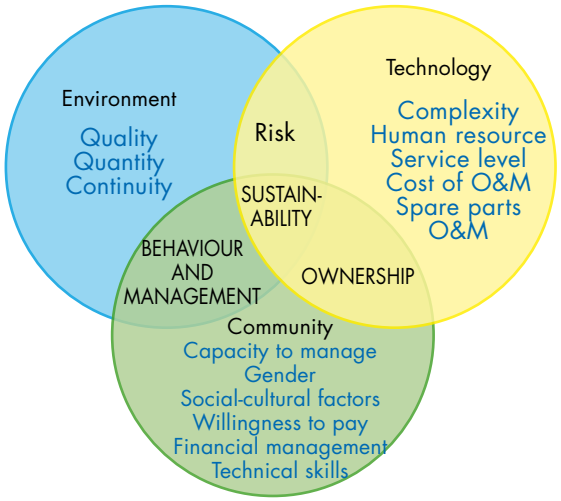


Figure 1: Factors which influence sustainability

1.2 Course Outline

Next, the trainer should take the participants through an outline of the course and what they can expect over the next few days.

Table 1: Outline of Modules

Section 2: Organizational Structure

(i) the governance & management structure of WSS schemes

(ii) the roles and responsibilities of different groups and individuals

(iii) conflict resolution

Section 3: Communications

(i) discuss the characteristics of high quality communication & how to improve communication

(ii) understand how to communicate with internal and external CWSSP stakeholders

(iii) how to hold effective meetings

Section 4: Operations & Maintenance

(i) the technical aspects of daily operations

(ii) the importance of maintenance

(ii) the roles and responsibilities of stakeholders in O&M

Section 5: Controlling NRW

(i) the benefits of controlling non-revenue water (NRW)

(ii) the potential sources of NRW

(iii) key measures that may be implemented to minimize NRW

Section 6: Customer Service

(i) have a better understanding of the key elements of high-quality customer service

(ii) have the practical tools to improve customer care

Section 7: Financial Management

(i) Understand the general principles of bookkeeping & financial management

(ii) Understand how to create and read financial statements

Course Review

Course Evaluation

The trainer should ask the participants if they have any questions regarding the course content.

[2] *CINARA-IRC course material: Gestion para la sostenibilidad en programas de agua potable y saneamiento (Management of sustainability in drinking-water and sanitation programmes), 1994-98.*

2 Organizational Structure Module

Module 2 Objectives

By the end of this lesson, the trainees should understand:

(i) the governance & management structure of WSS schemes;

(ii) the roles and responsibilities of different groups and individuals; and

(iii) how to hold effective meetings.

Target trainee(s):

- Executive Committee members
- Water Users Association
- Operations Manager
- Accountant
- Technician

Methodology(ies): lecture, discussion, activity

Materials: flip chart, markers/pens, handouts of management structure

Time Required: 2 hours

2.1 The Need for CWSSP

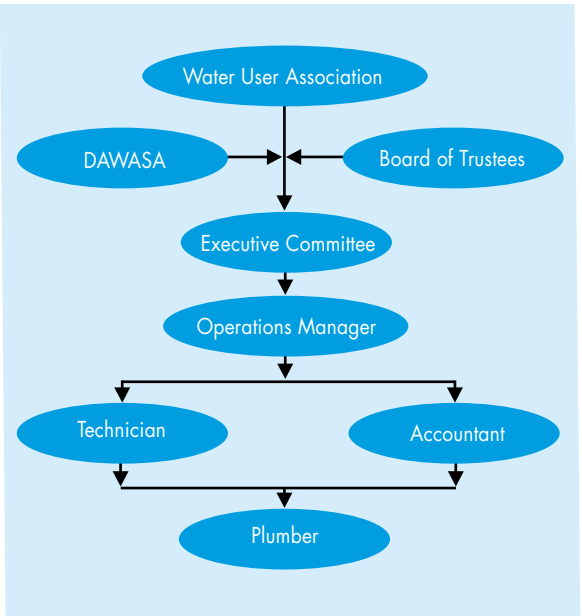
Community-managed schemes in urban areas are usually developed to reach communities that are not - and are unlikely in the near future - to be served by the main water services provider. These communities are likely to grow in area and population and they have water and sanitation demands that will only be met with innovative solutions.

Capacity building of these communities is essential to the implementation, management and long-term sustainability of the water and sanitation systems.

2.2 Governance & Management Structure of Urban WSS Schemes

Note to the trainer: Make sure to stress the importance of having a clear organizational structure. Organizations with clear roles and responsibilities - and enforcement of roles and responsibilities– face less confusion and conflict.

Figure 2: An example of the organizational structure used in Dar es Salaam



2.3 Roles and Responsibilities

The trainer will take the participants through the roles and responsibilities of each party in this structure, starting with the community level.

(i) Water Users Association

The following governance and management structure was designed to help ensure that community-managed WSS schemes ***receive adequate support;*** are ***managed in a sustainable manner***; and achieve ***transparency in operations.***

The Water Users Association (WUA) is a consumer membership body.

- ☑ All residents of the area may register at the Community Water Management Office and everybody is encouraged to become a member.
- ☑ There is no fee to become a member of the WUA.
- ☑ The purpose of the WUA is to strengthen consumer voice and to provide a forum for residents to dialogue with their water services provider and the Executive Committee.
- ☑ The WUA shall meet on a quarterly basis to discuss any water and sanitation related issues in the community—especially those that the WUA would like to bring to the attention of the Management Team and the Executive Committee. These quarterly meetings provide a forum for discussion and a sharing of information related to WSS services.
- ☑ The WUA should be 'gender-conscious'. Women are primarily responsible for obtaining water and are usually left out of the decision-making process. The WUA Executive Committee should be gender-balanced.

The WUA will elect the Chair of the WUA and also the members of the Executive Committee. The frequency of elections will depend on the WUA Constitution. The WUA must study and approve the Rules and Regulations for the functioning of the Executive Committee and the Management Team.

The Chair is responsible for calling and leading WUA meetings and liaising with the Executive Committee.

Note to Trainer: Ask the participants why all residents should become a member of the WUA?

Possible Answer: In order to have a voice in the development of WSS infrastructure and management in the community. In addition, the WUA may hold the Executive Committee accountable.

(ii) Executive Committee

The Executive Committee members must be residents of the beneficiary community. They are elected by the WUA and should be respected and trustworthy members of the community.

The overarching purpose of the Executive Committee is to provide leadership and vision for the overall management of the infrastructure.

The Committee has the following responsibilities:

- ☑ Sensitizing the community (through the WUA) on the health risks of drinking water from shallow wells and the reasons we must pay for drinking water.
  - Water borne diseases can be avoided by using water from the community system. This water must be paid for because there are costs to producing and distributing it but there are enormous health and convenience benefits to the end consumer.

☑ Employing the Management Team through a competitive and transparent process (which may consist of an Operations Manager, Accountant, Technician, Meter Readers and Plumbers)

- Do candidates meet the criteria?
- Have the positions been adequately advertised?

☑ Setting performance targets for the Operations Manager

- The Committee will need to set realistic targets for the Operations Manager to achieve. These targets should be outlined in his/her contract and should be discussed in detail with the Manager to ensure that he/she understands what the Committee expects. Ideas for target categories include revenue collection, billing efficiency or non-revenue water for example - but the Committee must attach a numeric goal to each target.

☑ Monitoring performance of the Operations Manager

- At the mid-term and end of the Operations Manager's contract, the Executive Committee should review the Manager's performance. Has he/she met the targets set by the Committee? Why or why not?

☑ Preparing progress reports for the Trustee Board, WUAs and Water Services Provider on a quarterly basis

- The Board, WUA and Water Services Provider will monitor the progress of the overall operations. The Executive Committee (with the help of the Operations Manager) is responsible for submitting a progress report to the water services provider four times a year (i.e. quarterly or every 3 months).
- In addition to its monitoring purpose, it is a way to communicate with other stakeholders over successes and challenges.
- The report should include financial statements for the period and the communication form *(see Annex 1)*.

☑ Meeting with the WUA on a quarterly basis to discuss progress and any WSS issues.

- The Committee shall organize a meeting with the WUA every 3 months to discuss issues of interest. The WUA Chair and the Committee Chair will work together to outline the agenda for this meeting.

Figure 3: Checklist of Leadership Qualities

√ Always display integrity - you are setting an example to those around you
√ Define and communicate your vision
√ Learn to motivate your team
√ Be a good listener
√ Know your strengths & weaknesses
√ Maximize on others' strengths

In addition, the Executive Committee shall ensure transparency in financial management and make documents available to the Water Services Provider and the WUA upon request.

The Chairperson shall be the main contact with Water Services Provider and the WUA.

The specific roles of each Executive Committee member will vary depending on that Committee's unique constitution. However, all members are expected to abide by the group's constitution. The Constitution should specify the method of election, duration of terms and term limit of executive officers. The Committee shall meet at least on a monthly basis.

(iii) Management Team

The management team is hired by the Executive Committee.

- The performance targets for the Operations Manager are set by the Committee and outlined in a performance contract.
- The Committee shall evaluate the Manager's performance on a regular basis.
- The Committee reserves the right to fire Managers who are unable to meet targets.

The size of the management teams will vary depending on the size of the scheme (depending on the number of customers or the geographical area for example) and initial profitability. Each Committee will have to evaluate whether they can afford only an Operations Manager in the beginning stages, or a bigger team including an Accountant, Technician and assistants such as plumbers and meter readers. The size of the team will likely grow over time but it is okay to start with a small management team - or to hire some people on a part-time basis.

All members of the Management Team are responsible for reducing non-revenue for water - this includes reporting leaks and illegal connections; encouraging timely payments and reporting broken meters or unusual meter readings (very low or very high consumption - obvious if there are dramatic fluctuations from month to month).

(a) Operations Manager

The Operations Manager is in charge of day-to-day operations of the water supply and sanitation infrastructure. He/she supervises the Accountant and the Technician. The Operations Manager reports to the Executive Committee. The Executive Committee will have to decide on the criteria that are appropriate for the specific community. The criteria below are an example used in Dar es Salaam.

He/she should meet the following selection criteria:

- A holder of diploma or a Full Technician Certificate (in fields such as, Water/civil Engineering, Business Management or Accounting). An advanced diploma will be an added advantage.
- Basic computer skills (Word, Excel)
- Fluent in local and business languages
- Preference given to a resident of the community
- Should not have a criminal record (for example theft) or reputation of bad conduct in the community (it is important that the Operations Manager is respected in the community)

Although the Accountant is in charge of bookkeeping and revenue collection, the Operations Manager must ensure that the proper systems are in place for transparency and efficient bookkeeping. He/she is ultimately responsible for reporting to the Executive Committee and providing quarterly financial reports.

Although the Technician is in charge of maintenance, repairs and general technical oversight of the infrastructure, the Operations Manager must ensure that the Technician has a standard system for preventive maintenance and that he/she has the adequate tools to accomplish the job.

The Operations Manager will also be responsible for revaluating the Human Resources needs of the Team and proposing new hires (part-time or full-time) to the Executive Committee for approval. The size of the team will change over time as the network expands and the customer base grows. The Operations Manager will set performance targets for his/her staff and evaluate these on a regular basis, providing feedback to staff.

(b) Accountant

The Accountant reports to the Operations Manager. His/her main responsibility is to keep accurate financial records and to advise the Operations Manager on overall cash flow issues and financial management.

The Accountant should meet the following selection criteria:

- ☑ Strong command of local and business languages
- ☑ 2 years experience in a relevant field
- ☑ Basic computer skills (Word, Excel)
- ☑ A degree in Accounting, Finance or Management is preferred.
- ☑ Preference given to a resident of the community
- ☑ Should not have a criminal record (for example theft) or reputation of bad conduct in the community

The Accountant shall carry out the following tasks:

- ☑ Register new customers
- ☑ Read and record meters (or supervise meter readers)
- ☑ Prepare and disseminate bills
- ☑ Collect payments
- ☑ Engage with defaulting customers (alerting them of disconnection in the case of nonpayment for example);
- ☑ Prepare financial reports.

In some cases, Meter Readers or other assistants may be hired to work with the Accountant (either on a part-time or full-time basis—perhaps only during the week of meter reading and bill distribution for example). The Accountant is in charge of managing Meter Readers.

(c) Technician

The Technician is responsible for operating and maintaining the infrastructure. He/she reports to the Operations Manager. The Technician is also responsible for ensuring that household connections meet the minimum technical standards (for example that they use the right quality of pipes and that the trenches are deep enough).

He/she must meet the following selection criteria:

- ☑ Technician in plumbing or water works grade I
- ☑ Experience with both water and electrical/ mechanical works
- ☑ Basic computer skills (Word, Excel) are a plus
- ☑ Strong command of local language
- ☑ 2 years of relevant experience
- ☑ Preference given to a resident of the community
- ☑ Should not have a criminal record (for example theft) or reputation of bad conduct in the community

The Technician's main responsibilities include the following:

- Preventive maintenance of infrastructure
- Leak detection and control
- Connecting customers and installing meters
- Ensuring that the quality of water is safe
- Disconnecting non-paying customers and illegal connections
- Keeping an updated asset register and a log book of repairs

Additional plumbers may be hired to assist the Technician as needed, on a full-time or part-time basis. The plumbers will be managed on a day-to-day basis by the Technician. Requests to hire additional plumbers must be presented to the Operations Manager who together with the Executive Committee, will make the decision on whether or not to hire new personnel.

(iv) Water Services Provider (WSP)

The Water Services Provider's roles and responsibilities will vary from city to city. What is important is that the WSP clearly communicates its role in the program to avoid confusion amongst stakeholders and to ensure that expectations are realistic.

Issues that need to be clarified:

- ☑ Is the main WSP responsible for financing construction?
- ☑ How often should the communities report to the main WSP?
- ☑ Do the communities need to apply for a license?
- ☑ Will the main WSP assist with maintenance costs?
- ☑ Can the communities call upon the main WSP's staff for on-going technical support? To resolve conflicts?

(v) Board of Trustees

The composition of a Board will vary from city to city. Possible members include representatives from national and local governments (e.g. Parliament, City Council), the Water Services Provider and civil society. The Water Services Provider CEO shall appoint the representatives of the Board.

The Board of Trustees' main responsibility is to give political backing to the community-managed schemes and to review any high-level obstacles that need to be addressed, such as policy or tariff reviews or political interference.

The Board shall meet at least once a year.

2.4 Conflict Resolution

In the event of a dispute related to the contract or any other breaches, the Parties shall;

1. Attempt to resolve such disputes or differences amicably through negotiations.
2. If the parties fail to resolve the dispute amicably, the parties shall submit the dispute to the Water Services Provider.
3. The dispute shall be settled by arbitration in accordance with local law. The decision of the arbitrator shall be final and conclusive.

Conflict Resolution Activity

The participants should divide into groups of 6-8 people. The trainer will give each group a copy of the *Conflict Resolution Activity Worksheet* (see Annex 2).

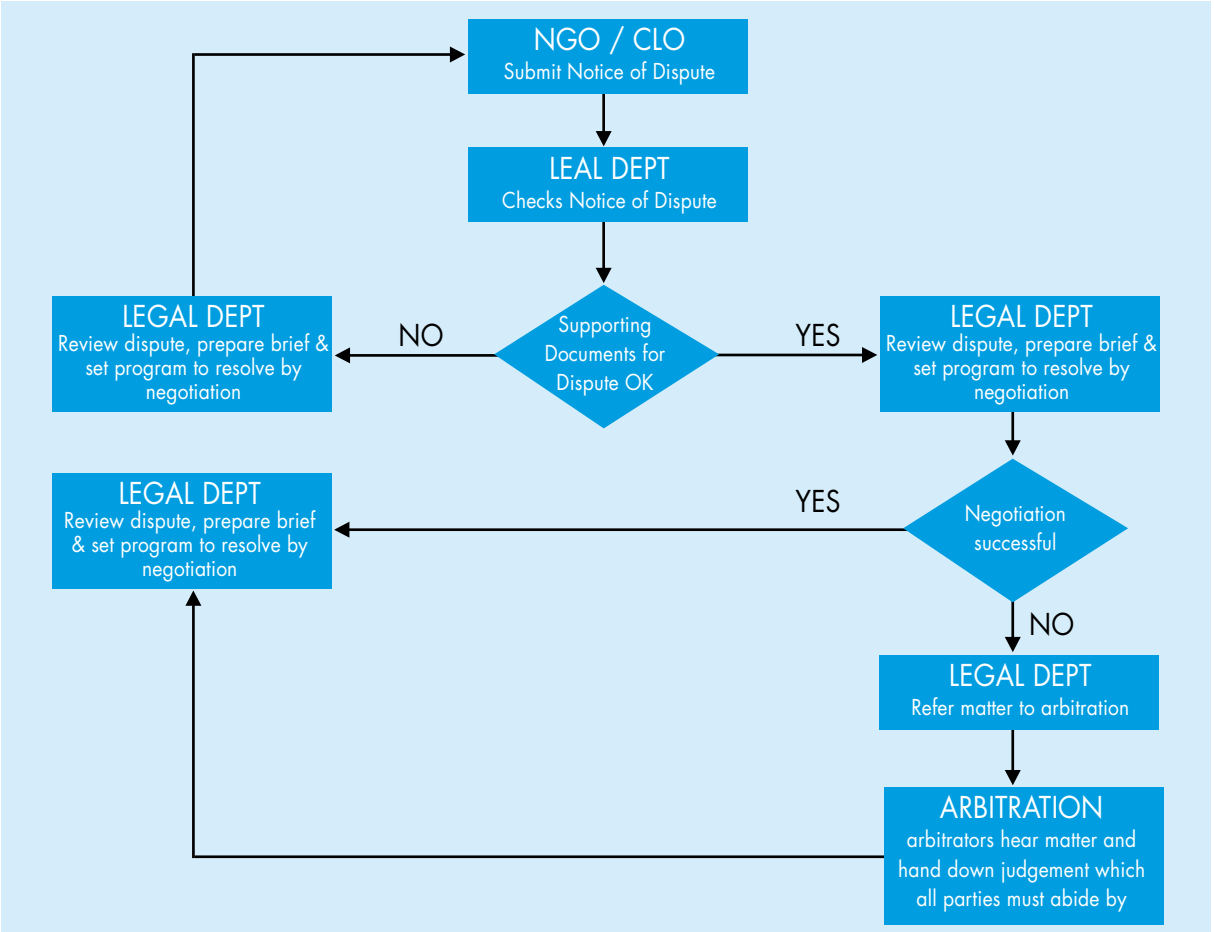
The worksheet describes a conflict scenario (all groups have the same scenario). The group should be given 10 minutes to discuss and decide on the best way to resolve the conflict.

A representative from each group shall present the decisions made by the group to resolve the conflict. The trainer should encourage groups to act out their decisions in a role play.

The purpose of the activity is to demonstrate that there are different ways to resolve the same conflict, so great care should be taken to decide how best to resolve the issue.

Were any of the conclusions surprising? Why or why not? The trainer should lead a discussion of the decisions that were made by each group.

Figure 4: Process for Resolving Disputes - example from Dar es Salaam



3 Communications Module

Module 3: Objectives

By the end of this session, the trainees will:

(i) Have discussed the characteristics of effective communication and how to improve communication; and

(ii) Understand the processes for communicating with internal and external stakeholders.

Materials: flip chart, markers/pens

Time Required: 1.5 hours

3.1 What is Communication?

Communication is a mutual exchange of information and understanding by any effective means. It is fundamental to the creation and health of effective organizations. It is the process by which information is intentionally or unintentionally exchanged between individuals. It also involves the building of strong human relationships. There is a big difference between vertical (between the water services provider and consumers for example) and horizontal (inter-office for example) communication.

Communication Flow Activity

The trainer shall lead the participants through a brainstorming session of the types of communication/information flows that are necessary in the management structure of an urban water and sanitation scheme.

For example, what types of message would a meter reader communicate to consumers? Is written, verbal or visual communication best in each of these cases? Why?

What types of messages does the Project Manager need to communicate to the Executive Committee? For each idea, ask the participants to choose the 'best' way to communicate (written, verbal, visual).

The trainer may lead the participants through the same exercise with other relationships in the diagram on page 21 - WHO needs to communicate WHAT to WHOM and WHY? What could happen if the messages are transmitted without regard for the organizational structure?

Target trainees:

- Executive Committee members
- Water Users Association
- Operations Manager
- Accountant
- Operator/Plumber/Technician/Meter reader

Methodology(ies): activity, lecture, discussion

Vertical Communication)

[Example of communicating with consumers]

Effective communication with your consumers will be central to your success. If your consumers are unclear on who is responsible for what; or if they do not understand the tariffs…you are not communicating effectively.

The goal of communication should be to enhance customer buy-in, ownership, willingness to pay, responsibility and hygienic use of water.

- ☑ Which messages will the management team need to communicate with consumers to achieve the goals listed above?
- ☑ What is the best way to communicate these messages?
- ☑ Different strategies are required for mass communications (a tariff change for example), and one-on-one communications (letting a customer know he/she is late paying the bill for example).
- ☑ Communication should be a two-way stream - in addition to communicating with your customers, there should be channels for them to communicate with you (to report level of satisfaction and complaints for example).

Horizontal Communication

[Example of office communication]

Horizontal communication, such as office communication, is important for coordinating activities and making sure the team is moving in the same direction, towards the same goal.

- ☑ the manager will likely hold regular group meetings but also one-on-one meetings
- ☑ one-on-one meetings are best to discuss sensitive issues related to performance or misconduct

Trial and error:

As you experiment with different ways to communicate with customers (flyers, meetings, word-of-mouth), try to find out what works best - so you can continue using the channels that work best and you do not waste time and money using channels that do not get the messages across effectively.

3.2 Vehicles for Communication

There are advantages and disadvantages to using written, verbal or visual communication.

Written Communication

This is useful in the following situations:

- The sender wants a record for future references.
- The receiver will be referring to it later.
- The message is complex and requires study by the receiver.
- The message includes a step-by-step procedure.
- Oral communication is not possible because people are not in the same place at the same time.
- There are many receivers. Caution: the receivers must be interested in the subject and willing to spend time to read and understand the message.
- A copy of the message should go to another person.
- The receiver prefers written.

However, we also need to be aware of some of the disadvantages of using written material to communicate. Strategies involving written communication (like sending out a flyer), can reach a wider audience but are limited to those who can read and are interested.

There is no guarantee that the written message will get through. The written word provides no opportunity for clarification. Strategies involving significant amounts of written documents tend to depersonalise the communication process by reducing the sense of involvement.

Verbal Communication

Verbal communication allows for interaction between people and opportunities to ask questions or to ask for clarification.

Visual Communication

Showing is a very important form of communication for the following reasons:

- Most people understand things better when they have actually seen how they work - so instead of telling someone how to fix a leak for example, they are more likely to learn if you show them.
- Complex ideas can be presented clearly and quickly using visual aids or a demonstration.
- People retain information longer when it is presented to them visually.

Strategies involving both words and visuals are most effective for communicating information. While people absorb information through all of their senses, the highest percentage of what they take in is through sight.

3.3 Communication flows in the CWSSP

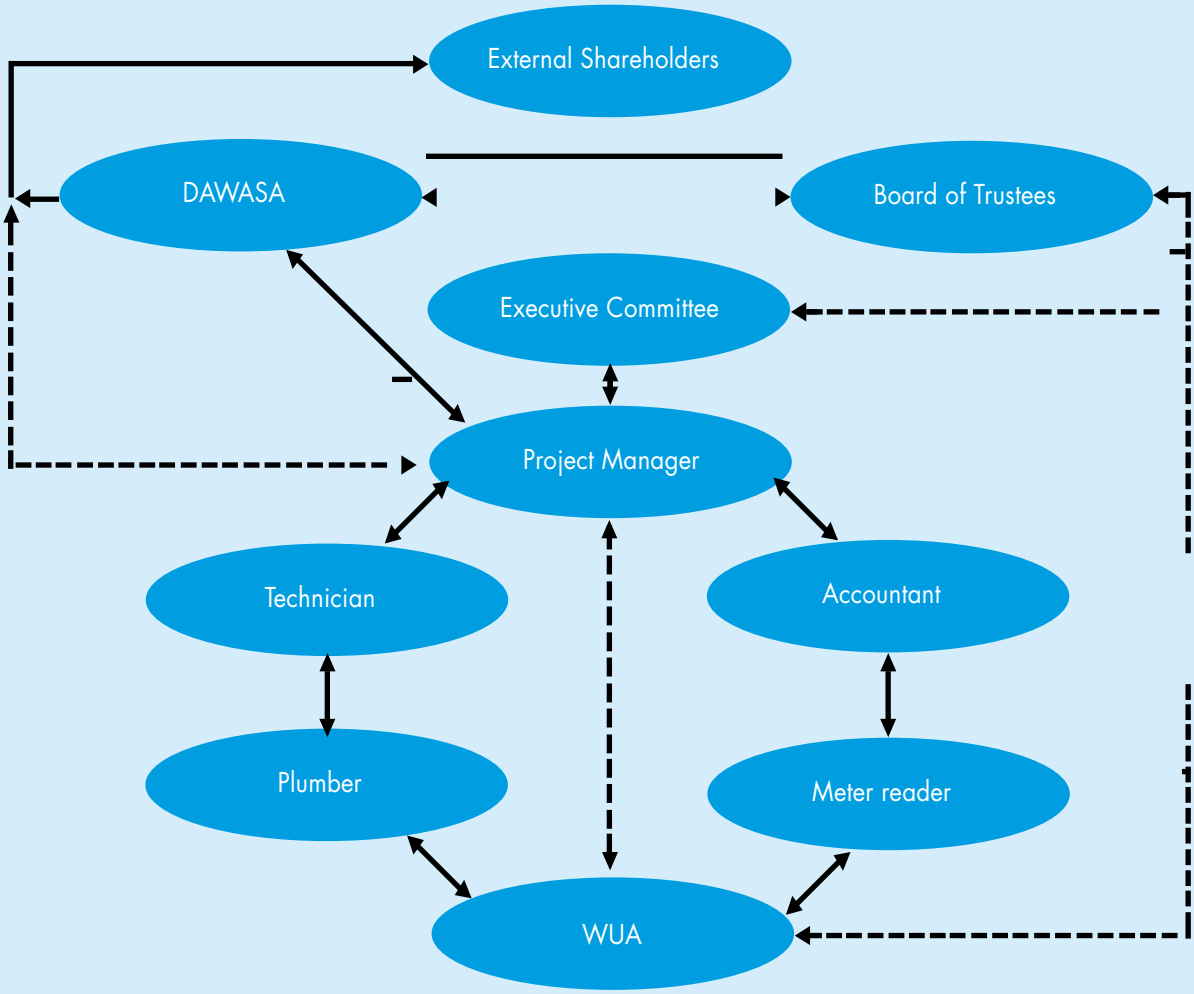
The model of communication below will help guide communication between parties. Nobody should feel constrained from communicating with any other stakeholder in this structure, but the model below highlights the relationships between parties that should communicate on a regular basis - and also helps to clarify 'who reports to whom'.

Many of these reporting structures will be described in the management team's contract.

3.4 Holding effective meetings

In order to be effective, minutes should be drafted, agreed upon, signed and filed for all meetings. Major decisions on: (i) expenditures and development; or (ii) hiring and firing, should not be made outside of official meetings, unless there is a justifiable reason, such as an extreme emergency.

Figure 5: Dar es Salaam example of the information flow



Types of Meetings

There are three types of meetings groups will need to hold: (i) regularly scheduled meetings; (ii) emergency meetings; and (iii) annual meetings. Attendance and minutes should be taken at all meetings.

(i) Regularly Scheduled Meetings: Groups will have to decide on the frequency of their regular meetings.

(ii) Emergency Meetings: These are usually unplanned for and convened to address urgent matters.

(iii) Annual General Meetings (AGM): AGMs are typically held to review progress over the last

Checklist for Organizing & Conducting Meetings

- √ Distribute invitations with adequate advance notice
- √ The invitation should describe the key agenda issues
- √ The venue and the time should be convenient for the majority of members in order to ensure fair representation
- √ The Chair shall keep the meeting on track to ensure that it does not run longer than necessary

financial year and to plan for the upcoming year. Elections usually take place at AGMs. Other major decisions regarding operations, large investments or changes in policy are usually discussed and voted upon during an AGM. Consequently, a large attendance is desirable and the AGM should be well publicized.

Example of Meeting Agenda (an outline)

1. Call meeting to order
2. Apologies
3. Reading and approval of previous minutes
4. Key issues for discussion
5. Any other business (AOB)/Announcements
6. Closing

4 Operations and Maintenance Module

Module 4: Objectives

By the end of this session, the trainees shall be familiar with:

(i) the technical aspects of daily operations;

(ii) the importance of maintenance; and

(ii) the roles and responsibilities of stakeholders in O&M.

Target trainee(s):

- Project manager
- Operator/Technician
- Executive Committee members
- Water Users Association
- Accountant

Methodology(ies): lecture, discussion
Materials: flip chart, markers/pens, handouts
Time Required: 3 hours

Some community-managed schemes may be connected to the main water services provider's network. However, many are not on the network and operate their own boreholes and may or may not have a reticulation system.

The sanitation focus for this O&M chapter is on public toilets with a septic tank.

4.1 Overview of Operations and Maintenance

Operations and maintenance (O&M) refers to all of the activities needed to run a water supply and sanitation scheme, except for the construction of new facilities. The overall aim of operation and maintenance is to ensure efficiency, effectiveness and sustainability of water supply and sanitation facilities. This module focuses on the technical aspects - and the management of these technical operations. However, other aspects of O&M are just as important and are covered in other modules.

This technical module is focused on providing basic knowledge and skills to handle technical issues and hopefully to reduce the amount of non-revenue water (sometimes called 'unaccounted for water'). The material in this chapter focuses on borehole and septic tank technologies.

Operations refers to the daily management of the scheme (including pump operation, rationing, network surveying, recording and report writing), while maintenance deals with the activities that keep the system in proper working condition.

4.2 Types of Maintenance

Maintenance may be preventive, corrective or reactive.

Trainer Question: Ask the participants what is meant by preventive maintenance? Corrective maintenance? Reactive maintenance? Can they try to give examples of each?

Preventive maintenance: this includes work that is planned and carried out on a regular basis to maintain and keep the infrastructure in good condition, such as network inspection, flushing of the well, cleaning and greasing of

mechanical parts and replacement of items with a limited lifespan. It sometimes also includes minor repairs and replacement as dictated by the routine examinations.

Corrective maintenance: replacing or repairing something that was done incorrectly or that needs to be changed; an example is the reallocation of a pipe route or replacement of a faulty pump.

Reactive maintenance: this is a reaction to a crisis or public complaints; it normally occurs as a result of reported pipe breaks and the malfunctioning or breakdown of equipment.

Ideal Scenario = Active preventive maintenance

In order to ensure the routine maintenance and health of the system, the technician should adhere to a routine check-up. The project manager will need to ensure that the technician is doing his/her job. If done correctly and on a regular schedule, preventive measures can reduce the risk of costly repairs.[3]

The key to ensuring effective equipment maintenance is to make certain that responsibilities are clearly defined and maintenance personnel have the tools and skills to do their job effectively. It is also essential to schedule preventive maintenance (see Table 5).

4.3 O&M Fact Sheet: Boreholes[4]

In the following section the trainer will take the participants through a description of the borehole technology and their operation and maintenance needs.

Brief description of technology

Boreholes give access to groundwater in an aquifer and facilitate its abstraction. They differ from dug wells, which usually have a bigger diameter and allow a person to enter for cleaning or deepening.

Boreholes can be constructed by machine or by hand-operated equipment and usually consist of three main parts:

1. **At ground level,** a concrete apron around the borehole with an outlet adapted to the water abstraction method prevents surface water from seeping down the sides of the well, provides a hard standing, and directs wastewater away from the well to a drainage channel.

2. **Below ground** (but not inside the aquifer), these parts are usually lined with pipe material (mostly PVC and sometimes galvanized iron), to prevent it from collapsing, especially in unconsolidated formations. In consolidated formations, a lining may not be required.

3. **Below water level** (and inside the aquifer), the pipe material is slotted to allow groundwater to enter the well. A gravel filter layer surrounding this part facilitates groundwater movement towards the slotted pipes and, at the same time, prevents ground material from entering the well. In consolidated formations this gravel may not be required. A proper combination of slot size, gravel filter and aquifer material, and extensive sand pumping before the well is brought into production (well development) can considerably improve long-term performance.

Description of O&M activities (boreholes)

- **Operation**

Operation of the well itself is usually not required.

[3] *Source: Prepared by World Bank, Department of Operations Evaluation http://www.gdrc.org/uem/water/wb-urbanwater.html*
[4] *Brikke, Francois (2000). Operation and Maintenance of Rural Water Supply and Sanitation Systems: A Training Package for Managers and Planners. IRC International Water and Sanitation Centre.*

FACTS ON BOREHOLES

Range of depth: From a few metres to 100 metres.

Yield: From less than 0.3 litre to about 17 litres per second.

Expected life: Over 25 years.

Area of use: In areas with suitable aquifers.

Construction: In most countries, drilled wells are constructed by public or private sector drilling companies.

When the production capacity of the well is lower than the demand, daily monitoring of the water level may be necessary. The Operations Manager should communicate with the Water Services Provider when levels are low. Abstraction of the water from the well is managed by the group technician.

- Maintenance

Apart from cleaning the apron daily and occasionally cleaning the drain and repairing the fence, if there is one, there are hardly any maintenance activities. Rarely, when a well has to be desilted (the physical process of removing suspended particles from water) or rehabilitated, all appliances have to be removed and a specialized company will have to come and do the job. There are various rehabilitation techniques such as forced air and water pumping, brushing, and treatment with chemicals. It is very difficult to deepen an existing drilled well.

- Organizational aspects

The Management Team (the technician and the Operations Manager), are responsible for preventing water contamination, executing O&M activities, financing O&M activities, and monitoring water quality. The Water Services Provider should perform random and periodic water quality assessments. National water quality standards vary from country to country. The Tanzanian quality standards are included as an example later in the chapter but efforts should be made to acquire the standards that apply in your country.

Table 3: O&M Requirements (boreholes)

Activity	Frequency	Human resources	Materials & spare parts	Tools & equipment
Clean well site	Daily	Local	-	Broom, bucket
Clean drain	Occasionally	Local	-	Hoe, spade, wheel-barrow
Repair fence	Occasionally	Local	Wood, nails, wire, etc	Saw, machete, axe, hammer, pliers, etc..
Repair apron	Annually	Local	Cement, sand, gravel	Trowel, bucket
Rehabilitate well	Very rarely	Specialized contractors/ consultants	Gravel, pipe material, etc	Various special equipment

Table 4: Actors implied & skills required in O & M (borehole)

Actor	Role	Skill
Water users	Use water, pay bills, keep water points clean, report leaks	No special skills
Technician	Monitor network, implement preventive maintenance schedule, monitor water quality	Technical skills & basic skills for cleaning
Operations Manager	Supervise technician, organize for major maintenance	Organizational and management skills
Executive Committee	Supervise management team, report leaks, sensitize community on their roles	Management and communication skills
Water Service Provider	Provide technical assistance on request	Technical and organizational skills
Specialized well company	Rehabilitate the well	Very specialized skills

Frequently Encountered Problems

The trainer shall ask participants to share and discuss their frequently encountered problems with the operation and maintenance of water systems.
Note: New groups may not have experiences to share at this point.

Following the discussion, the trainer may share some of the other frequently encountered problems that have not already been discussed:

- defect on pumps and motors;
- over pumping due to increased demand (can lead to pump burnout);
- pump failure due to power fluctuation;
- bad water quality or collapse due to corrosion of the galvanized iron lining;
- poor water inflow because of an inadequately developed well;
- entrance of ground particles in the well due to the installment of the wrong screens or low-quality technical work;
- contamination due to a faulty apron design or construction or neglect of maintenance; and
- collapse of the borehole where no lining is applied or where the lining is not strong enough.

The following table is a recommended preventive maintenance calendar for water supply that can help minimize risks.

Note: Some communities may have a bulk water supply from the water services provider instead of a borehole supply.

Table 5: Preventive Maintenance Calendar

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Cleaning of reservoirs (Every 3 months)	●●●	—	—	●●●	—	—	●●●	—	—	●●●	—	—
Physical water analysis (Every month)	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●
Chemical water quality analysis (Every 4 months)	●●●	—	—	—	●●●	—	—	—	●●●	—	—	—
Check-up of mechanical devices (Every 4 months)	●●●	—	—	—	●●●	—	—	—	●●●	—	—	—
Inspection of customer meters (Every 6 months)	●●●	●●●	—	—	—	—	●●●	●●●	—	—	—	—
Testing of well/source capacity (Once a year)	—	—	—	—	—	—	—	—	—	—	—	●●●

KEY ●●●●● Action required
— No action required

NOTE: The project technician is responsible for implementing the preventive maintenance calender; the project manager should supervise.

Community water source before the CWSSP

Table 6: Example of Tanzania Water Quality Standards

PHYSICAL & CHEMICAL PARAMETERS	CONCENTRATION	UNIT	TZ TEMPORARY STANDARD
Turbidity	16.7	NTU	30
Ph	7.08	–	6.5 - 9.2
Colour	NIL	MgPt/L	50
Electrical conductivity	751	uS/cm	2000
Total dissolved solids	376	Mg/1	500 - 1500
Odour	NIL	TON	n.m
Taste	–	–	not offensive
Phenolphalein alkalinity	NIL	MgCalCo/L	n.m
Total alkalinity	60	MgCalCo/L	n.m
Carbonate hardness	60	MgCalCo/L	n.m
Non-carbonate hardness	25	MgCalCo/L	n.m
Total hardness	85	MgCalCo/L	600
Calcium	22	Mg/1	250
Magnesium	7.3	Mg/1	200
Manganese	0.001	Mg/1	0.5
Iron	0.32	Mg/1	1
Chloride	184.34	Mg/1	800
Sulphate	28.3	Mg/1	600
Nitrate	1.06	Mg/1	30
Nitrite	0.001	Mg/1	0.05
Orthophosphate	NIL	Mg/1	n.m
Flouride	N.D	Mg/1	3
Total coliform	NIL	–	NIL
Faecal coliform	NIL	–	NIL
Chlorine Residual	NA	Mg/1	0.15 - 0.20

4.4 O&M Fact Sheet: Septic tank and aqua-privy[5]

Brief description of technology

Septic tanks and aqua-privies have a water-tight settling tank with one or two compartments, to which waste is carried by water flushing down a pipe connected to the toilet. If there is a tank immediately under the latrine, excreta drop directly into the tank through a pipe submerged in the liquid layer (aqua-privy). If the tank is located away from the latrine (septic tank), the toilet usually has a U-trap. The systems do not dispose of wastes; they only help to separate the solid matter from the liquid. Some of the solids float on the surface, where they are known as

[5]*Brikke, Francois (2000). Operation and Maintenance of Rural Water Supply and Sanitation Systems: A Training Package for Managers and Planners. IRC International Water and Sanitation Centre*

scum, while others sink to the bottom where they are broken down by bacteria to form a deposit called sludge.

The liquid effluent flowing out of the tank is, from a health point of view, as dangerous as raw sewage and remains to be disposed of, normally by soaking into the ground through a soakaway or with a connection to small-bore sewers.

The sludge accumulating in the tank must be removed regularly, usually once every 1–5 years, depending on size, number of users and kind of use. Water Services Provider can advise on the optimal frequency for sludge removal.

Every tank must have a ventilation system to allow escape of explosive methane and malodorous gases (generated when bacteria decompose some of the sewage constituents) from the tank.

Septic tanks are more expensive than other on-site sanitation systems and require sufficient piped water. Aqua-privies are slightly less expensive and need less water for flushing.

Amount of water needed per toilet flushing: About 2 to 5 litres if a pour-flush pan or aqua-privy system is used.

Description of O&M activities (septic tank or aqua privy)

- Operation

Regular cleaning of the toilet with soap in normal amounts is unlikely to be harmful… but the use of large amounts of detergents or chemicals may disturb the biochemical process in a tank.

- Maintenance

Routine inspection is necessary to check whether desludging is needed and to ensure that there are no blockages at the inlet or outlet. The tank should be emptied when solids occupy between one-half and two-thirds of the total depth between the water level and the bottom of the tank. The Water Services Provider may be able to recommend private desludgers who transport the sludge to the Provider's sites for a fee.

Checklist for organizational aspects

- ☑ Do you have local exhausters?
- ☑ Do you have local skilled contractors for construction and repair?
- ☑ Is sludge disposed of in a safe manner?

The Management Team will have to identify local partners for exhausting, construction, repair and disposal of sludge.

Frequently encountered problems

Many problems are due to inadequate consideration being given to liquid effluent disposal. Large surges of flow entering the tank may cause a temporarily high concentration of suspended solids in the effluent owing to disturbance of the solids which have already settled out. Leaking tanks may cause insect and odour problems in aquaprivies because the water seal is not maintained.

Warnings!

Septic tank additives - such as yeast, bacteria, and enzymes - which are often sold for "digesting scum and sludge" and "avoiding expensive pumping" have not proved to be effective.

Even if preventive maintenance is done correctly and on schedule, there may be expensive maintenance requirements from time to time. For this reason, it is important to keep aside an investment bank account especially for new investments and 'emergency repairs' *(the investment bank account is discussed in the Module on Financial Management).*

Table 7: O&M requirements (septic tank)

ACTIVITY	FREQUENCY	HUMAN RESOURCES	MATERIALS & SPARE PARTS	TOOLS & EQUIPMENT
Clean squatting pan/seat & building	Daily	Household	Water	Brush, water, container.
Unblock U-trap when blocked	Occasionally	Household	Water	Flexible brush or other flexible materials
Inspect if entry pipe is still submerged (for aqua privies)	Regularly	Household	Water	Stick
Inspect floor, squatting pan/seat & U-trap	Monthly	Household		
Repair squatting pan/seat, U-trap or building	Occasionally	Household	Cement, sand, water, nails, local building materials	Bucket or bowl, trowel[6] , saw, hammer, knife
Control vents	Annually	Household	Rope or wire, screen material, pipe parts	Scissors or wire-cutting tools, pliers, saw
Empty tanks	Every 1-5 years	Service crew	Water, fuel, lubricants, etc..	Vacuum tanker (large or mini) or MAPET equipment [7], if possible

Table 8: Actors implied & skills required in O&M (septic tank)

ACTOR	ROLE	SKILLS
Users	Flush, be tidy	Understanding of hygiene
Public toilet management	Collect user fees, keep facilities clean, inspect vents, keep record of emptying dates, control contents in tank and pay for emptying services when necessary	Understanding of hygiene and hygiene promotion, basic bookkeeping, measuring skills
Sanitation Service (private)	Empty tank, repair if needed	Basic masonry, skills to work with vacuum tanker or MAPET
Water Services Provider	Provide technical advice	Technical skills

[6] *A trowel is a small hand tool with a handle and flat metal blade; used for scooping or spreading plaster or similar materials*

[7] *MAPETs are small tankers used in unplanned areas to draw waste water.*

4.5 Spare Parts and Supplies

The Management Team should keep a supply of some items at all times - especially the more inexpensive and frequently used spare parts. These should be stored in a safe location that is locked. All spare parts kept in stock should be recorded in an inventory register.

Commonly used supplies for water supply that should be kept in stock include: pipes, wrench spanner, gum boots, plugs, bib-cocks, male connectors and straight connectors.

Commonly used supplies for sanitation that should be kept in stock include: toilet unclogging sticks, gum boots, protective gloves, industrial brooms and mopping cloth.

Also, the Executive Committee and the Management Team together should establish minimum standards for materials with the goal to maintain quality and enhance uniformity and durability of the system.

4.6 Essential O&M Records

Up-to-date and accurate records need to be maintained in all water supply systems. This is essential so that responsible officials can easily know the operation status of the systems. The type of system determines the type and number of records and reports needed. For a community-managed water supply scheme records and reports should focus on the following items:

Water System

- Borehole/bulk supply production capacity
- Water loss on daily, monthly and annual basis
- Network survey schedules
- Water quality
- Rationing schedules (if applicable)
- Leakage reports and attendance capturing
  - Time, location and mode of reporting
  - Course of the leak (whether by human or system defects)
  - Fittings used to repair
  - Actual cost involved in effecting the repair

Table 9: Example of a Productions Record

Community name	Source	Prod. Capacity	Month	Water Quality	Monthly Production	Amount Supplied	UfW	Leaks Reports	Leaks Attended	Remarks
Kitunda	Borehole	$12m^{3/hr}$	Jan	Good	$2,000m^3$	$1,700m^3$	$300m^3$	15	15	none

Table 10: Example of a Leakage Control Record

Date	Location	Reporting time	Mode of reporting	Repairing time	Fittings applied	Manpower involved	Remarks
12/12/07	Kitunda kati	07:45 am	Customer	8:50 am	- Straight connection - Gate valve	None	Mention whether the leakage has been controlled and if not why?

Register of Water Sales
(i.e. meter reading)

Meter readers should have a systematic way to record meter readings, such as the example given below.

Cubic meter (m^3)

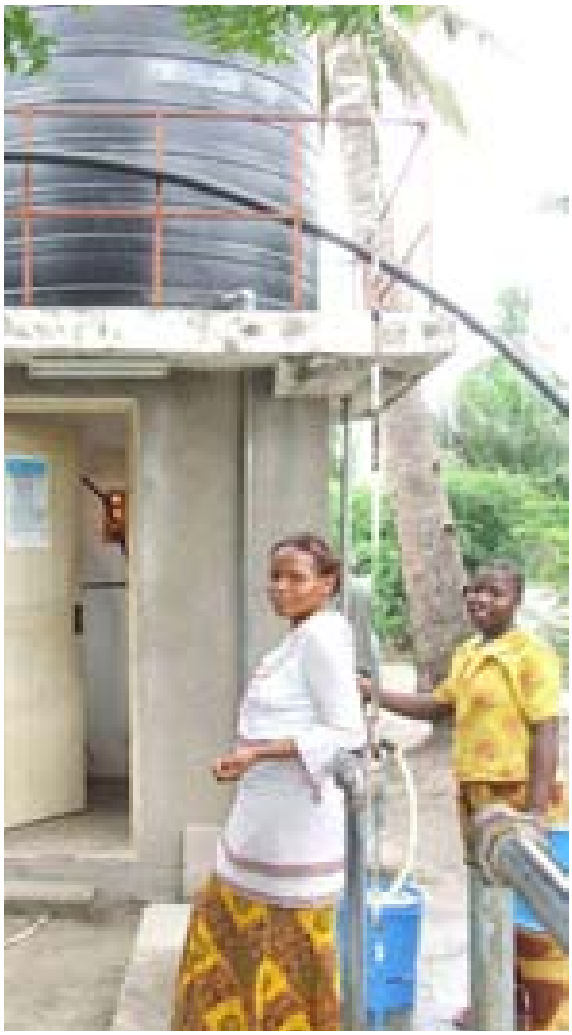
A measurement equal to 1,000 litres or 50 jerry cans (of 20 litres) and written as m^3 on your bill. Most households of 5 people use about $5m^3$ to $8m^3$ per month.

Table 11: Meter Reading Form

Date	Kiosk/ house No.	Opening Reading	Closing Reading	Total Water Consumption	Remarks
22/10	K2	135	151	$16m^3$	None
22/10	H35	44	50	$6m^3$	Leak outside house
22/10	K3	201	299	$98m^3$	Consumption too high; check for leaks

Since meter readers are 'in the field' they can also write down any observations that should be reported to the Technician. The right column on the table above can be used for this purpose.

After recording the consumption of each individual meter, the meter reader should give these records to the Accountant. The Accountant will produce the consumer's bills based on real consumption - never on a flat or fixed rate.



5 Controlling Non-revenue Water (NRW)

Module 5: Objectives

By the end of this session, the trainees shall understand:

(i) the benefits of controlling non-revenue water (NRW);

(ii) the likely sources of NRW; and

(iii) key measures to minimize NRW.

Target Trainees:

- Project manager
- Operator/Technician
- Executive Committee members
- Water Users Association
- Accountant

Methodology(ies): lecture, discussion

Materials: flip chart, markers/pens, handouts

Time Required: 2 hours

5.1 Introduction

Minimizing non-revenue water (NRW) is an important part of Operations and Maintenance. However, the topic is given its own chapter because it is so important to overall sustainability and deserves a great deal of attention.

Definition

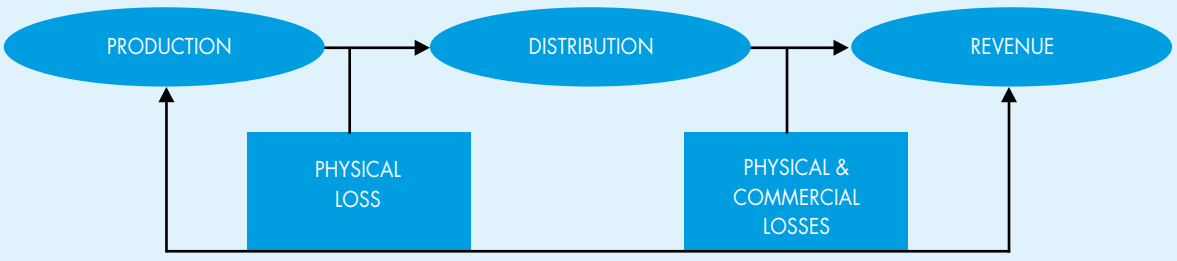
Non-revenue water is also sometimes called unaccounted-for water (UfW) (although the two are technically a bit different) NRW is the difference between the amount of water produced and put into a supply system and the amount of water which is billed to consumers.

NRW = Amount of water produced (minus) amount of water billed to customers

Reducing the amount of non-revenue water (and increasing revenue), means that over time the scheme will have enough profit to expand the network, increase the number of employees and improve staff conditions.

There are 2 major categories of NRW: (i) Physical (or 'Technical losses'); and (ii) Commercial losses. A combination of both physical and commercial losses makes up the overall level of non-revenue water.

Figure 6: Possible sources of non-revenue water



Note: The water scheme must have a bulk meter at the source in order to calculate NRW.

Physical Losses (water lost via leaks)	Commercial Losses (revenue lost via under billed consumption)
Leaks may occur due to some of the following reasons: • installation of inferior materials • substandard installation techniques (loose pipes fittings and shallow trench excavation) • poorly constructed reservoirs • aging systems and house connections • human activities on the network • poor maintenance (either infrequent or poor technical skills)	Commercial losses are a result of some of the following administrative failures: • inaccurate or broken meters • incorrect billing • illegal connections • faulty meter readings recording • theft All of the above named reasons lead to "Non revenue water" which is basically a combination of commercial and physical losses.

5.2 Reducing Water Losses

Network Inspection

The purpose of regular network inspections is three-fold:

1. to detect leakages;
2. to identify illegal connections; and
3. to identify unacceptable human activities around network infrastructures (any activities that may contaminate the water supply or destroy the infrastructure).

While it is the technician's duty (or his/her team of plumbers), to carry out network inspections daily, all members of the community are responsible for reporting leaks, illegal connections and other inappropriate or illegal behaviour (such as vandalism).

Reports can be made to any member of the Management Team or the Executive Committee.

It is in the community's best interest to look after the network. Leaks and illegal connections may allow contaminants to enter the piped water supply, which can cause negative health effects. Also, vandalism may result in an interrupted water supply.

NOTE: The Management Team and the Executive Committee must act fast after reports have been filed to ensure that action is taken against water thieves and leaks are plugged within a reasonable time. If action is taken slowly or if anonymity is not respected, the community may lose confidence and trust in the Management Team and may cease to report future leaks and theft.

Checklist for Identifying NRW Sources

The following four tasks may help the technician - or accountant - to identify sources of non-revenue water:

(1) Walking around the network on a regular basis to identify any problems;

(2) Establishing regular check-points on junctions and areas with frequent problems and checking these regularly;

(3) Comparing the sum of all customers' meter readings with the bulk meter; and

(4) Establishing good relationships with customers so they will provide tips on leaks and water theft

Note: If a customer's monthly consumption is much less—or much more—than their average monthly consumption, there may be a problem (for example a bypass, a broken meter or a leak; this will require teamwork between the Accountant and the Technician to identify irregular meter readings).

Reducing Commercial Losses

The first step towards managing NRW is to have a **functioning metering system** - this means that the production point and all consumption points have working meters and that all consumers are billed according to actual consumption (not estimated or average consumption or a flat fee).

The following data must be collected in order to calculate NRW:

- The amount of water produced/pumped (recorded by a bulk meter);
- The amount of water distributed in each particular zone (recorded by zonal bulk meters - *might not apply to smaller schemes);*

Note: *Zonal Bulk Meters are usually used on large schemes but they are very helpful for isolating problem areas by breaking the network into smaller units to manage;*

- The amount of water consumed (recorded by individual domestic and commercial meters).

The difference between the individual connection readings (metered consumption) and the bulk meter reading (production) will show you the amount of water that is 'lost'.

Example for calculating NRW

The bulk meter reading is 324 m^3 for this month. The Accountant has billed the customers a total of 298 m^3 for the same month. What is the rate of NRW for this month?

Step 1: 324 m^3 (minus) 298 m^3 = 26 m^3 'lost'
Step 2: 26 m^3 (divided by) 324 m^3 = 8% NRW

NRW for this month is 8 percent.

6 Customer Service Module

Module 6: Objectives

By the end of this session on customer care, the trainees will:

(i) have a better understanding of the key elements of customer service and why it is important

Target trainee(s):

- Executive Committee
- Operations Manager
- Accountant
- Technician

Methodology(ies): lecture, discussion, activity

Materials: flip chart, markers/pens

Time Required: 2.5 hours

6.1 An Overview of Customer Care

Opening Question: In the water business, are you selling a **product** or a **service?**

Give the participants enough time to discuss the question.

Answer: *Both. Water is a* ***product,*** *but regularity of supply, response time, and accessibility of staff are all related to* ***service.***

What we do = sell water
How we do it = service

Follow-up Question: Can you name some other service elements of the water business?

The primary goal of customer service is to achieve CUSTOMER SATISFACTION. The secondary goal of customer service is to manage SERVICE STANDARDS.

What is Customer Satisfaction: A quality associated with the outcome of the service ***as judged by the consumer*** *(not the service provider).*

Let's take a look at some of the elements of service that customers notice.

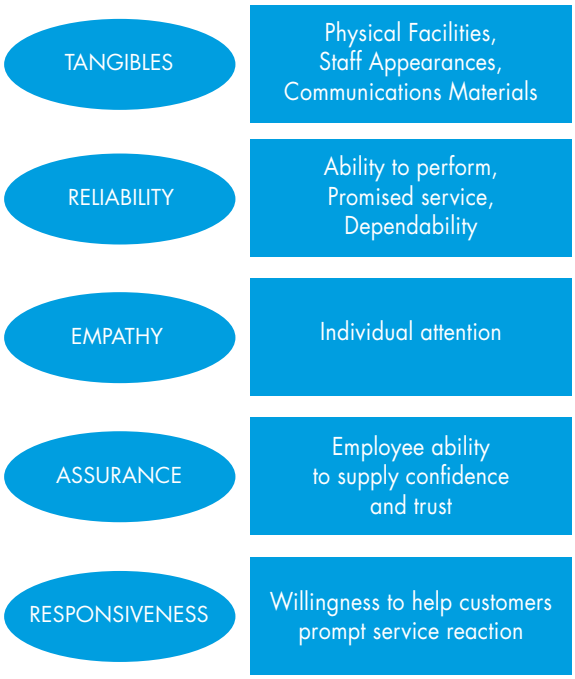


Figure 7: Five Service Dimensions (Source: SERVQUAL, Zeithaml Parasuraman Berry)

Now let's take a closer look at some of the questions we need to ask ourselves regularly to make sure that we are offering the best customer service we can.

Table 12: Checklist for Service Dimensions

Tangibles Checklist

Are our offices neat and clean?

Do our staff project an image of competency and professionalism?

Are the consumer bills easy to understand?

Are written materials professional and clear?

Are we meeting demand? Is there enough water in the system?

Reliability Checklist

Are we on time to meetings and appointments?

Are we able to meet promises made in terms of service delivery? (Important not to make promises we can't keep!)

Empathy Checklist (emotional element)

Are we friendly? Polite? Approachable?

Do we give our customers individualized attention?

Do we have customers who are unable to pay their bill?…*the company cannot be too flexible and must verify that there is an urgent need… maybe an alternative payment arrangement could be made (weekly payment plan for example)*

Assurance

What promises are we able to make?
Can we guarantee clean water?

Are our employees knowledgeable?
Do we convey trust and confidence?

Responsiveness Checklist

What is our speed of responding to emergencies?

Do our customers know where to go (and who to contact) for assistance? Is there a channel for customer complaints?

Do we have regular office hours? *It is a good practice to post a sign with office hours.*

Do our customers have a Forum for expressing their views? *(The Water Users Association is an appropriate Consumer Forum—making the WUA vibrant is in your best interest in order to get feedback on what you are doing well and what could be done better)*

TIPS ON COMMUNICATION

- Listen to customers & acknowledge their comments
- Keep customers informed in a language they can understand
- Make an effort to get to know customers and their needs

Trainer Question: Are there any other aspects of customer service that will be important to our consumers? Ask the participants to list any that come to mind.

6.2 Challenges in Providing Quality Customer Care

Challenge #1: Having service standards in place does not automatically lead to customer satisfaction. Why not?

- Because customers have changing requirements
  - *You must have continuous communication with clients*
- Because management may communicate poorly with customers
  - Avoid making promises you cannot keep
  - Make sure to communicate important messages (like water shortages)
- Because employees might not have adequate resources to perform their jobs to the best of their ability.
  - *Budget constraints are always present but having the right tools (or having a plan to acquire tools) is important.*

Happy employees are more likely to treat customers well. Do employees have the right office supplies and equipment? Are employees paid on a timely basis? Do employees have freedom of expression and feel comfortable discussing issues with management?

If the answer to any of these questions is NO, then customer service will probably suffer. Management should look at these issues carefully.

These considerations are important because unhappy employees will not represent the company well. Staff cannot be expected to use their own resources for work purposes.

Challenge #2: Making sure that the service standards in place reflect what customers really want.

- If management does not understand customer expectations then service standards cannot reflect customer expectations.

Solution: Get regular feedback from customers and try to close the gap between what you think customers want and what they actually want.

Table 13: Customer Complaint Form

- [x] Keep a daily list of complaints/issues
- [x] Keep a record of the action taken - verbal/technical/written

No.	Name of Member/ Institution	Date	Complaint/ issue	Recommended action/response	Date of response	Remarks
1	Mary Makoye	2/10/07	Meter is broken	Send plumber to test meter-replace if necessary	Resolved by Operations Manager on 20/10/08	Action delayed due to late shipment of new meters
2						

Customer Service Activity: A Role Play

The trainer shall lead the participants through the following role play exercises.

Role Play #1: The trainer should ask for two volunteers. One volunteer will play the role of Office Manager. The 2nd volunteer will play the role of a customer who has a problem with his/her bill.

Follow-up questions: Did the Office Manager greet the customer? Did the Office Manager listen well? Did he/she ask questions? Could the Office Manager have provided tips on reducing consumption?

Role Play #2: The trainer should ask for two different volunteers. One volunteer will play the role of technician. The 2nd volunteer will play the role of a resident who is collecting water from a shallow well and does not want to pay for water. The technician's goal is to convince the resident to consume water from the system.

Follow-up questions: Was the technician convincing? Could the technician have used any other arguments to convince the resident to stop using shallow well water and to start using water from the system? Do you have any comments on the technician's communication style?

6.3 The Importance of Billing

Bills need to be accurate, on time, and easy to read. When customers sign-up with you, you will need to explain the meter reading and billing cycle.

Here is an example, although the exact timing might vary depending on your operations:

"A Meter Reader will read your meter on the last day of each month and deliver your bill to your home or business at the beginning of each month for the previous month's water use. You must pay your bill in full by the 10th of each month. You may also make arrangements with us to pay on a weekly, instead of a monthly basis. Your bill will include the following:" (List all information included on bill).

As a group you should establish rules for how to deal with defaulting customers:

- ☑ how much notice to provide before disconnecting a defaulting customer?
- ☑ should you have a reconnection fee?

Note to trainer: Lead a discussion with the participants on other issues that will need to be decided in relation to defaulting customers; do they suspect they will have to deal with many defaulting customers? What can they do to minimize the number of defaulting customers? Should they charge a consumption deposit for example?

From time to time your customers are sure to experience family emergencies or other events that may cause financial hardship - make sure to keep an open line of communication with your customers so you can help them to get on an installment plan for example, instead of disconnecting them altogether.

A major challenge = being firm but flexible!

Table 14: Information that should be included on a customer's bill

Water consumed (m^3)	
Previous meter reading	Current meter reading
Current charges (meter rent, water)	
Any past due amounts (arrears)	
New total amount owed (current bill+arrears)	

7 Financial Management & Bookkeeping

Module 7 Objectives

By the end of this session on financial management and bookkeeping, the trainees will:

(i) Understand the general principles of financial management; and

(ii) Understand how to create and read financial statements.

Target trainee(s):

- Executive Committee
- Water Users Association
- Operations Manager
- Accountant
- Technician

Methodology(ies): lecture, discussion, activity

Materials: flip chart, markers/pens, activity handouts

Time Required: 3.5 hours

This module is essential to running a sound operation based on business principles that will help ensure the longevity of the infrastructure and services to the community for years to come.

7.1 General Principles of Financial Management

Cost recovery (water supply): to recover all of the costs associated with a water system.

Q: Why is cost recovery essential?

A: To ensure that water can be continually provided through a high-level of service. In addition to covering operation costs (and eventually investment costs), charging a tariff helps to ensure that the beneficiaries gain a sense of ownership and concern for preserving the facilities.

Transparency in accounting: Keeping clear, easily understood records that are accurate and available to the Executive Committee and the WUA.

Q: Why is transparency important?

A: To have checks and balances that minimize corruption; also, you need good records to identify both successful and problem areas (like defaulting customers for example).

Monitoring: is ongoing and systematic to compare actual performance with plans.

Q: What are some tools used for monitoring?

A: Budget reports and financial statements.

Operating Costs: These are also called recurring costs and include costs associated with salaries, rent, office supplies, communications, depreciation, transport, chemicals and fuel (all costs associated with production, sales and distribution).

These are generally costs that you will have every month.

Capital Costs: These are also called investment costs and focus on the purchase of long-term assets. They can include costs associated with studies, property, construction, infrastructure, assets (like meters) and training. These costs are more infrequent than operating costs.

The Executive Committee shall approve capital cost expenditures.

7.2 The Importance of a Budget

An annual budget should be developed and approved by the WUA. The Water Services Provider can help communities prepare the first budget.

The budget should take into account all staff time so that the scheme does not rely on volunteers. Depending on volunteers becomes problematic over time because people expect to be compensated for their time and can justify misappropriation if they perceive that they are not being treated fairly.

Also, communities may refuse to pay for services if they do not think that revenue is being managed transparently.

A budget is the first step towards transparency and proper planning!

7.3 Setting Tariffs

The tariffs for water supply and use of sanitation facilities should reflect the actual cost of providing the service, including the costs associated with the maintenance and replacement of equipment.

It is best practice for communities to pay for water on a consumption basis rather than a flat rate, to encourage conservation of water. This requires metering of all consumption points. The water tariff should be reviewed on an annual basis to ensure it is covering real costs related to operations and maintenance.

7.4 Keeping Records of Receipts

All transactions (money in and money out) should be recorded with a receipt.

Trainer question: *Why is it good practice to be in the habit of writing receipts?*

Possible Answer: Often when the Accountant comes across a bookkeeping error that cannot be easily fixed, flipping through the receipt books can help pinpoint the problem - perhaps an incorrect amount was entered - or omitted altogether!

Receipts also provide both the customer and the accountant with the same record of the transaction - which might be useful in case of a dispute.

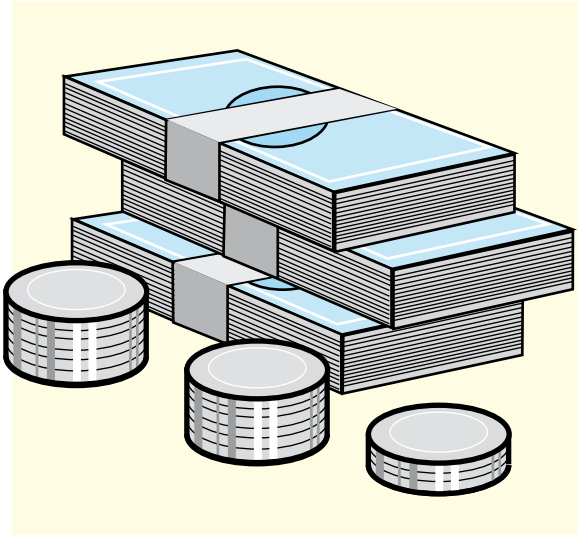
Mistakes happen and keeping a receipt book is a good way to minimize and correct mistakes.

When do we use receipts?

- ☑ customers' payment of water bill
- ☑ sale of an asset (furniture for example)
- ☑ customers' payment of connection fee
- ☑ payment of salaries

The following is also important for writing official receipts:

- Printed receipt books can be purchased from a bookshop and should be stamped with the group's/company's name;
- Receipts must be serially numbered;
- Only one receipt book should be used at a time;
- The amount in figures should be the same as the amount written out in text;
- Receipts should be issued immediately upon payment.



7.5 Financial Statements

The following financial statements should be completed by the Accountant, but it is important for everyone to be able to read and understand these because they will be presented to the WUA during the annual general meeting.

Cash Flow Statement

A cash flow statement shows a company's incoming and outgoing money (revenue and expenses), during a time period - usually monthly or quarterly. It is useful in determining a company's short-term profitability and its ability to pay its bills.

Table15: Example of a Cash Flow Summary

Statement of Cash Flow - Sample for the period 12/31/2007 to 12/31/2008	
Revenue	$ 1,800
Operating Expenses	-$ 1,000
Capital Expenses	-$ 350
Net increase (decrease) in cash	$ 450
Cash previously available	$ 100
End of year cash	$ 550

Note on Expenses: Expenses not related to the scheme should not be paid for with the revenue from your water and/or sanitation scheme. For example, home and family expenses should not be mixed with these business expenses.

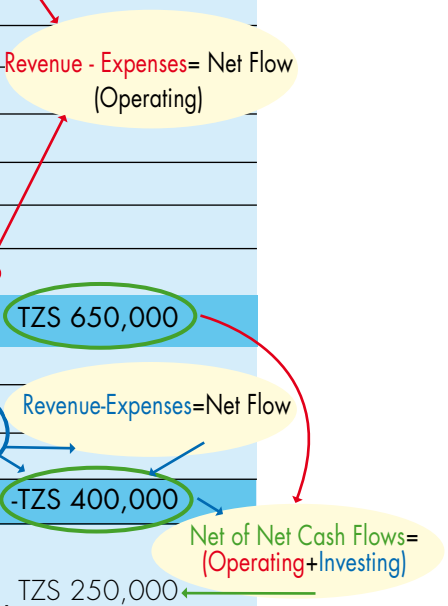
Now let's look at the same cash flow statement in more detail below. These should be done on a monthly, quarterly and annual basis.

Note to Trainer: Let the participants know that it probably looks more complicated than it really is. We are still following the basics - taking our revenues and subtracting our expenses. The Cash Flow statement below just has more detail than the version below.

Walk the participants through each line of the Statement - first explaining each line and then explaining the calculations.

Table 16: Detailed Cash Flow Statement—example in Tanzanian Shillings

Statement of Cash Flow - Detailed Example for the period 12/31/2007 to 12/31/2008		
Cash flows from operating activities		
I. Revenues		
Cash receipts from customers	TZS 2,000,000 -	
Total Revenue	TZS 2,000,000	
II. Operating Expenses		
Cash paid to employees (salaries)	-TZS 600,000	
Electricity	-TZS 200,000	
Telephone	-TZS 50,000	
Rent	-TZS 100,000	
Spare parts	-TZS 300,000	
Interest on loans	-TZS 100,000	
Total Operating Expenses	-TZS 1,350,000	
Net cash flows from **operating** activities (Revenues - Expenses)		TZS 650,000
III. Investing activities		
Purchase of equipment	-TZS 300,000	
Training cost	-TZS 100,000	
Net cash flows from **investing** activities (Revenues - Expenses)		-TZS 400,000
Net increase in cash (sum of cash flows from operating and investing activities)		TZS 250,000
Cash available at the beginning of year (carried over from previous year)		+ TZS 100,000
End of year cash (sum of 14 & 15)		= TZS 350,000



Income Statement: Also called a Profit and Loss Statement (P & L), the income statement indicates how revenue (money received from the sale of products and services before expenses are taken out) is transformed into net income (the result after all revenues and expenses have been accounted for). Net income is often called 'the bottom line'.

The purpose of the Income Statement is to show managers whether the company made or lost money during the period being reported. Income statements also help evaluate past performance and predict future performance (this is important when trying to budget for bigger expenses or deciding whether or not you can afford to hire more staff).

The Income Statement should be prepared quarterly (4 times a year) and annually.

An Income Statement shows what has happened in a business over a specific period of time, usually a year. It is similar to a movie which illustrates changes in the cost and returns of a business over time.

2008 INCOME STATEMENT (Example in Tanzanian Shillings)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL 2008
Gross Revenue	35,000	25,000	27,500	30,000	32,500	35,000	35,000	35,000	37,000	37,000	39,000	42,000	410,000
Line Item Expenses	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Rent	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	102,000
Telephone	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	18,000
Insurance	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
Salaries	2,500	2,500	2,500	3,000	3,000	3,000	3,500	3,500	3,500	4,000	4,000	4,000	39,000
													0
Professional	750	750	750	750	750	750	750	750	750	750	750	750	9,000
Services	500	500	500	500	500	500	500	500	500	500	500	500	6,000
Office Supplies	250	250	250	250	250	250	250	250	250	250	250	250	3,000
Marketing/Publicity	2,000	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	13,000
													0
Capital Expenses	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	180,000
Interest Expenses	2,000	2,000	2,000	1,500	1,500	1,500	1,000	1,000	1,000	1,000	1,000	1,000	16,500
													0
TOTAL EXPENSES	500	500	500	500	500	500	500	500	500	500	500	500	6,000
													0
NET INCOME(NI)	34,500	33,000	33,100	33,200	33,300	33,400	33,500	33,600	33,700	34,300	34,400	34,500	404,500
NI Before Capital	500	-8,000	-5,600	-3,200	-800	1,600	1,500	1,400	3,300	2,700	4,600	7,500	5,500
Expenses	15,500	7,000	9,400	11,800	14,200	16,600	16,500	16,400	18,300	17,700	19,600	22,500	185,500

Sample Income Statement

Now let's take a look at a sample income statement for a small business over a 12-month period. Gross Revenue is listed at the top - this is the amount customers actually pay the Water Company. The expenses are listed in categories below the gross revenue (example is in Tanzanian Shillings).

Net Income (a.k.a. net profit or net earnings): This is the bottom line (Gross Revenue minus Total Expenses), which is the most commonly used indicator of a company's profitability. If expenses exceed income, net income is negative.

Observations about the example income statement above:

- Some expenses fluctuate, some stay the same over the course of the year
- Revenue varies from month to month, but has increased overall from January to December

Now let's take a look at a sample income statement for a small business over a 3-year period.

	2007	2008	2009
Gross Revenue	250,000	410,000	500,000
Line Item Expenses			
Rent	90,000	102,000	110,000
Telephone	15,000	18,000	18,000
Electriicity	12,000	12,000	12,000
Salaries	20,000	39,000	50,000
Exhausting Services	0	9,000	10,000
Office Supplies	5,000	6,000	10,000
Chemical Supplies	2,500	3,000	6,000
Communication	42,000	13,000	13,000
Capital Expenses	0	180,000	200,000
Interest Expenses	0	16,500	16,500
General & Miscellaneous	1,000	6,000	7,000
TOTAL EXPENSES	145,500	404,500	452,500
NET INCOME (NI)	104,500	5,500	47,500
NI Before Capital Expense	104,500	185,500	247,500

Gross Revenue must cover ALL Expenses!

Calculated to get an idea of profit if large investments had not been necessary

So this is the income statement (example in Tanzanian Shillings). It provides a moving picture of the business performance over the years.

Other comments on the example above:

- It is common for expenses to increase as a company grows
- Comparing annual incomes helps the company evaluate its trends and analyze where expenses might be cut
- Revenue doubled between 2007 and 2009
- Expenses have grown only 12% between 2008 and 2009
- Expenses grew 178% between 2007 and 2008!

Ask participants what is the major cause of this increase?

- Any other observations on this income statement?

"Efficient Managers increase sales while controlling expenses"

Hands-on Budget Development: An Activity (30 minutes)

The participants shall split up into groups of five people. The trainer will give each group the worksheet for this activity (see Annex 2).

Each group is given a sample of three month's expenses and revenues.

From this income statement, the group should try to devise an annual budget—using a history of expenses and revenues to forecast and develop the next year's budget (12 months).

The groups should take into consideration how much revenue they should aim to generate to cover costs and emergencies and to make sure that expenses are minimized.

The purpose of the activity is to practice collaborating and discussing budget issues.

After the participants have presented their annual budget to the larger group, the trainer should ask the following questions:

- ☑ Did any of the groups' expenses exceed revenue? They should not…
- ☑ Did any of the groups' allow for emergencies? They should…

7.6 Principles for Managing Bank Accounts

It is recommended that the group keep two separate bank accounts: (i) an operations bank account; and (ii) an investment account.

(i) What is the Operations Bank Account used for?

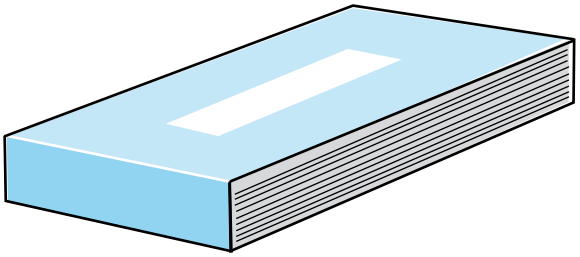
The Executive Committee shall open a bank account to pay for operations (for example paying salaries, electricity, office supplies) and to deposit operating revenue.

- All money should be deposited in the bank as soon as possible. Cash should not be left overnight in the office.
- Make sure to have three signatories (where any two can sign) to authorize withdrawals from the account (the Operations Manager plus two members of the Executive Committee).

(ii) What is the Investment Bank Account used for?

This is an account that the group deposits money into on a regular basis - after having covered operational costs. It is used to pay for ***major repairs (emergencies) and investments (expansion).*** The amount to be allocated to this account is generally determined as a percent of revenue.

- The Executive Committee shall together determine the amount that should be deposited into the investment account and the frequency of these deposits (for example, 30% of revenue every month).
- There should be **three signatories** necessary from the community (where any two can sign) to withdraw money from this account—two from the Executive Committee and also the Operations Manager. In addition, there should be a counter signatory from the Water Services Provider for each withdrawal from the Investment Account (only applicable where the community management team has a close working relationship with the main water services provider).



7.7 Petty Cash Principles

Petty cash is the amount of money the Accountant is allowed to keep for meeting emergency and minor group expenses or for making change for customers. The person taking the petty cash (usually the Accountant) must sign a voucher to indicate that he/she has received this money.

Summary of Essential Records

Covered in this Chapter:

- Income statement (monthly & annual)
- Cash flow statement

Included in the Annexes:

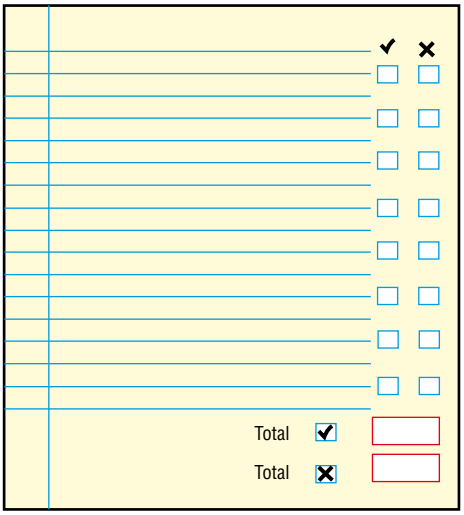
- Water Services Provider Communication Form
- Customer Account Ledger
- Cash Book
- Customer Bill

8 Review of the Course

This brings us to the end of the training modules. The Trainer should ask the participants the following questions in order to review the information and to clarify any issues that may need further explanation.

Quiz Time!

1. Who is responsible for interviewing and selecting the Operations Manager?
2. Who does the Accountant report to on a daily basis?
3. What is the purpose of having a Board of Trustees?
4. Only the Accountant has access to the Financial Statements—True or False?
5. In the water business, are we selling a product or a service? Please explain.
6. What are some of the challenges in achieving customer satisfaction?
7. Why is cost recovery important?
8. What is the purpose of having two separate bank accounts?
9. All conflicts should be immediately brought to the attention of the Water Services Provider—True or False?



Answers

1. The Executive Committee
2. The Operations Manager
3. Political support and high level advice (policy, tariffs for example)
4. False, all Financial Statements are available upon request
5. Both—the actual water is a product; but the quality and reliability of that water are aspects of service. Also, the customer care staff provides to customers (response time, friendliness, accessibility) are also part of service.
6. To achieve customer satisfaction, staff must really understand what customers want—not assume they already know. Also, communication must be continuous and staff should not raise expectations they cannot reach.
7. Cost recovery is essential to ensuring that the business will be able to continue. If the business cannot cover its costs, it will fail.
8. The Operations Bank Account is used for common expenses and deposits. The Investment Bank Account is more like a savings account in which money is set aside to cover large investments only, such as repairs.
9. False—parties in conflict should try to resolve their issues amicably. If this is not possible, then the conflict should be brought to the attention of the Water Services Provider.

References

CEDPA (1995). Training trainers for development: conducting a workshop on participatory training techniques. Washington, DC, USA, Centre for Development and Population Activities.

F. Brikké et al (1997) Linking technology choice with operation and maintenance, in the context of low-income water supply and sanitation. Published by the Operation and Maintenance Network of the Water Supply and Sanitation Collaborative Council.

Narayan D, Srinivasan L. (1994). Participatory development tool kit: training materials for agencies and communities. Washington, DC, World Bank.

Servaes J, White SA. eds. (1996). Participatory communication for social change. New Delhi, India, Sage Publications.

Annex i: Templates

(i) MONTHLY COMMUNICATION

Water Users Association .....

Please use the following space to update the Water Services Provider on any technical, financial or institutional issues you may be facing. Also, please describe the specific assistance that you require.

Submit this form to the attention of: **Contact Person (NAME), Water Services Provider**

I. Technical Issues

Please report any outstanding technical issues on your network: _____

_____

_____

Water Services Provider action requested? _____

_____

Please report any illegal connections within your area of service: _____

_____

_____

Please report the location of leakages in your area of service: _____

_____

_____

II. Financial Issues

Please report any financial issues you are facing:_____

_____

_____

Please report all your outstanding debts:_____

_____

_____

Water Services Provider action requested? _____

_____

_____

III. Communication Issues

Please report any communication issues you are facing: _____

_____

_____

_____

Water Services Provider action requested? _____

_____

_____

IV. Other Issues

Please report any other issues you would like to bring to the attention of the Water Services Provider: _____

_____

_____

_____

_____

Water Services Provider action requested? _____

_____

_____

Would you like to schedule an appointment with the Water Services Provider?

If yes, indicate: Day ☐ Month ☐ Year ☐

Prepared by *(please sign below):*	Confirmed by *(please sign below):*
Name_____	Name_____
Title _____	Title _____

(ii) Customer Account Ledger

Keeping a customer account record will help the Manager and his/her Team to keep track of each customer's consumption and payments over time. This will also allow the Operator to identify trends in water consumption and to target customers with significant arrears. In addition, customers can ask to see their account page at any time.

(iii) Asset Register

Over time the community water services provider will acquire and accumulate assets. These assets should be recorded in an 'Asset Register'. The register should include the following information: type of asset, a description of the asset, year of purchase and the purchase price.

(Photo courtesy of Habel Chibelenie)

Customer Account Ledger

Name _____ Account No. _____Plot No._____

Chamber No._____ Connection Date_____ Dom/Kiosk_____

Date	Description	Consumption (m^3)	Bill Amount	Payment	Outstanding Balance

(ii) Asset Register

Over time the community water services provider will acquire and accumulate assets. These assets should be recorded in an 'Asset Register'. The register should include the following information: type of asset, a description of the asset, year of purchase and the purchase price.

It is important to keep an asset register so that:

(i) All stakeholders can easily know what the water group owns; and

(ii) The worth of the company may be easily determined.

(iv) Cash Book

The cashbook is a record book in which all cash received and all cash paid out is recorded (this includes cheques). All revenue and all purchases should be recorded and described here. The list below gives an example of the information that should be recorded in your cash book.

(v) Tanzanian Example of a Customer Bill

KONGOWE WATER USERS ASSOCIATION

MONTHLY WATER BILL

Customer name: Juma Mohamed
Billing month – July 2007
Customer Adress: Box 2121 Dar es Salaam
Meter No.: 78

Previous readings (ltrs)		1,040.00
Readings this time (ltrs)		3,200.00
Total (ltrs)		2,160.00
Price per litre (Tsh)		1.00
Total amount (Tsh)		2,160.00
Previous Outstanding (Tsh)		600.00
Total amount due		2,760.00

Signature of Iissuing Officer .....

Signature of Accounting Officer.....

Approved by.....

"Pay your bill on time for better service"

Table 17: Asset Register

Date	Type of Asset	Detail of the Asset	Year of purchase	Purchase price

COLUMN	DESCRIPTION
Date:	when the payment was made
Details:	the name of the person or firm from whom the money is paid or received
Receipt No:	the number of receipt (for cash received) or the payment voucher number (in case of all payments)
Cash in:	the amount of money received in cash
Cash out:	the amount of money paid out in cash
Balance:	the difference between cash in and cash out
Bank in:	the amount of money deposited in a bank (whether in cash or cheque form)
Bank out:	the amount of money withdrawn from a bank account
Balance:	the difference between bank in and bank out (this is the amount of cash remaining in your office after the bank deposit has been made)

Annex ii: Worksheets For Activities

(i) Conflict Resolution Activity

(ii) Financial Management Activity

Materials: Flip chart, markers, printouts of worksheets

The quarterly income statement below *(example is in Tanzanian Shillings)* should be given to the groups to help them develop a 12-month budget (template on the next page).

Quarterly Income Statement (2007)

	OCT	NOV	DEC
Gross revenue	1,500,000	1,400,000	1,700,000
Line item Expenses	**OCT**	**NOV**	**DEC**
Rent	240,000	240,000	240,000
Telephone	50,000	50,000	50,000
Electricity	120,000	118,000	125,000
Salaries	600,000	600,000	600,000
Exhaustig Services	0	135,000	0
Office Supplies	100,000	20,000	70,000
Chemical Supplies	110,000	110,000	110,000
Communication	42,000	40,000	50,000
Capital Expenses	0	480,000	0
General & Miscellaneous	500	500	500
TOTAL EXPENSES	*1,262,500*	*1,793,500*	*1,270,000*
NET INCOME	237,500	-393,500	429,500

2008 Draft Budget (Activity)

Instructions: Groups of 5-6 people should work together to develop a budget for the next 12 months in local currency. Groups should refer to the quarterly income statement they have been given, but groups are free to add or delete expenses. There is no right or wrong answer (as long as revenues cover your expenses)! This is an exercise for projecting expenses and revenues and negotiating through the budget development process.

Annual Budget (2008)	2008
Estimated Gross Revenue	
Estimated Line Item Expenses (fill in)	**2008**
Capital Expenses	
General & Miscellaneous	
TOTAL EXPENSES	
NET INCOME *(Revenue minus Expenses)*	

Annex iii: Evaluation Form

Please mark with a tick, where applicable.

1. *What do you think about the overall length of the course?*
   - ☐ Far too long
   - ☐ Too long
   - ☐ Just right
   - ☐ Too short
   - ☐ Far too short

2. *What do you think of the allocation of time for the different components of this course?*

	Far too much	Too much	Just right	Too little	far too little
Lectures					
Exercises					
Discussions					
Individual work					
Leisure					
Additional comments					

3. *How would you grade the relevance of the course to your needs?*
   - ☐ *Excellent*
   - ☐ *Good*
   - ☐ *Reasonable*
   - ☐ *Poor*
   - ☐ *Not relevant*

Comments: _____

_____

_____

_____

4. *What do you think of the balance between theory and practice?*
   - ☐ *Far too much theory*
   - ☐ *Too much theory*
   - ☐ *Just right*
   - ☐ *Too much practice*
   - ☐ *Far too much practice*

5. *How did you find this course in general?*
   - ☐ *Too difficult*
   - ☐ *Difficult*
   - ☐ *Just right*
   - ☐ *Easy*
   - ☐ *Too easy*

6. *Have your expectations, which you had when joining the training, been realized?*
   - ☐ *Completely*
   - ☐ *Largely*
   - ☐ *Partly*
   - ☐ *To some degree*
   - ☐ *Not at all*

7. *Which areas do you feel you need further training?*

8. *How do you think the course can be improved?*