
# Water Safety

*Making and keeping our drinking water safe*

## A TEACHER'S TOOLKIT

World Health Organization
SOPAC
LIVE&LEARN
Environmental Education


SOPAC

This toolkit was prepared by Live & Learn Environmental Education for WHO (World Health Organization) and Sopac (South Pacific Applied Geosciences Commission, as part of the Safety Plan Project, which is part of the National Water Safety Plan project.

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LIVE&LEARN
Environmental Education

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# Contents

# Introduction

This toolkit is designed to be used by teachers and other educators to teach children about the importance of safe drinking water in Vanuatu and to make connections between water hygiene and water borne diseases. It is designed to strengthen school curriculum themes and create student awareness, as well as effect behavior change. The booklet is aimed at students between grades 5 and 7 and can be used to support topics in basic science and health and hygiene.

## The activities within the modules will assist students to:

- gain a deeper understanding of the importance of safe drinking water;
- gain the practical experience and knowledge of doing a water safety audit and water testing;
- develop problem solving skills;
- develop thinking and reasoning skills;
- develop record keeping and analytical skills;
- take responsibility for their own family water hygiene and
- understand and make connections between water contamination and water management.

## The booklet consists of three modules;

- Why do we need clean water?
- Where does our drinking water come from?
- How can we make our drinking water safe?

Each module contains background information for the teacher and one or more activities for the teacher to present to the students. The activities are designed to allow students to learn through practical experiences, including discovering problems, thinking about solutions and taking some actions to solve problems that they discover. The activities contain a *purpose* and *what to do* section which helps the teacher present the activity by following simple steps and provides easy to follow directions for running a class discussion to take place after the activity is complete.

At the end of the booklet is a glossary to help the students learn and understand the terminology.

This toolkit is part of Live & Learn's Water Safety Plan Project, which is part of the National Water Safety Plan project funded by WHO (World Health Organization) and SOPAC (South Pacific Applied Geosciences Commission).

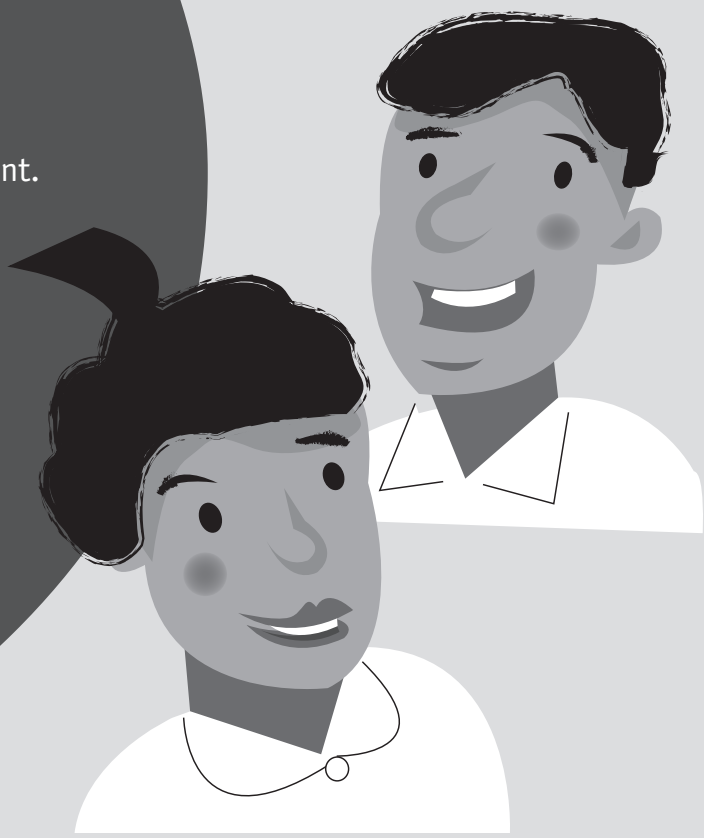
Module

1

# Why do we need clean water?

**Learning Outcomes:**

- Students can explain why clean water is important.
- Students can talk about water contamination and the diseases that can be carried in water.
- Students can explain the coliform bacteria cycle.
- Students will be able to carry out an hydrogen sulphide test to see if water is suitable for drinking.



# Module 1: Why do we need clean water?

Living things cannot survive without water. Water is a necessity for life. An average person needs 4 litres of clean water every day to survive—this is not surprising given that 70% of our bodies are actually made up of water!

Being such a necessity, an insufficient supply of safe drinking water or **contaminated** (impure) drinking water, poses a threat to many living organisms and especially humans. Humans can survive for several weeks without food, but for only a few days without water. A constant supply is needed to replace the fluids lost through normal daily activities, such as breathing, sweating and urinating. Water of sufficient quality to serve as drinking water is called **potable water** whether it is used as such or not. Water that is not harmful for human beings is sometimes called safe - water which is not **contaminated** to the extent of being unhealthy.

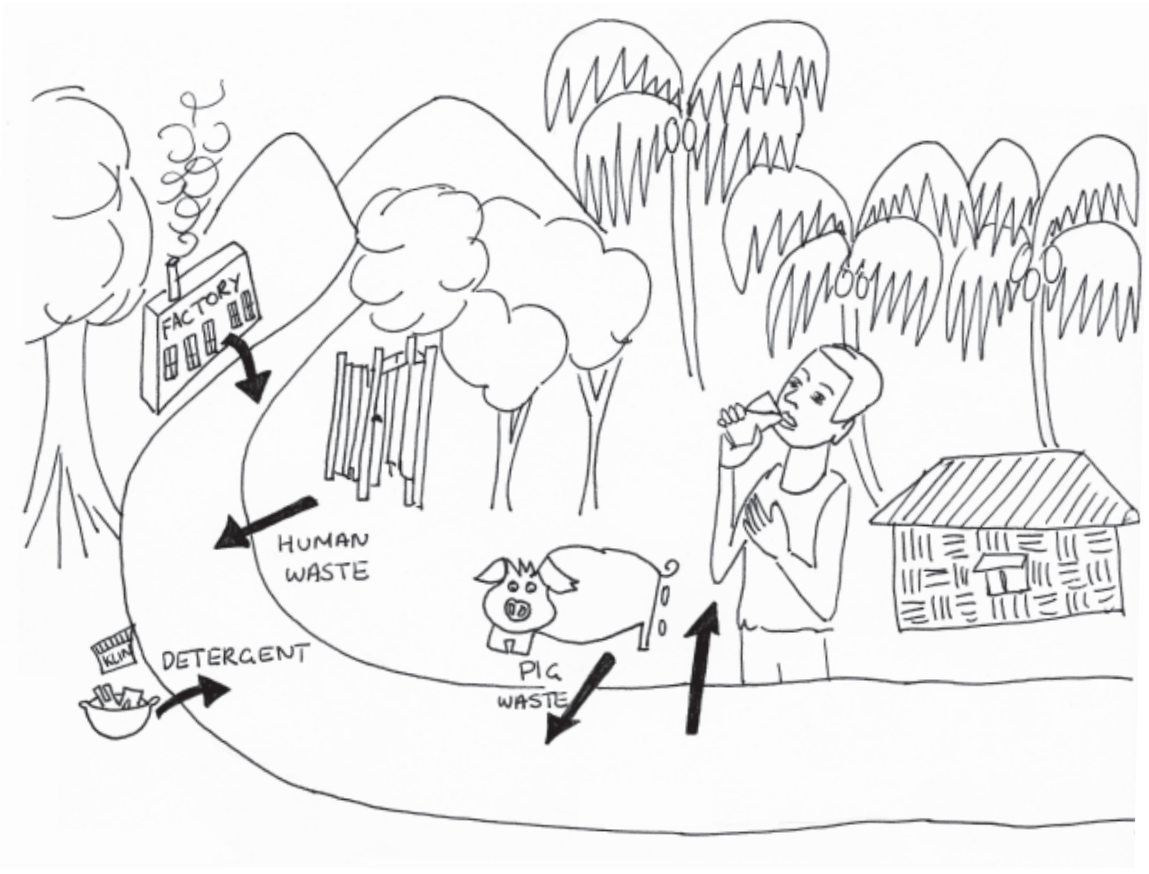



*Figure 1: Coliform bacteria cycle. Water can be contaminated by animal waste, human waste and factory waste. We cannot assume that water is safe just because it is clear as many contaminants are invisible or are dissolved in water. Coliform bacteria is a bacteria which lives in the intestines of humans and animals and is discharged in their faeces. If coliform bacteria are found in water, it is considered unsafe to drink.*

## Water can carry disease

A big problem facing people is that although we all need water, unclean water can contain germs or **microorganisms** (bacteria too small to see with the naked eye) that cause disease. These nasty little organisms can make you very sick, and in some cases lead to death. They are especially dangerous for small children or the elderly. Water that looks clean is not necessarily safe for humans to drink. **Contaminated** (impure) drinking water is sometimes hard to see because the germs, bacteria and toxic chemicals that cause diseases cannot be seen with the naked eye. You could fit more than a million disease causing germs in one single drop of water! So, you cannot assume that water is safe just because it is not dirty or does not have a bad smell.

If drinking water comes from a **polluted** source and is untreated it may contain germs and bacteria that can cause the spread of water-related diseases like diarrhoea, **dysentery, typhoid**, **cholera, polio** and **Hepatitis A**. Contamination can occur when human and animal feces which contain coliform bacteria enter the water source. Coliform bacteria lives in the intestines of both animals and humans.

**The World Health Organization** estimates that 80% of all sickness and disease in the world is a result of poor quality water and sanitation.

2.2 million people, mostly children die from diarrhea every year in developing countries. This is equal to the whole population of Vanuatu times eleven! This means 25,000 people die per day from diseases carried by dirty water. It is therefore extremely important to understand how water can be protected from contamination and to test drinking water for disease causing germs.

## The Hydrogen Sulfide ($H_2S$) Paper Strip Test

The $H_2S$ test is a simple test that will tell us if the water being tested is contaminated within three days (or less) depending on the amount of contamination. The test identifies if hydrogen sulphide ($H_2S$) is in the sample. $H_2S$ is produced by fecal colifom bacteria. Fecal coliform is a type of bacteria that lives in the gut of humans and animals, if it is found in the water it means that harmful bacteria or viruses could be in the water. If the water being tested changes colour, this means that hydrogen sulphide is present, and also indicates the likely presence of bacterial contamination by fecal colifoms in water. This also means that we need to take urgent action.

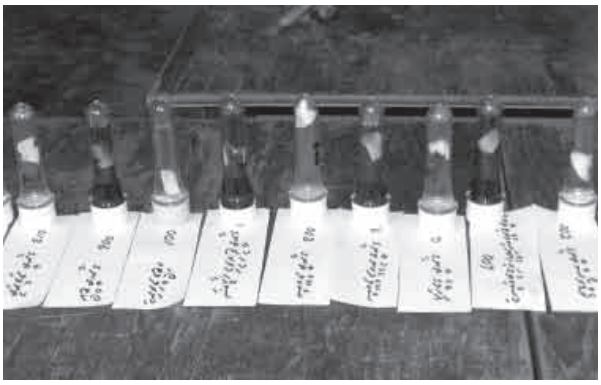


*Figure 2: $H_2S$ Sample bottle*

The Hydrogen Sulphide- $H_2S$ Paper Strip Test uses a paper strip to check for bacterial contamination in drinking water sources. The gas that coliform bacteria produces is called hydrogen sulphide (this is the gas that smells like rotten eggs).

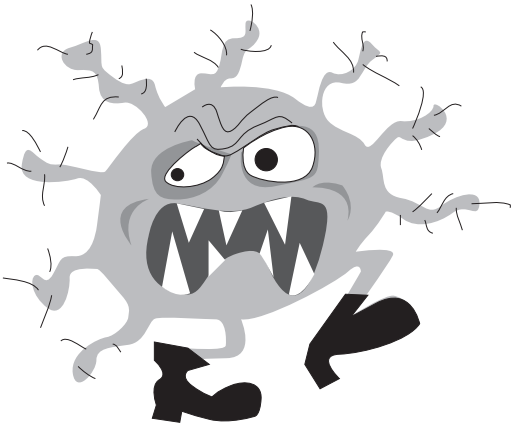
In order to check for the presence of coliform bacteria in water, a water sample is collected into the test bottle with the paper strip. Chemicals have been mixed into a solution and placed on the paper strip. The paper strip will react with the water sample by turning black if it comes into contact with hydrogen sulphide.

If the water sample or paper-strip turns black, this indicates that hydrogen sulphide was produced. This means that it is likely that bacteria of fecal origin are present in the water- that is, the water has been contaminated with animal or human waste.

The advantages of the $H_2S$ Paper Strip test are, that it is low-cost, does not require samples to be shipped or refrigerated, does not require a laboratory or expensive equipment, and most importantly, it is easy to understand and carry out in the field!

> Activity

1



# Is our water contaminated?

## Purpose

To gain an understanding of the coliform bacteria cycle, and how contaminated water can affect you.

## What to do

Ask the class the following question about water:

1. Why do we drink water every day?
2. Write the reasons that the students provide on the blackboard.
3. When they have run out of ideas add some extra ideas to the list, and share some of the facts about water in the back ground information (above).
4. Then ask the students to close their eyes and imagine what would happen if the only water that they had to drink was dirty or contaminated. You may need to explain the meaning of contamination (see glossary).

If possible provide students with a copy of the *How water gets contaminated picture* (*figure 1*) If you can't make copies then draw your own version of the picture on the black board.

Ask each student to imagine that they are the person in the picture who is drinking the contaminated water. Then ask each student to write a short story about what it is like being this person. Choose from the following to write about:

- What happens to you after you drink the water?
- What you would say to the people who made the water contaminated?
- Or, for fun – imagine you are the pig and write about what you've been doing in the water!

When everyone is finished allow some students to read out their stories to the class, or choose some to read out yourself.

> Activity

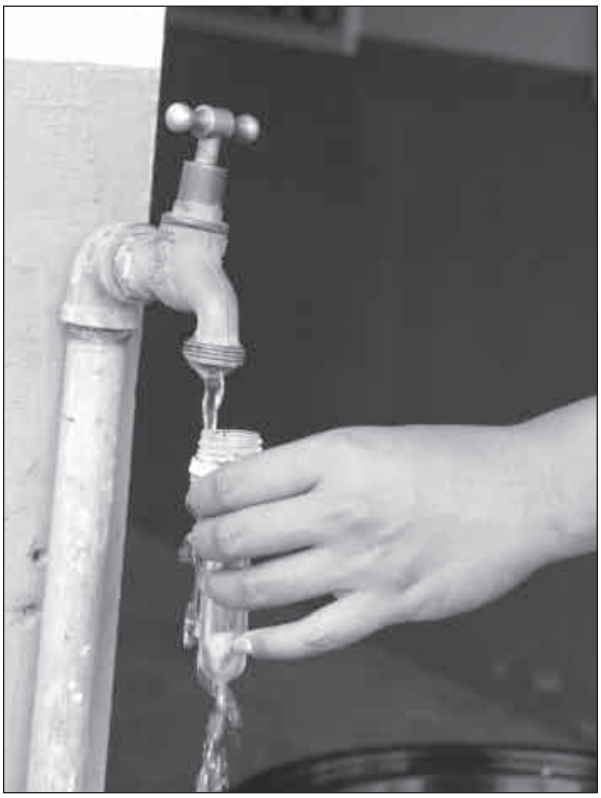
2

# $H_2S$ test on school drinking water

## Purpose

To help the students understand the importance of doing regular $H_2S$ tests on drinking water and to provide them with the opportunity to observe and record the results of the water test.

*Figure 3: Testing tap water*



## What to do

Now that the students have learned about contamination theory use this test to see if the school drinking water contains $H_2S$ which would indicate that it is contaminated with coliform bacteria.

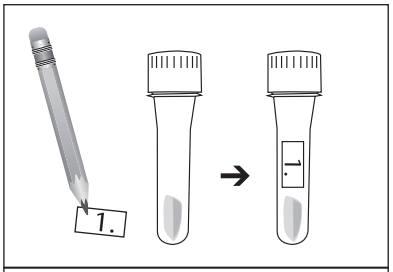
Read the information on the $H_2S$ Paper Strip Test and then follow the instructions below.

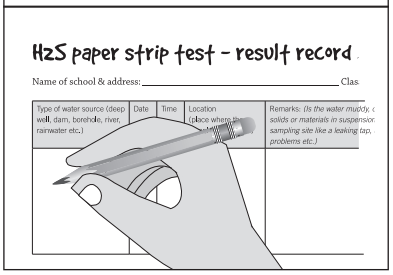
Take the class to the tap or tank from where the schools drinking water comes, and take a sample in the test tube provided.

Fill in the result sheet with the class every day at the same time for three days. See if the sample changes colour.

# How do we carry out the $H_2S$ Paper Strip Test?

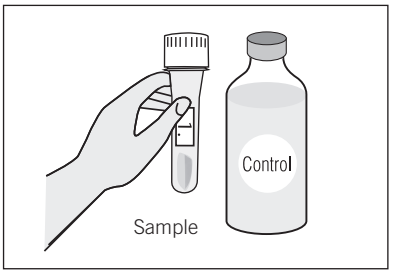
## Step 1: Fill in the details




1. Fill in Sample number and date on the round sticker or sticker strip label and stick on the sample bottle. ***Be careful not to get the sticker wet!***
2. Record your Sample number, date, time, location and description of the water sampled on the Result Record Sheet.
3. Record any other information e.g. **turbidity**, (how cloudy the water is), smell, source of pollution, faulty pump, etc.

## Step 2: Collecting the Control




- A control is used to compare the colour change in the test samples, and to ensure that the sample bottles are not contaminated before use.
- A control is a sample that you know for sure should not be contaminated.
- You need to collect the control only once for each monitoring programme.

4. Collect a sample of uncontaminated water e.g. distilled water, boiled water, bottled water, water treated with chlorine. This is to be used as the control.
   - There may be a slight change in the colour of the sample to a pale yellow or light brown due to the colour change of the reagent. This is normal.

### Note!

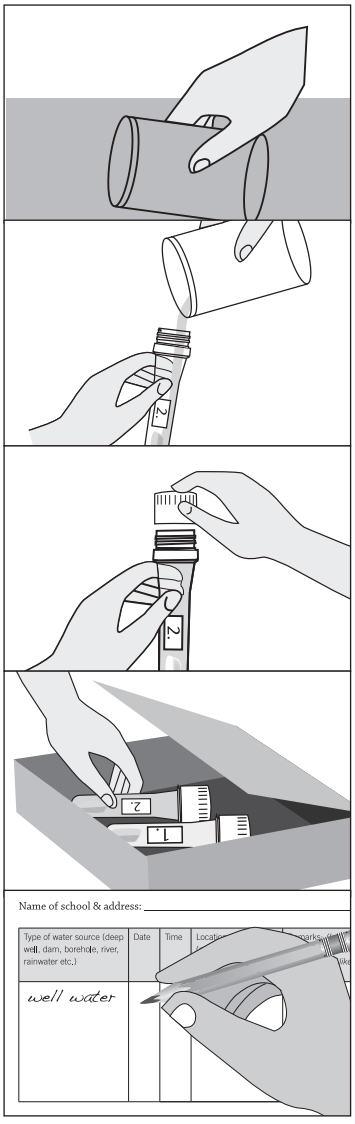
- Do not expose your bottles to direct sunlight. Store in a dark place.
- The sun's rays can kill the bacteria inside the test bottles and you will not get a true result.

## Step 3:
## Collecting the water sample:

### A. From the tap

5. Turn on the tap and allow the water to flow for 15 to 20 seconds.
6. Collect sample water from the tap by filling the sample bottle **up to the mark**.
7. Fill the test bottle carefully, this is because the test bottle will fill very quickly to the marked line and may overflow.
   If you do overfill the bottle, do not spill the water out and do not worry. Your result will still be valid.
8. Immediately close the sample bottle

### B. From storage containers such as water tanks, bore holes and wells or rivers

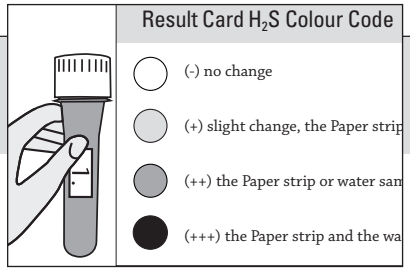



9. Rinse the container to collect the water several times in clean water.
10. Collect a sample of water from the container by filling the sample bottle up to the mark.
11. Close the sample bottle.
12. Place all the test samples in a dark place at room temperature.
13. Wash your hands!

## Step 4:
## Check your results

- Check your test sample at the same time each day for 3 days for changes in colour.
- Record the date and time for each observation on your recording sheet and your result for each day.
- Compare the colour change with that of the control.
- Use the $H_2S$ Colour Code to indicate the degree of contamination.

## Result Card $H_2S$ Colour Code




(-) no change

(+) slight change, the Paper strip or water sample has turned grey.

(++) the Paper strip or water sample is partially black.

(+++) the Paper strip and the water sample are noticeably black.

## Step 5:
## What do your results mean?

(-) If there is no colour change this indicates that there are no hydrogen sulphide producing bacteria present.

(+) If the water has turned grey, there is a possibility that bacteria, is present in the water. Wait for a few days and check again.

(++) If the colour change is partially black then there is some amount of bacterial contamination in the drinking water. You may want to set up a regular monitoring programme and boil your drinking water!

(+++) If the paper strip and the water sample are noticeably black then there is a very high risk of bacterial contamination in the drinking water, therefore, it is not safe for drinking. Take action!

(+++) If there is a fast reaction—that is, the water solution and paper strip turns black overnight—that means that there is a high probability of bacteria present!

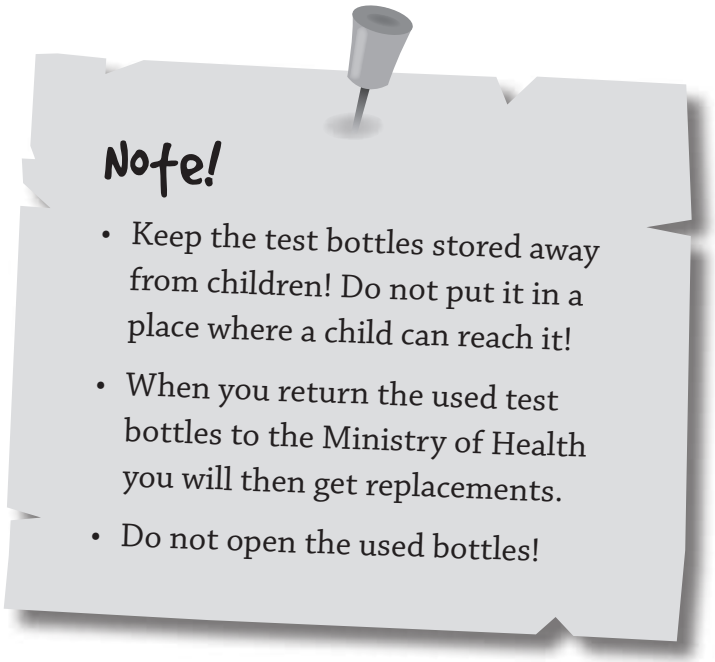
Your water is contaminated! You should clean out your water storage containers, tanks or well and boil the water before you drink it!

## How to Fill the Result Record Sheet?

Every time a Water ambassador is going out for water monitoring, he or she needs to fill in the provided Result Record Sheet.

**All the relevant details need to be filled in the Sheet.**

1. Fill in the address or where you doing the water sampling e.g. Mele Village,
2. Write in your sample number in the first column.
3. Fill in the type of water that you are sampling e.g. rainwater.
4. Record the date and time of sampling.
5. Identify the location of your sample e.g. the school water tank
6. In the "Remarks" column, fill in information like the color of the water, the smell or if there is faulty tap or pipe.
7. Use the colour code to find out your results- e.g. "+" or "++" and record this in the "Results" column. Fill in your observation each day for three days and record the date and time of observation.
8. The "Notes" section below the table can be used for other information like the source of contamination or if there is a latrine built within a short distance from the drinking water source



# $H_2S$ paper strip test – result record sheet

Name of school & address: _____ Class _____

| Type of water source (deep well, dam, borehole, river, rainwater etc.) | Date | Time | Location (place where the sample is collected) | Remarks: *(Is the water muddy, coloured, contain solids or materials in suspension also problems at sampling site like a leaking tap, unclean, drainage problems etc.)* | Results each day over 3 days -clear, +grey colour, ++part black, +++very black | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Notes:

## Note for teacher

After the water safety audit has been completed the class will be able to make connections between water hygiene and clean safe water

> Activity

3

# Making meaning from the $H_2S$ test

1. Go over the test results with the students.
2. Look to see if the water in the test tube after 3 days turned grey or black. What does it mean?
3. How do students feel about the test results?
4. Get the students to break into groups and write down why they think the water is or isn't contaminated.

*Figure 4: Students discussing the $H_2S$ test results*

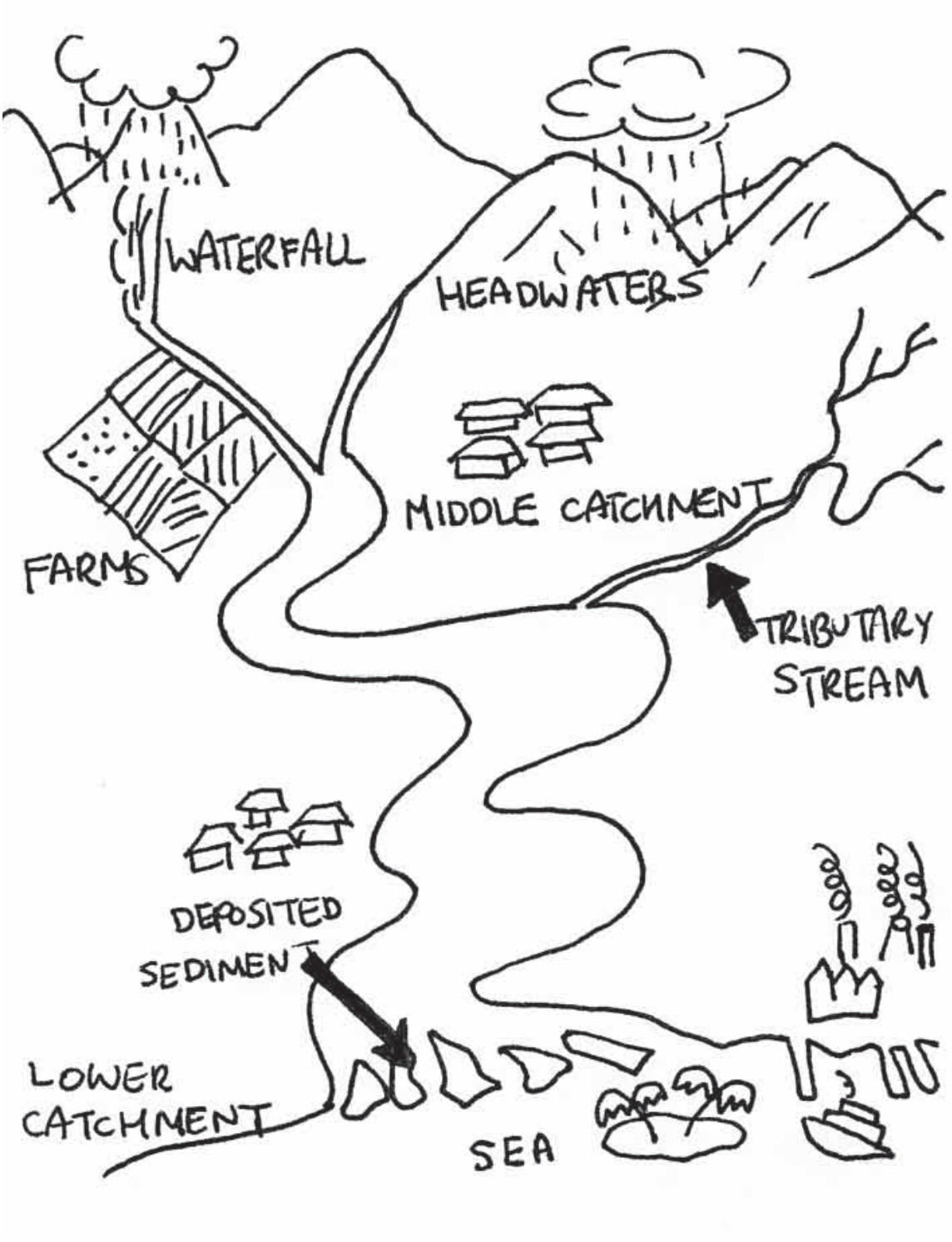
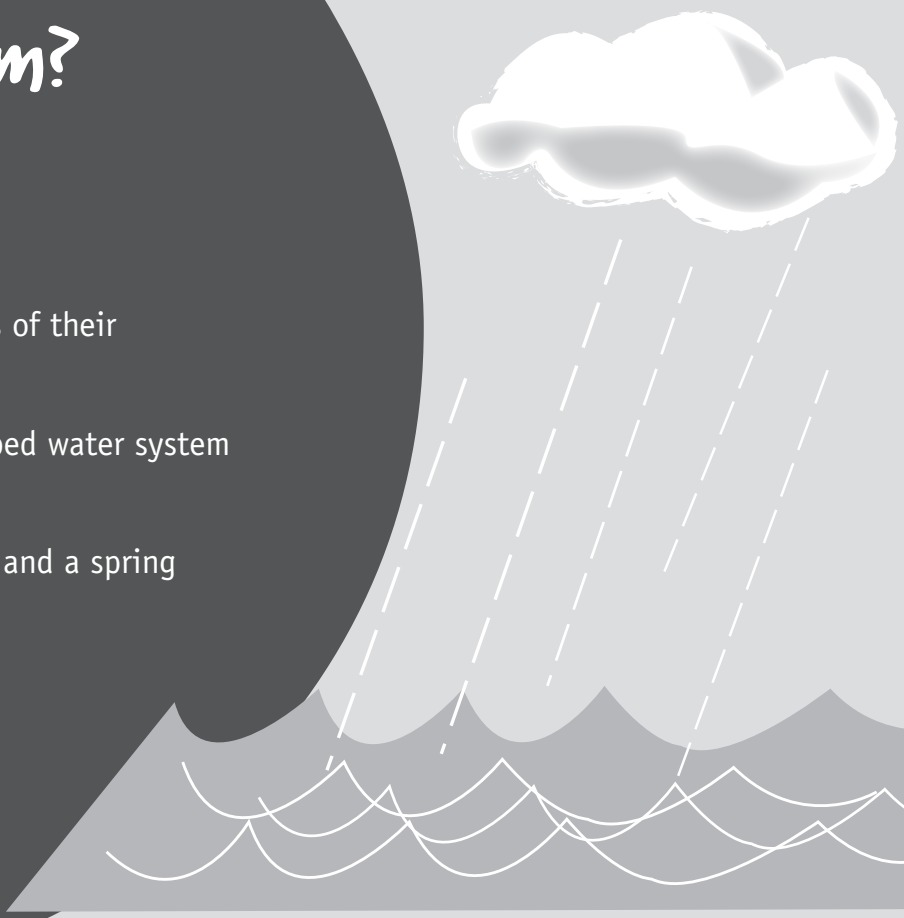



*Figure 5: River catchments*

Module

2

# Where does our drinking water come from?



## Learning Outcomes:

- Students can identify the sources of their communitys' drinking water.
- Students can explain how the piped water system in their community works.
- Students can describe an aquifer and a spring

# Module 2: Where does our drinking water come from?

## There are four main sources of drinking water in Vanuatu

### 1. Rivers and streams

Our rivers and streams can originate from springs (water coming out of the ground from the top of an aquifer), or from rain water runoff from the mountains and hills draining to the lowest point of the land. (*Figure 5*)

### 2. Bores and ground wells

Bores and ground wells are holes drilled or dug down to aquifers, or natural stores of water, under the ground (ground water).

### 3. Rain water

Rainwater is water that has fallen as rain. It can be collected from a corrugated iron roof or another structure and stored in a container such as a rainwater tank. *(Figure 6)*

### 4. Piped water comes from springs, rivers, underground wells, tanks or dams.

With a bore, a hole is drilled down into an aquifer *(figure 7)* and the water is pumped out into tanks. Pipes then go from these tanks to a system of pipes that go to the community.

If the river is the source of piped water it can be pumped or gravity fed into storage tanks and then fed into a system of pipes to the community. *(Figure 7)*

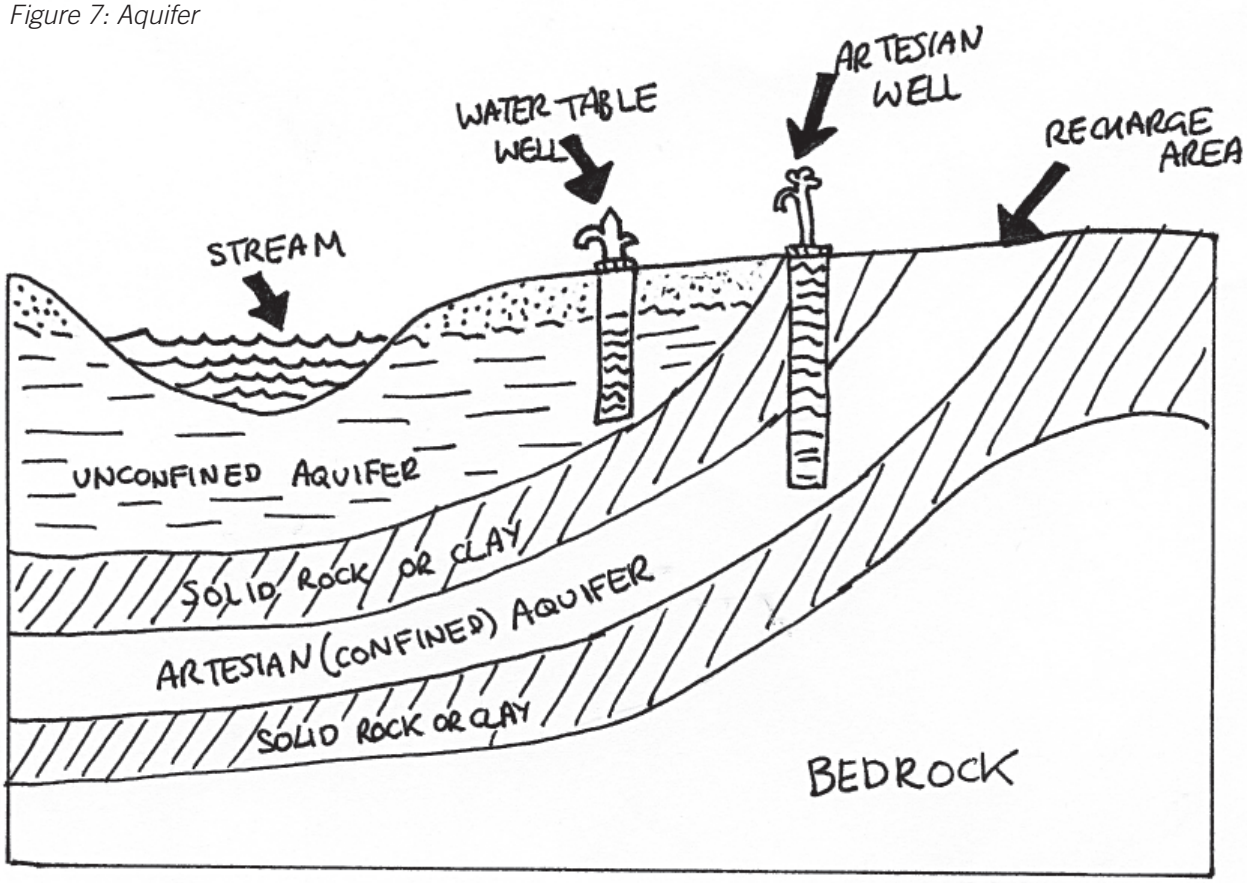
The unconfined aquifer is the water table or ground water that you find easily near rivers or lakes if you dig a hole.

The confined aquifer is water that is trapped between layers of rock or clay. The well or bore hole that is drilled into the confined aquifer is called an artesian well.

**Q. Where does your drinking water come from?**

*Figure 6: Collecting rainfall in a rain water tank*

*Figure 7: Aquifer*



> Activity

# 4

# Guest speaker

## Rural water supply/Water committee/private water company speaker

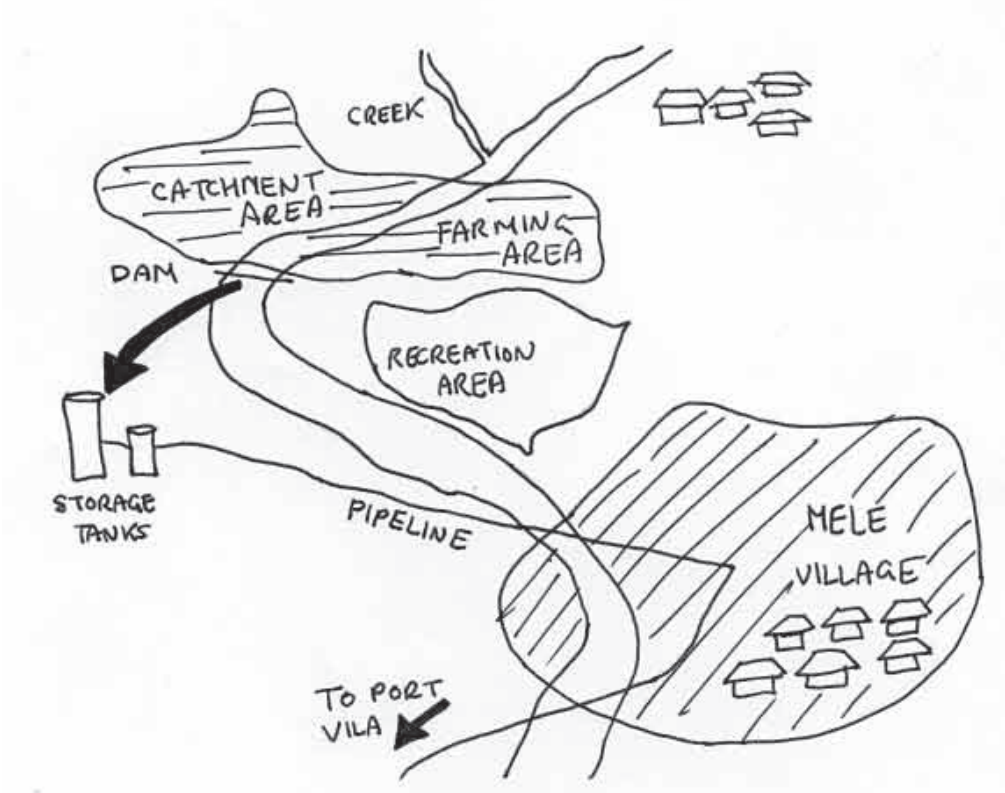
### Purpose

To understand how the piped water system in your community works and what this means for the community.

### What to do

Invite a guest speaker from the water supplier or water committee in your community. Ask him /her to talk about the piped system in your community. Is the water from a river or a bore? Has it been treated or tested? What are the pros and cons to having a piped water system? Would it be a good idea for your community if it doesn't already have one?

*Figure 8: An example of a water system in Mele, Efate*



> Activity

5

# Making meaning of the activity

1. Discuss the activity with the class. Do they think it would be good to have a piped water system? Why?
2. Get them to draw a system for their community. How could the community make this happen?
3. How does our drinking water become contaminated/polluted/unsafe?
4. How does our river water become contaminated?
    - When houses and villages move too close to the river then rivers tend to get polluted.
    - Gardens planted alongside the river cause erosion and run off of nutrients and soil into the river.
    - Toilets contaminate ground water that runs into the river, and soap and detergents from washing dishes and clothes also cause pollution.
    - People often throw rubbish into the river or burn rubbish alongside, which produces a toxic chemical that settles on top of the water.
    - Animal grazing and growing and fertilizing crops
    - All this quickly makes river water unsafe to drink.

## How does groundwater become contaminated?

Some groundwater contamination occurs naturally. Saltwater intrusion occurs when too much fresh water is pumped out of the aquifer and saltwater from the ocean is drawn in to replace it. Serious contamination usually occurs because of human activities. This contamination includes the runoff of agricultural pesticides, chemicals from household cleaning products, and oil and metals from roadways. Leakage of bacteria from septic systems, and bush toilets, also creates a serious hazard to groundwater purity. Most of these pollutants enter the aquifer through water draining from the surface. Since groundwater moves slowly, it may take many years for a pollutant to be detected.

## Rain water

Most people think that rainwater is always safe to drink. That in fact may not always be the case. This will depend on how safe the tank or storage container is. If rain water is collected from roofs, then these roofs and their gutters need to be kept clean. Birds, rats and geckos have access to the roofs and gutters and can even get inside the tank if the openings are not screened. Screening of inlets to tanks and other storage containers is essential in Vanuatu to prevent mosquitos from breeding in collected water.

*Figure 9: Polluted River*

> Activity

# 6

# Understanding ground water

## Purpose

The purpose of this activity is to understand what ground water is and how it moves and to make the connections between ground water and contaminated drinking water.

## What to do

1. Make or find a container without leaks. A cake tin would be ideal.
2. Fill it with sand and pat it down.
3. Get the students to pour some red cordial into the sand at one end.
4. Sprinkle the sand with water until it is saturated but not too wet.
5. Tell someone to tip the pan at a small angle, tip it so the end that had the cordial added is 'up.' Hold the pan like this for a few minutes
6. Dig the sand out at the bottom end of the pan and observe what is underneath.

> Activity

# 7

## Understanding the activity

- Ask the students what colour is the sand and water that came out from the hole that was dug?
- Discuss with the class how the water moves through the sand towards the lower ground.
- Talk about how the water from a septic tank or bush toilet can enter the ground water.
- Ask students to give provide some ideas about how they might come into contact with this contaminated ground water?
- Can they suggest what we can do to stop this happening?

> Activity

8

# Field trip to the river

## Purpose

The purpose of this activity is to observe, and then discuss the activities taking place along the rivers edge, to make connections between these activities and the pollution of the river  and to write up an action plan and follow it through.

## What to do

1. Take the class on a field trip.
2. Walk along the rivers edge.
3. Get the students to observe and record how the people are using the river. In their notes they should include the following:
    - A tally count of how many houses and gardens are near the waters edge.
    - How close are the nearest houses (in meters).
    - Record or describe the kind of toilets people are using and how far from the river are they located.
    - Note down any rubbish that has been dumped into the river, or on the banks.

| Number | Houses less than 30 meters from river edge. How many meters? | Toilet. How many meters from rivers edge? | Use of river e.g. Washing, fishing, swimming | Rubbish? Dumped on the side or in the river? | Action to be taken by householder? |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |

> Activity

# 9

# Making meaning from the field trip

- In the classroom discuss how these houses could be polluting the river.
- Ask the students to draw the river and label the places where it is used for washing, swimming, gardening, rubbish dumping, etc.
- Ask the students to work in small groups and instruct each group to write down actions that need to be taken (what can the people in these houses do to change things?). When each group has finished, ask one student from each group to share some ideas with the rest of the class.
- As a group discuss what we can do as a school/class/individual? Part of this plan may be public awareness about the river and how it becomes polluted.
- Ask a local member of parliament to come to your class and show him/her your findings. Ask how he/she can help.

*Figure 10: Rubbish dumped into water source*

Module

3

# How can we make our drinking water safe?

**Learning Outcomes:**

- Students understand how to make drinking water safe
- Students able to conduct a water safety audit
- Students understand how to clean a rain water tank

# Module 3: How can we make our drinking water safe?

There are ways we can change our contaminated water sources back into clean healthy drinking water or keep it that way if it is already free from contamination.

## Rivers

All gardens need to be at least 30 meters away from the river. When trees and indigenous vegetation are cut down close to a river, and gardens are put in, then **erosion** begins. The land starts to slide into the water. This affects the water by making it very muddy, or **turbid**. When the water is very dirty it stops the sunlight going through it, which causes plants to die, thus affecting the marine life too.

- Houses and toilets should also be built at least 30 meters away from the river edge. Bush toilets, septic and VIP systems contaminate rivers by contaminating the **ground water** which flows into them.
- Rubbish should not be thrown into or burnt along the sides of the river.

**Furans and Dioxins** which are toxic chemicals are released when plastic is burned and settle on the waters surface. These are ingested by marine life, animals, and humans and can cause serious diseases.

Rivers need to be fenced so animals don't cause erosion and defecate in the water. Water for animals needs to be piped at least 50 -100m inland from the river. Animal feces are as bad as humans when it comes to carrying disease.

Any excavating of large amounts of sand from the river needs a full **Environmental Impact Study** (a study done by or under the direction of the Dept. of Environment) first. Excavating in rivers can have a devastating effect on the river life and environment.

## Ground wells

The water table near a river is usually high, so if you dig a well the water is usually not too far down. It is because of this reason, that it is also very easy to contaminate a ground well. If a bush toilet or septic tank is built less than 30 meters away from the well, then it will affect the water in the well, contaminating it.

Ground water travels toward the river or sea, so the toilet should be at the lowest point.

Wells must be kept covered when not in use, to keep out animals and their feces.

Keep the vegetation away from the sides of the well to stop animals hiding close to it.

## Rainwater tanks

All inlet holes to a rainwater tank need to be screened. If there is not a screen over the inlet

holes then small creatures can get inside and cause contamination. Mosquitoes can also breed in unscreened collected water which heightens the risk of malaria. Roofs and gutters often have bird or rat droppings on them too, so should be cleaned after long periods of dry weather.

The water storage containers in the house also need to be kept covered and kept clean.

All rainwater tanks and storage containers should be disinfected on a regular basis.

## Piped water

Make sure your pipes do not have leaks! Water from the ground can get inside them, and if it is polluted it can contaminate your drinking water. The outside tap should have a soak away so there is no standing water, and animals and vegetation should be kept away to keep the tap clean.

## Personal Hygiene

Make sure you wash your hands with soap every time you go to the toilet. Bacteria on your hands are easily transmitted to other things.

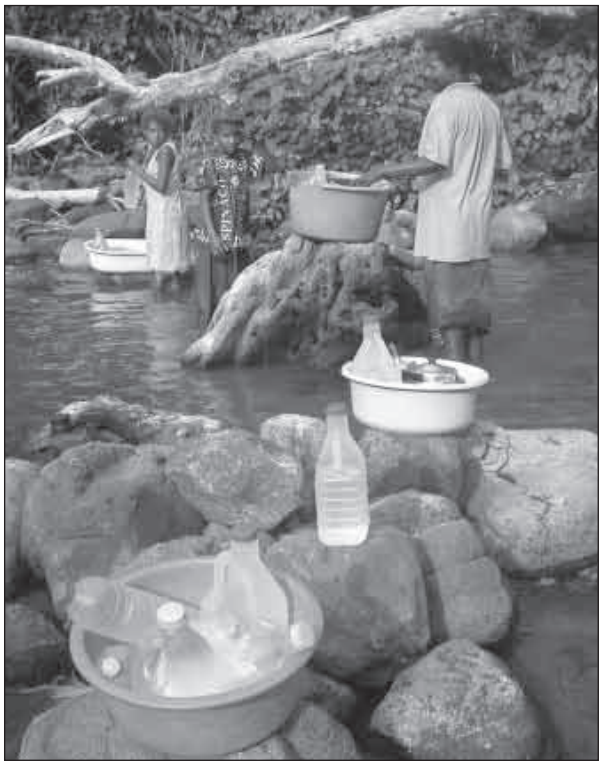
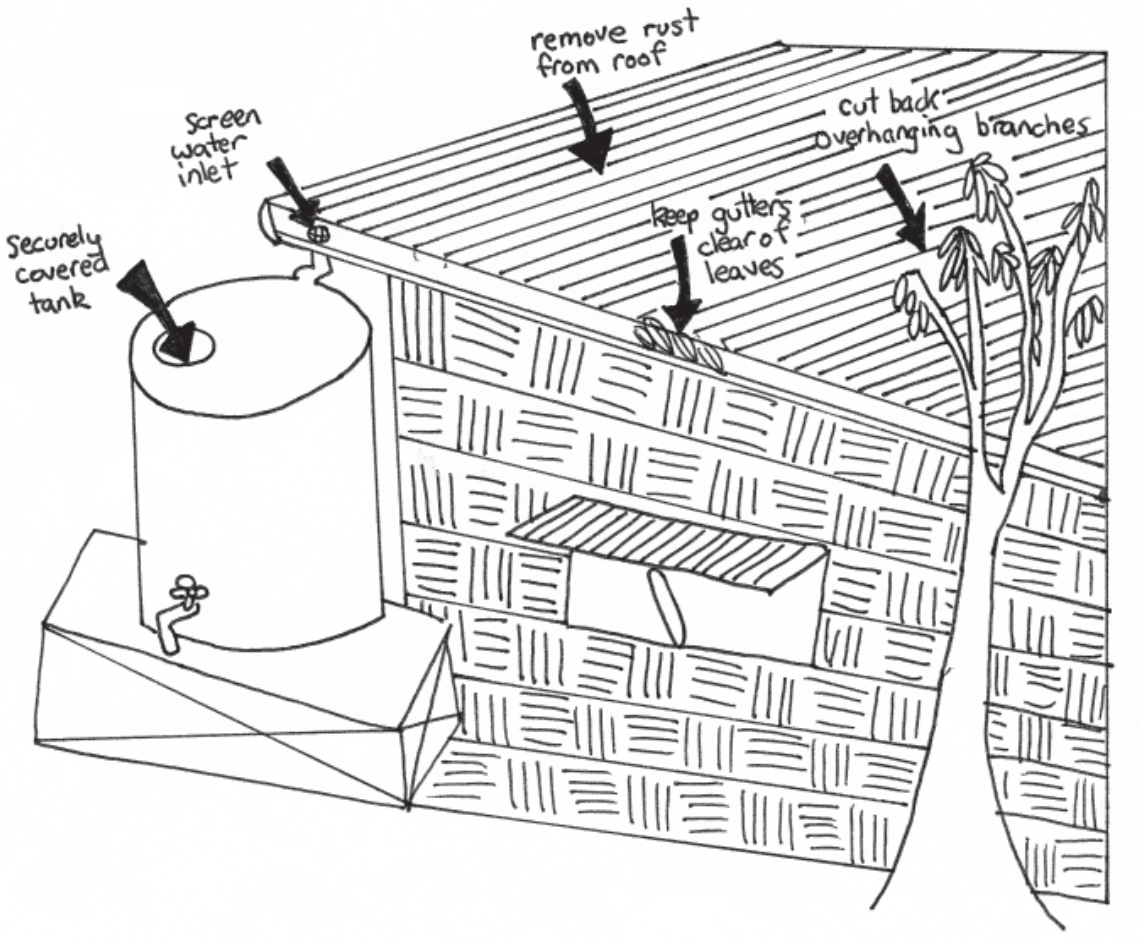


*Figure 11: Collecting drinking water*

*Figure 12: Ensuring your water is safe*



> Activity

# 10

# Conduct a water safety audit on the schools drinking water

## Purpose

To observe, record and make connections between contaminated water and water management and practices.

## What to do

Take the class out to the schools drinking water source and go through the audit questions. (You can do the $H_2S$ test at the same time if it's more convenient)

After waiting 3 days, the results of the $H_2S$ test will be ready to analyse.

## Why carry out a water audit?

An audit is simply a series of questions and observations that are made to find out more about water, how it is used, and whether it is at risk of being contaminated. The main reason to do a water audit is to get a better understanding about water in order to carry out the right measures to make sure it is kept clean and healthy.

This audit seeks to find out the following:

- How is water being used?
- What are the sources of water (where does the water come from?)
- Is the water at risk of being contaminated by disease causing germs?
- What activities are putting the water at risk of contamination?

The audit will allow you and the school to discover the answers to these questions. Then, with this new knowledge the schools and communities can create an action plan to address the findings of the audit and to promote safe sanitation, hygiene, and health in their communities.

## The class can do this water safety audit on the school water supply.

Fill in the tables below where they apply

| Water Source (Where do you get your water from?) | What do you use it for? | Does it ever run out? (Explain) | Do you think it is safe to drink? (Explain) |
|---|---|---|---|
| Water Tank | | | |
| Well | | | |
| River | | | |
| Others | | | |

## Water tank

| Condition of gutters and roofs (if present) | Please tick ✓ | How are often are these maintained/cleaned? | Please tick ✓ |
|---|---|---|---|
| Very good – very few leaves, no dirt or evidence of animals | | Often (every 1 – 2 months) | |
| Good – few leaves, little dirt or evidence of animals | | Occasionally (twice a year) | |
| Poor – many leaves, some dirt and/or evidence of animals | | Rarely (once a year or less) | |
| | | Never | |

Is there an intake screen on the tank? Yes ☐ No ☐

How often is it cleaned?

Is there any uncovered opening on the rainwater tank? Yes ☐ No ☐

## Well water

1. What kind of well do you have?

☐ Drilled (bore) ☐ Dug ☐ Open ☐ Sealed

| What types of toilets are 'nearby' in the community (include neighboring properties) | Approximate distance from well (meters) | Are these 'uphill,' 'downhill' or on 'flat ground' |
|---|---|---|
| Pit/VIP toilet | | |
| Septic tank | | |
| Area where people defecate (e.g. in the bush or river) | | |

## River

1. How many meters is the school to the nearest creek or river?
2. How is the river used by people in the school? (You may tick more than one answer)

☐ Drinking ☐ Washing clothes ☐ Cleaning dishes

☐ Fishing ☐ Washing (cars) ☐ Disposing of waste water

☐ Dumping rubbish ☐ Toilet

☐ Providing water for animals (e.g. pigs or cows) ☐ Other (Please describe)

Rate the condition of river banks:

| | | |
|---|---|---|
| Excellent | 4 | Almost all native plants (no introduced weeds or gardens); almost all of the ground is covered by plants; good mix of trees, shrubs and smaller plants; no signs of disturbance; no access to animals |
| Good | 3 | Mostly native plants; good cover of plants, good mix of trees, shrubs and smaller plants; no signs of recent disturbance; little or restricted access of animals |
| Fair | 2 | Mixture of native plants and introduced plants; moderate cover of plants (some spaces); narrow corridor of plants (less than 5 m); evidence of recent site disturbance; little or restricted access of animals |
| Poor | 1 | Mostly introduced plants such as weeds, grasses and gardens; little cover by native shrubs or trees; lots of bare ground, extensive site disturbance; unrestricted access for animals |

*Figure 14: A healthy river with local plant life all around*

## Pipes and Taps

Do you have access to piped water via a tap? Yes ☐ No ☐

How many people share this tap? _____

Is the area around the tap stand fenced Yes ☐ No ☐

Please describe _____

_____

_____

_____

Does water accumulate near the tap stand Yes ☐ No? ☐

Please describe _____

_____

_____

_____

## > Activity 10 : Conduct a water safety audit on the schools drinking water

| What types of toilets are 'nearby' in the community (include neighboring properties) | Approximate distance from tap stand (meters) | Are these 'uphill,' 'downhill' or on 'flat ground' |
|---|---|---|
| Pit / VIP toilet | | |
| Septic tank | | |
| Area where people defecate (e.g. in the bush or river) | | |
| Other (please explain): | | |

Please describe condition of taps and pipes. Are there any leaks?

*Water is life!!*

> Activity

11

# Making meaning of the water audit

Doing a water safety audit on the schools drinking water source is a good way to demonstrate to the students how they can make sure their drinking water at home is safe.

By filling in the survey sheets, you can help them make the connections between good hygiene habits and clean water.

1. Have the class break into groups of 5 or 6.
2. Give each group a large piece of paper.
3. Have them draw the table below

Get the students to make the connection between the contaminated water and the problem. Maybe there are no screens on the top of the rainwater tank, or the roof is dirty. Maybe the tap where the water comes out is dirty, or the pipe is broken.

After they have found the source of contamination, how can they fix it?
What actions can they take?

If the school drinking water is not contaminated, make up an imaginary source of contamination.

What would they do to fix it?

| Source of Drinking Water | Test result | What do you think is the source of contamination? | Action to be taken |
|---|---|---|---|
| | | | |

# Glossary

**Aquifer**
An underground layer of porous stone, earth or gravel containing water.

**Artesian**
Ground water.

**Cholera**
An infectious disease caused by drinking water containing the cholera bacteria. It causes diarrhea abdominal cramps, vomiting and dehydration.

**Coliform bacteria**
Total coliforms are mostly natural residents of soil and water. Fecal coliforms are those that are usually found in the fecal material of animals. Their presence usually means that the water may be contaminated by sewage effluent. Finding the source of the problem and correcting it is very important.

**Contamination**
To introduce impurities or foreign matter.

**Dioxins**
Unwanted byproduct of combustion.
See furan

**Dysentery**
A disease causing inflammation of the intestine which causes severe diarrhea often with blood in the feces.

**EIS**
Environmental Impact Study. A study done by environmentalists to see how a development will effect the environment.

**Erosion**
To wear or fall away, like soil on river banks.

**Furans**
Toxic chemical released by burning plastic.

**$H_2S$**
Hydrogen Sulfide. A toxic gas, smelling like rotten eggs.

**Microorganisms**
Bacteria, fungi. Organisms too small to see with the naked eye. Usually single-celled.

**Pollution**
The contamination of the environment with harmful substances.

**Potable water**
Water safe to drink

**Turbid**
Having the sediment disturbed. Muddy. Not clear.

**Typhoid**
An illness caused by the *Salmonella* bacteria which causes high fever and diarrhoea.

**Water Table**
The level, underground, below which the ground is saturated with water. The top of an unconfined aquifer

**WHO**
World Health Organization

# Notes

# Notes

Caring for our waterways begins with
each and everyone individually.
A big wave begins by small ripples.

World Health Organization
SOPAC
LIVE&LEARN
Environmental Education