



# TRAINING MANUAL

*Good Water, Sanitation & Environmental Hygiene  
Practices for Primary Schools*

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# 1

## INTRODUCTION

This manual has been developed as part of the Health Promoting Schools Initiative, and is intended to be used in primary schools. The aim of this manual is to inculcate good water, sanitation and hygiene practices in our children.

### Who can use this manual?

This training manual is a practical guide to be used by teachers and school health assistants who are involved in the promotion of water, sanitation and hygiene practices (WASH). School WASH education is a specific part of the wider school health education program that deals only with water and sanitation-related health problems in and around the school.

The manual has been designed to provide the necessary background to WASH topics for teachers and school health assistants, as well as activities and materials for use with students. We hope that teachers and school health assistants are able to use this manual for training in schools and adapt it to suit local conditions.

### Objectives

This manual has been designed with twin objectives:

- To raise knowledge and awareness of good water, sanitation and hygiene practices with teachers and school health assistants; and
- To provide participatory tools, techniques and materials for teachers and school health assistants to promote improved water, sanitation and hygiene practices amongst students.

## How to use this manual

Chapter 1 and 2 provides an introduction and background information that can be read prior to undertaking lessons in the classroom. It addresses the rationale and reasoning for using participatory techniques and tools during teaching.

Chapter 3 goes into more detail on the participatory principles and techniques available for teachers and school health assistants to use.

Chapters 4, 5 and 6 provide a step-by-step explanation of various participatory activities and tools that can be used for water, sanitation and environmental hygiene topics. Physical materials designed to be used in this manual are provided separately in a toolbox (see below).

Chapter 7 provides a discussion of the importance for ongoing monitoring to understand the effectiveness and impact of the teaching in improving water, sanitation and hygiene practices in Maldivian schools.

## Toolbox content

Item	Details
Sequence story cards	Nine A4 cards - a story called 'Poor Jaraas, no place to live'
Sequence story cards	Twelve A4 cards - a story called 'Water story'
Sequence cards	Two A4 cards showing good and bad rainwater collection practices
The 'Kilaa Handi' story book	1 A2 size big book and 5 A4 size small books
Unicef clips on CD/ DVD	5 short TV spots on water, sanitation and health topics
Fenthiki hand washing song on CD/DVD	Short song to accompany hand washing activity
Poster showing the water lens	A2 poster showing the water lens
Poster showing the water cycle	A2 poster showing the water lens
Super fenfulhi hand puppet	A hand puppet of the 'Super fenfulhi' character
Board Game on Water, Sanitation and Hygiene practices (WASH game)	A board game with messages on water, sanitation and hygiene practices



# 2

## BACKGROUND

Water is essential for life. We are all aware of this fact, and yet it is all too often taken for granted. The Maldives is a unique island nation surrounded by the Indian Ocean and wherever we look we see water. But ironically, the Maldives has very limited freshwater resources that can be used to sustain human life. Traditionally we have relied on rain water and the thin and fragile layer of freshwater that forms a 'freshwater lens' just beneath the ground. However the freshwater lens is thin and highly at risk to pollution that can seep in through our sandy soils, from inappropriate waste disposal or leaking septic tanks. If we take too much of the freshwater out of the lens it very quickly becomes salty. So our freshwater supplies are very vulnerable.

Water is also linked to our health, general well being and even to our ability to get an education and make a living. Contaminated water supplies are a major cause of illness such as diarrhea and dysentery. As well as the general dangers of the illnesses themselves, they cause children to miss school, adults to miss work, medical expenses and general unhappiness.

Therefore, on our islands with such limited sources of freshwater, all community members, including teachers and students, need to understand how to protect and safeguard our water supplies from contamination, so that in turn we can safeguard our health and our environment. This area of teaching is called Water, Sanitation and Hygiene (WASH).

## School health promotion in the Maldives

In recent times much attention has been placed on schools. This is because schools are a place of learning that can model good practices for children to follow at school, at home or in the wider community. Children are seen as potential 'change agents' both now and as future adults. However sometimes schools also can model poor practices and may also be dangerous places where diseases can be spread.

## Existing WASH situation in Maldivian schools

In 2002 a 'situation analysis' was conducted on 'school hygiene and sanitation education' by the Maldives Water and Sanitation Authority (MWSA), in consultation with the Ministry of Education and UNICEF.

## Barriers to change

The situation analysis painted a worrying situation in our schools, which should be of concern to all community members; parents, teachers and students alike. There is a need to significantly improve WASH practices in Maldivian schools. This training manual offers a systematic way to promote awareness and education programs on water, sanitation and hygiene topics with both teachers and students. However this training program will only achieve lasting WASH behaviour, if resources like toilet facilities and safe water supply are available, enabling students to apply newly acquired knowledge, attitudes and beliefs into desirable behaviours.







# 3

## PARTICIPATORY PRINCIPLES AND TECHNIQUES

In order to become effective promoters of water, sanitation and hygiene practices, teachers require a certain level of hygiene awareness and commitment. It is important that teachers and school health assistants demonstrate:

- A working knowledge of the relationship between water, sanitation, hygiene behavior and health;
  - Awareness about their importance as a role model, resulting in proper hygiene behavior;
  - Skills to work with students in participatory ways; and
  - Commitment to bring about improvements themselves or to request assistance when it's needed.
- (UNICEF & IRC, 1998).

To support teachers, it is important, not only that good quality materials are developed, but also that they are properly distributed and used by teachers and children. Teaching materials should be based and built upon the existing situation in schools.

For WASH education to be effective, a number of basic criteria need to be taken into account:

- It has to be practical and make the link between knowledge, attitude and behaviour.
- It has to be action-oriented.
- Its messages need to be relevant in the local context.
- Its messages need to be simple and understandable in the local context.
- Its messages need to be locally acceptable.
- It should stimulate reflection by students about their behaviour.

- It should repeat and reinforce messages over time and in a variety of ways.
- It should make use of local communication methods. (UNICEF & IRC, 1998)

Participatory activities provide an opportunity for students to use their knowledge and skills to analyze issues both individually and as a group. This approach allows

students to use their own experience and benefit from the experiences of other students. Participatory activities enable participants to identify their own obstacles to improved water, sanitation and hygiene practices. However teachers must think about how the chosen method will effectively address the planned content (knowledge, attitudes and skills) and enable the student to learn in a fun and interesting way (IRC, 2007).

Table 1: Examples of child-friendly methods suitable for life skills-based hygiene Education (courtesy of IRC, 2007)

Methods most suitable for age group 4-7	Methods most suitable for age group 8-12
Storytelling Drama Reciting poems and singing songs Puppet plays Language games Reading stories Walks Conversations and discussions Drawing, painting, colouring	Storytelling Reading stories Carrying out projects or surveys Quizzes Conversations and discussions Singing and dancing Drawing, painting, clay modelling, etc. Writing compositions and creative writing Brainstorming Excursions Drama, role playing, pantomime Language and math games such as crosswords Development of maps, e.g. of the community Developing surveys and asking questions

## Participatory Techniques

The following section outlines some specific participatory techniques in more detail. This background material is provided to help teachers fully understand the technique and how to apply it successfully in the classroom.

### A. Learning by doing:

The advantages of this technique are that (i) it links what children **learn** with what they **do**; (ii) it links what children do in **class** with what they do in the **home**; (iii) the activities are not taught in one lesson and then forgotten; they are learned and developed over a **longer period** of time.

#### Procedure for learning by doing

1. Identifying a local health issue and understanding it well: Children and/or their teacher/facilitator identify a priority health issue. The issue chosen may relate to a stated objective of the school curriculum or syllabus, or to a health campaign taking place in the community. Once

an issue is identified, the children carry out activities designed to increase their understanding of it.

2. Finding out more about the health issue: This step involves children in further information-gathering activities. Some of these activities may take place inside the school, while others might take place in the community or at home. Ideally, these activities help children to learn how to gather and document information and develop important communication skills.
3. Discussing what's been found out and planning action: Here the children organize their findings and use them as a basis for planning action in relation to specific health or hygiene problems they have identified during step 2. The teacher/facilitator can take part in the planning process, and help children to distinguish between correct and incorrect information they might have gathered.
4. Taking action: The children undertake the activities planned at step 3. These might take place in school, community, or home, depending on the nature of the



health or hygiene issue chosen. The types of activities undertaken may also depend on local customs and the nature of the relationships in the community, including between the school and the community.

5. Discussing results: The children and their teacher/facilitator evaluate the effectiveness of their activities. If unexpected problems have been encountered, it is important for these to be discussed.
6. Discussing how we can be more effective next time and sustain action: Step 6 invites children to improve upon the activities they implemented at step 4 and, if appropriate, to repeat or continue their action.

## B. Student team learning

Student team learning is a good approach to be used when giving knowledge about environment and hygiene issues. The main aim is to develop the students' understanding of the link between water, sanitation and hygiene and their health. They will learn personal hygiene practices as related to washing hands and protecting well water, and how to promote personal health. When school students work in mixed groups, to help one another to do things under the guidance of the teacher, it is always easy for the teacher to introduce a new concept and practically undertake the activities with the students so that the students comprehend the concept easily.



Students benefit from a less academic side effect of team learning, i.e. they learn how to feel good about themselves. Students also take on new responsibilities and succeed with these responsibilities; they come to gain confidence in themselves and learn to solve their own problems. Research shows that students have higher achievements when they have confidence in themselves and when they attribute success to their own abilities and not to luck. In team learning, it is the students themselves who are responsible for the success of a lesson and therefore they tend to feel more responsible for the success of their own learning.

In order to allow students to gain this power in the class, teachers cannot simply lecture and let students take a passive role.

1. Design activities, as in this manual, and let the students take initiative.
2. Be a facilitator and guide the students.
3. Let the students be interdependent.
4. Allow face to face interaction among students.
5. Allow individual accountability for critically exploring the assigned material.
6. Allow each student to be aware of their involvement and how they will contribute to the discussion and activities.
7. Let students take ownership and pride in working together to discuss and find out new things.

## C. The Inquiry learning Process

Inquiry learning adopts a more student-centered approach. Inquiry learning involves students in the active and careful analysis of a situation or problem. In inquiry learning, students use their own thinking skills to make their own generalizations or conclusions - and thus are actively involved in generating 'knowledge' in forms that are meaningful to them.

There are many different approaches to inquiry learning, depending upon the subject area or topic, the background skills of students and the learning objectives of the teacher. This generally means that no teaching is wholly teacher-centered or wholly student-centered. Rather, most classroom learning usually involves a mix of different learning experiences along a range between teacher- and student-centered approaches.

Inquiry-based learning occurs when students learn by carrying out an investigation. That is, they find something out for themselves rather than being told by the teacher.

To contribute effectively to the thinking skills needed to explore water, sanitation and hygiene issues, inquiry learning needs to include four stages in an iterative process:

- **A Challenge**  
After becoming aware of a significant question, issue or problem, students may reach a state of puzzlement, curiosity and/or concern and feel challenged to inquire further. The next step is to clarify, define and redefine the particular question, issue or problem to investigate.
- **Active student investigation**  
Students gather resources and work out what they need to know and do. They consider the problem, cast around, imagine, try to predict, work out what they already know,

and/or assess their ability to succeed. This is the stage when students analyze and interpret the data before them.

- **Making generalizations**  
Eventually students can synthesize what they have found into generalizations or principles that can be used to decide on possible solutions.
- **Reflection**  
Students need to consider how they achieved what they set out to do. They reflect, confirm, see where to improve, plan new things, evaluate, and consider possible action.

## A model for Inquiry Learning

### 1. Tuning In

Questions

Why should we investigate this? What do we already know? How does this affect us? What do we want to find out? What feelings or opinions do you have? What is the issue?

Objectives

Identifying and defining the issue. This involves activities designed to:

- Generate interest
- Establish current knowledge
- Draw on past experiences
- Identify possible aspects for investigating

Examples

- Considering a challenging question
- A field trip
- Considering a case study
- Discussing a value dilemma
- Studying maps, photos, posters, cartoons
- Having a visitor to the class
- Performing a task, game, or role-play
- Predicting about a given situation
- Word associations

### 2. Deciding Directions

Questions

What would happen if...? What guess could we make about...? What are we likely to see when...? How can we explain...? What do we want to focus on? What questions do we need to ask? Why is this happening?



#### Objectives

- Formulation of hypothesis involving:
- Choosing a focus
- Extending the scope
- Identifying and refining questions

#### Examples

- Brainstorming for suggestions
- Hypothesising
- Posing solutions to problems
- Identifying questions to guide investigation
- Predicting outcomes or consequences
- Developing tentative explanations
- Formulating propositions

### 3. Finding Out

#### Questions

How are we going to find out about this? Who, what, where has/is information we can use? How relevant or useful is this information? Whose views are reflected in this information? How else might we find out about this? How are we going to present our data?

#### Objectives

The collection of data is not an end in itself, but a means towards developing understandings.

#### Examples

- Excursions and field trips
- Conducting experiments
- Guest speakers
- Collecting and analyzing statistics, maps
- Surveys and interviews
- Evaluating primary sources, case studies etc.
- Film, music, magazines, newspapers, books
- Seeking opinions

### 4. Sorting Out

#### Questions

How might we sort out our information? What similarities and differences can we see? How can we categorize this information? How does this information compare or contrast with other situations? What connections can we see? What inferences or conclusions can we draw? Does this information change our view of the issue?

#### Objectives

Data collection, processing and analysis, refining the issues. This involves:

- Organizing and presenting data
- Forming or modifying concepts through classification strategies

- Comparing and contrasting findings
- Discussing the issue and hypotheses
- Evaluating

#### Examples

- Recording impressions through art, music, personal journals and stories
- Values clarification and analysis
- Drafting and editing
- Statistical analysis
- Grouping and labelling
- Making and interpreting graphs, charts
- Small group discussion

### 5. Drawing Conclusions

#### Questions

What can we now say about . . . ? Have you changed your thinking about . . . ? What differences and similarities did you notice? What general conclusions can you make? What evidence do you have to support this? How does this relate to our earlier questions and hypotheses?

#### Objectives

- Drawing conclusions requires students to express their understandings and communicate them to others. This involves:
  - Interpreting information
  - Developing and modifying generalizations
  - Explaining similarities and differences
  - Establishing connections
  - Confirming, rejecting or modifying hypotheses and predictions

#### Examples

- Making a model or a mural
- Devising a play
- Presenting a role-play
- Holding a debate
- Giving a report to talk

### 6. Considering Social Action

#### Questions

How can we contribute to decisions made in the classroom or school? What could be done about this issue? What would happen if these things were done? How might



we make others aware of what we know? How can we contribute to or influence decisions made in the community and society? What should be done about this?

#### Objectives

Social action requires that students be active in decision making during their inquiry and at its conclusion. This involves:

- Identifying action that could be an outcome of the enquiry
- Implementing if appropriate

## 7. Evaluation and Reflection

#### Questions

- How realistic are my teaching plans for this particular group of students? (e.g. mental ability tests, past record of achievement).
- How should the students be grouped for more effective learning? (e.g. range of mental ability scores, past record of achievement).
- To what extent are the students ready for the next learning experience? (e.g. readiness tests, pre-tests over needed skills, past record of achievement).
- To what extent are students attaining the minimum essentials of the lesson? (e.g. mastery tests, observation).
- To what extent are students progressing beyond the minimum essentials? (e.g. periodic quizzes, general achievement tests, observation).
- At what point would a review be most beneficial? (e.g. periodic quizzes, observation).
- What types of learning difficulties are the students encountering? (e.g. diagnostic tests, observation, students conferences).
- Which students are under-achievers? (Mental ability tests, achievement tests).
- Which pupils should be referred to counseling, special achievement classes, or remedial programs? (e.g. achievement tests, diagnostic tests, observation).
- Which students have poor self-understanding? (e.g. self-ratings, student conferences).
- What school mark should be assigned to each student? (e.g. review of all evaluation data).
- How effective was my teaching? (e.g. achievement tests, students' ratings, supervisors' ratings)

#### Objectives

Evaluation focuses on the monitoring of curriculum programs, practices and outcomes for the purpose of review and development:

- evaluation is more than measurement or assessment which are limited to quantitative descriptions of students;
- evaluation may include quantitative descriptions but it also includes qualitative or value judgments;
- evaluation is a collective term for all those ways of obtaining feedback on a teaching-learning process.

#### Examples

- Teacher-made Tests
- Work Samples
- Conferences and Interviews
- Logs and Diaries
- Checklists
- Anecdotal Records

## D. Story telling

Folktales about the relationship between the Earth and its human inhabitants have been at the heart of storytelling since earliest times. Not only do such stories offer a source of inspiration, they also contain the potential for understanding the many ways in which we value and devalue our planet. Stories provide us with practical insights into approaches to our most serious environmental problems. For example through story telling important messages regarding water, sanitation and hygiene practices can be promoted in an interesting and enjoyable way. The 'Kilaa Handi' storybook, included in materials accompanying this manual, is an example of a story that promotes good hygiene practices in children.

A good story is not only entertaining but is capable of holding student attention while they learn important concepts, attitudes and skills. Storytelling can be used to explore important shared themes and vision. There are many reasons why stories may be important in our cultures and to each of us personally.

Using stories in teaching is an interesting way to see the relationship between the environment and people. There are many stories published and available which could be used as a resource. The selection of stories to be used in the classroom should be discussed among the teachers because some stories are offensive and not appropriate to be used in the classroom.

- Stories safeguard and relate information as well as beliefs, and rules for living.
- Stories remind us of other times and different places and lift us beyond the 'here and now'. Through stimulation of our imagination they can facilitate the emergence of a fresh perspective on our actual situation.
- Each story has a beginning, middle, and end. A specific conflict and patterns of conflict resolution are usually embedded within this structure.
- Stories lead to powerful emotional responses. These emotions help us to clarify the way we feel and can fuel the desire for change. Different people respond differently to stories thereby touching on differences in personal perceptions and diversity in general.
- Stories nearly always generate communication. Not only does listening to a story create a warm bond between us, once the story is finished we often automatically turn to each other to talk and to share our responses. Likewise, a good story can be retold to others.

## E. Community problem solving

Community problem solving is a teaching and learning strategy that helps students learn to participate actively in addressing local community concerns, with a view to creating a more sustainable future.

There are eight major steps for guiding students through the process of community problem solving, but they do not have to be followed in a strict order. For example, as students develop confidence in community problem solving, the need to assess and develop their skills will diminish. And often, new issues for investigation will arise as you progress through the steps, requiring a recycling backwards and forwards through the steps.

What is important is that the steps be used flexibly and be adapted to local circumstances, to your own students, and to your own approach to teaching.

### Planning to use community problem solving

Some of the problems that might occur when using community problem solving include:

- Some students might not be used to teachers asking them to choose the topic (i.e. the local problem) they want to study.
- Some students could be puzzled when the teacher sets a problem but does not tell them the answer.
- Some students lose their concentration when they are taken out of the classroom on fieldwork.
- Sometimes local problems of interest to students may be the cause of controversy in the community.

## Selecting the Issue

Selecting an issue that is practicable for students to investigate is a key aspect of planning for community problem solving.

The following criteria may help you – and your students – choose a possible project and location:

- The locations are readily accessible to students.
- There is no serious risk to the safety of students at these places.
- The projects are within the range of ability of students.
- There is a genuine need in the community for this problem to be solved.
- Students believe the problem is significant to them.

It is important to bear these criteria for selecting problems in mind. However, experience indicates that students are most motivated when they work on problems of their own choosing.

## The Eight Steps of community problem solving

### 1. Exploring community problem solving

This first step involves providing students, teachers and school administrators with information about the nature and purpose of community problem solving. Other community and educational groups who have used community problem solving may be invited to explain the process and give examples of how it was used in their context. An important part of this step involves teachers and administrators actively deciding to use community problem solving as a teaching and learning strategy because it acknowledges the importance of students working in their local community.

### 2. Selecting problems

In this step the problem to be solved is chosen. Problems can be selected in many ways. For example, a tour of the school grounds or local community may provide ideas for students to generate a list of problems they would like to investigate. Students could then decide on one problem, as a class, or a number of problems in small groups. An important consideration when selecting a problem is to ensure sufficient resources are available and that the problem is manageable within the time frame for the students involved. Students and teachers may need to consider questions such as:



- Why is this important to our community?
- Are my students able to tackle this problem?
- Do we have time to undertake the entire community problem solving process? Or should we choose a smaller problem?

### 3. Evaluating and developing student skills

Students will need to draw upon a range of problem solving, investigation and group work skills as they work through the community problem solving process. Teachers should evaluate which skills are needed and check that their students have these skills before proceeding. They should continuously monitor student's skill levels and provide opportunities as part of classroom activities for ongoing skill development. The level of teacher guidance throughout the community problem solving process will depend on the students' past experiences with the process and the specific problem solving, group work and investigation skills of the students in this step. Teachers may need to consider questions such as:

- What skills do my students need to undertake community problem solving?
- What kind of guidance do I need to provide?

### 4. Investigating the problem

This is the step where students explore the full scope of the problem. This includes understanding the current situation and the reasons why the problem developed. Teachers and students might consider questions such as:

- What is the current situation in our community and how significant is this to me, the local community, nation, and for the world?
- What changes have led to the development of the problem?
- Are there any conflicts of interest among groups in our community?
- How can decisions be made to resolve this issue?

### 5. Developing visions of alternative futures

In this very important step, teachers encourage students to develop visions of how they would like the current situation to look in the future. Students and teachers could consider questions such as:

- What are our visions for the future?
- What are the alternatives?
- Which vision do we prefer and why?

### 6. Planning actions

This step involves students developing an action plan to achieve their selected vision for the problem being investigated. An essential component of this step is the evaluation of the action and careful consideration of whether those actions will result in the desired changes. Teachers and students may need to consider questions such as:

- What changes will bring us closer to the vision of sustainable futures?
- What barriers must be overcome to allow these changes to take place?
- List the steps that need to be taken to make these changes.

Note: This is the plan of action

### 7. Taking actions

This is the step where the action plan is implemented by the students and teachers. In order for the community problem solving process to be truly democratic, it is important that students are allowed to freely choose to take actions that address the community problem identified. These actions may be within their own lifestyles and families and/or in the wider community. Teachers and students may need to ask questions such as:

- How will the planned actions solve the problem?
- What is the role of students in deciding on these actions?

### 8. Evaluating actions and changes

It is important that this step follows the action-taking phase. It is at this point that teachers and students review the actions and identify the changes that have taken place. They then compare these changes against their vision for the future for the community problem they have been working on. This evaluation may lead the groups to revise their vision from Step 5 or develop a revised action plan for Step 7. Students and teachers may need to consider questions such as:

- What actions did we take?
- What changes resulted?
- To what extent are these changes the same as in our vision?
- How were barriers overcome?
- What did we learn from community problem solving?



# 4

## PARTICIPATORY ACTIVITIES AND TOOLS: PERSONAL HYGIENE AND SANITATION

### Introduction

The purpose of this chapter is to develop the students' understanding of the link between hygiene and sanitation and their health. They will learn personal hygiene practices as related to washing hands and how to promote personal health. The purpose of this chapter is also for students to learn how to reflect critically about hygiene and sanitation issues, and about their roles and responsibilities.

### Learning objectives

The objectives of the chapter are to:

- Link classroom activities to our student's community
- Create positive values, awareness and responsibility about personal hygiene and sanitation

- Create opportunities to investigate and research problems about personal hygiene and sanitation
- Provide opportunities for students to take positive action to address water, sanitation and hygiene issues

### Overview of topics

- Germs, germs everywhere
- Washing hands
- Personal hygiene
- Hygiene and sanitation
- International year of sanitation 2008

## 4.1 Topic: Germs, germs everywhere...

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### Learning Objectives:

- Students understand that germs are everywhere.
- Students understand that some germs can cause illness.
- Students can identify places where germs are likely to live.

### Grades: 1-5

### Time: Activity 1: 30 minutes

### Materials needed:

- Sequence story cards 'Poor Jaaras, no place to live' - for the beginning of the activity.
- Teacher Resource Sheet 1- read to familiarize yourself with the background to the topic.

### Introduction:

Start by explaining to the students that germs are essential for human life. Bacteria in our mouths and intestines help us to digest the food we eat and bacteria on our skin protect us from invading viruses and bad bacteria. The word "germs" is a general term for different types of tiny organisms, or living things, commonly known as germs. Bacteria and viruses are examples of two different types of germs. Bacteria are virtually everywhere in our environment and make up 60 per cent of the living matter on earth.

Of the billions of types of bacteria only about 50 are known to cause infection.

### What to do:

#### Activity 1- Poor Jaaras, no place to live

Have the children sit in a circle around the teacher and read the sequence story 'Poor Jaaras, no place to live'. Once you have completed the story, ask the students to discuss:

- What do you feel when you hear this story?
- Would you like to live in this environment? Why?
- What types of places do germs like to live?
- Can you think of any places on your island where germs might live?
- Are all germs bad? Are there good types of germs?
- What can you do to get rid of germs?

### Conclusion:

Finish the activity by reinforcing the idea that the word 'germs' is a general term for many different types of organisms. Not all germs are bad and cause illness. Discuss some of the ways to stop germs from spreading with students.

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## Teacher Resource Sheet 1

### What are germs?

Germs are essential for human life. Bacteria in our mouths and intestines help us to digest the food we eat and bacteria on our skin protect us from invading viruses and bad bacteria. The word "germs" is a general term for different types of tiny organisms, or living things, commonly known as germs. Bacteria and viruses are examples of two different types of germs. Bacteria are found everywhere in our environment and make up 60 per cent of the living matter on earth. Of the billions of types of bacteria only about 50 are known to cause infection.

Viruses cause far more illnesses than bad bacteria because they spread more easily. If more than one person in your family has the same sickness, it is most likely that it is a viral infection. Cold and flu viruses invade our cells and rapidly grow in number causing symptoms like a runny nose, coughs, aches and sore throats. Bacterial infections are "opportunistic," which means they tend to infect one



part of the body (e.g. pneumonia, an infection of the lungs that usually comes on following a common cold or flu). Antibiotics do not work against viruses.

### Where do germs hide?

If you had to pick the place in your house with the most disease-causing germs, what would you choose? Many of us automatically think of the bathroom toilet seat or

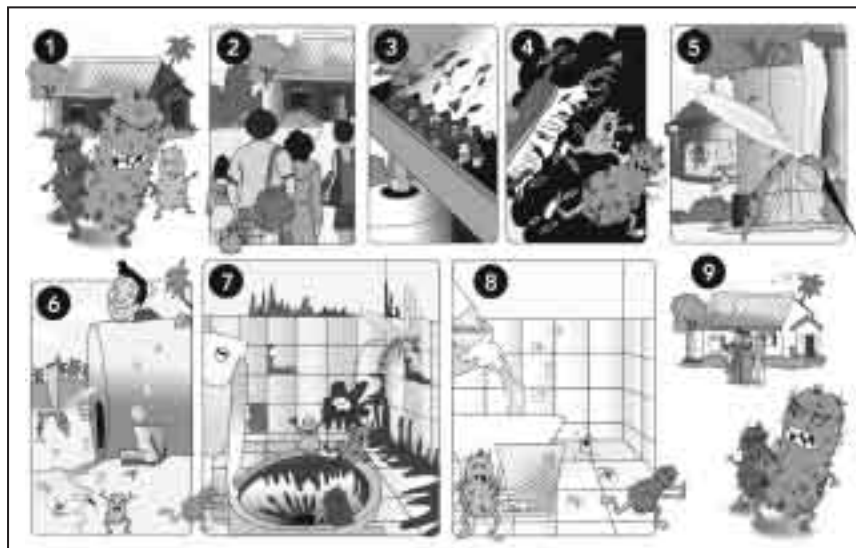
bathroom floor. But the kitchen is the biggest hot-zone for disease-causing germs. Top prize goes to the kitchen sink, followed by the kitchen sponge.

Germs can live for a surprisingly long time on hard surfaces like desks, doorknobs and tables. Most people get sick when they touch something that is contaminated with germs and then touch their eyes, nose or mouth. The easiest way to reduce your chance of getting sick is to wash your hands often with regular soap and water and avoid touching your face.

## Teacher Resource Sheet 2

### Poor Jaraas – No place to live

- Jaraas and his family lived in an old house on the island of Kunifushi. It was wonderful! Lots of dark corners, thick dust, old waste, cobwebs and dirty, messy places make fantastic hiding places. They can play and grow well there. Then when they are ready they can go and live in children's mouths, throats and stomachs and make them really ill. Like all germs do.
  - As usual Jaraas and his friends were playing hide and seek in the gutter. "Oh, what's that? cried Jaraas. "Dirt left behind by the cat... warm, smelly and sticky and so good to play with and hide in". Jaraas and his family made a dirt castle and buried each other in it. This is fun!
  - Their happy life took a turn when Moosa's family moved in. Moosa and his family were very clean. They did not like the messy surroundings. "Time to clean up the house" said Moosa.
- "Yes, said Hawwa. "Dirty water and waste help insects and other pests grow. The germs breed with them. Today we'll give those germs a lesson."
- Their enjoyable moment was interrupted. Moosa was sweeping away the dried leaves and waste on the roof. The gutter was next. "Save yourselves" cried Jaraas as he ran towards the well while others jumped into the water tank.
  - Swimming in the dirty water was fun! So was inside the water tank. The water had turned a wonderful sticky green. It had a lovely, stinky smell. Some of his family members slid down the stained walls of the tank while others caught rides on hundreds of mosquitoes buzzing around.
  - At that moment Moosa emptied the water tank and cleaned it with chlorinated water, as he does regularly during the rainy season. All the mosquitoes flew away and so did Jaraas and his family. This time they had to hide in the toilet.
  - Good! No cleaners here! Just dirty slimy water. A perfect home with food at arms length. They could trace pictures in it too... It is fun! But then they heard footsteps. Oh! No! They had to run again.
  - Jaraas and his family are fed up! This house is no good. It is dangerous. Everywhere is being cleaned. "They are using big sharp weapons to catch and destroy us" said the scared and exhausted Jaraas. They ran into the garden.
  - On Friday, Moosa's family dug out the weeds and threw out the smelly water and made a big pit for the dirt. The rats ran out. The mosquitoes all flew away. Jaraas and his family just escaped with their lives. They have been running from the children ever since.... Unless they find a lazy one who does not clean up!



## 4.2 Topic: Washing hands

### Learning Objectives:

- Students understand the importance of washing hands.
- Students have the skills and knowledge to wash their hands properly.

### Grades: 1-5

### Time:

Activity 1: 30 minutes

Activity 2: 30 minutes

### Materials needed:

- Liquid soap, water and single use paper towel/ hand towel
- Fenthiki song on CD/DVD- practice the song in Activity 2
- Super fenfulhi puppet (activity 2)
- Teacher Resource Sheet 1 - read to familiarize yourself with the background to the topic

### Introduction:

Start by explaining to students that most intestinal, stomach, and cold viruses are spread by our hands. Through touch, micro organisms are transferred from the fluids in the nose and mouth of one person to something (e.g., a pencil, food, a phone) or to someone else. When other people bring their hands or the object near their mouths, the bacteria or viruses may find a new home.

### What to do:

#### Activity 1: Shaking wet hands in a circle

Ask the students to stand in a circle. One student will wet one of her/his hand and shake the hand of her/his neighbour, who then shakes the hand of the other neighbour and so on. The students will be surprised how many of them will still feel the wetness in the hand.

Remind students that most intestinal, stomach, and cold viruses are spread by our hands. Lead a discussion based on this experience. Students should wash their hands after this activity.

Lead a discussion with students about what might be examples of good hand washing practice. The students will learn that safe hygiene practices include good washing of hands as follows:

- use sufficient water
- use soap



- rub both hands at least 3 times vigorously
- rinse thoroughly
- hands should be rubbed dry with a clean towel.

Ask students when they should wash their hands. Some examples include:

- after using the bathroom
- before lunch
- after interval time
- after blowing your nose

- after coughing
- after playing outside

Use the Super fenfulhi puppet to practice the Fenthiki song for activity 2.

Activity 2: Step by step guide on how to wash hands...

Demonstrate the steps for good hand washing technique to your students.

1. Wet your hands with running water.
2. Put a small amount of liquid soap in the palm of one hand.
3. Rub your hands together for 20 seconds so you produce lather. Make sure you scrub between your fingers, under your fingernails and the backs of your hands.
4. Rinse your hands well with clean running water for at least 10 seconds. Try not to handle the taps once your hands are clean. Use a paper towel to turn off the water.
5. Dry your hands with a single use paper towel. If you use a hand towel be sure to change it daily.

Repeat the demonstration, this time have the students sing the 'Fenthiki song' (see below) or another well known song like "Twinkle Twinkle Little Star" while rubbing their hands together. This will teach them the amount of time it takes to clean their hands properly. To make washing hands more fun, you can have students create songs that are 15 seconds long.

Repeat the activity, this time the students should demonstrate the steps for good hand washing technique using soap singing the Fenthiki song.

*NB. Bar soaps are not as hygienic as liquid soaps because they stay moist and attract germs. If a bar soap is the only option it should be stored on a rack so that the bar doesn't sit in water.*

## Fenthiki song in Dhivehi

### Verse 1

*Dhovey dhovey dhovey dhovey dhove lamaa  
Dhovelaa, dhovelaa dhovelaa ai dhove lamaa  
Saiboani laa hadhaa Fonu aruvaalaafa wah  
Ai dhonnan aadha koh Ulhema hey saafu koh (repeat twice)*

### Chorus

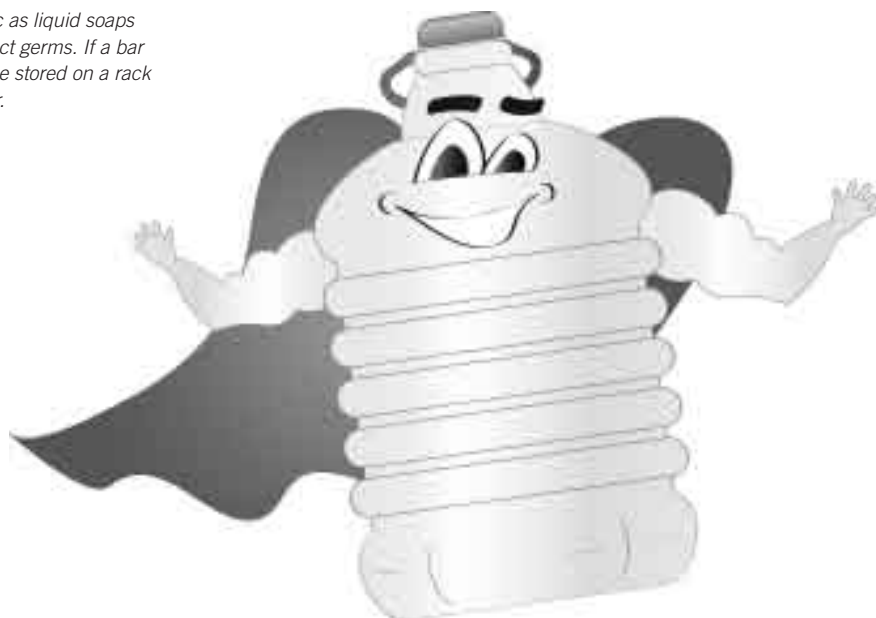
*Fini Fini Fini Fenthiki thalhaar, meevaa meevaa fini fini hiyaa  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Fini Fini Fini Fenthiki thalhaar, meevaa meevaa fini fini hiyaa  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves*

### Verse 2

*Fen, fen, fen, fenthiki thalhaar Dhovelaa,  
Dhovelaa, dhovelaa ai dhove lamaa  
Ingili thakuge dheythere Ves rangalhaar ungulhumaa  
Ehthere fushaa beyru fuh Ves Rangalhaar saafukoh (repeat twice)*

### Chorus

*Fini Fini Fini Fenthiki thalhaar, meevaa meevaa fini fini hiyaa  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Fini Fini Fini Fenthiki thalhaar, meevaa meevaa fini fini hiyaa  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves  
Aadha Akah hadhamaa higaa aiy dhonnan abadhuves*



## Washing hands song in English

Tune: Row Row Row your boat

*Wet, wet, wet your hands, wet with water clean  
Wash, wash, wash your hands, to keep them always clean*

*Put, put, put some soap, a little in your palm  
Clean soap, liquid soap, use them always clean*

*Rub, rub, rub your hands, with soap and water clean  
Scrub, scrub, scrub between, the fingers ten in all.*

*Rinse, rinse, rinse your hands well with water clean  
Clean hands, clean hands, keep them always clean*

*Dry, dry, dry your hands, dry them really well  
Cloth, towel, paper towel, dry with a towel clean*

### Conclusion:

Remind students that our hands spread an estimated 80% of common infectious diseases like the common cold and flu. But these disease-causing germs slide off easily with good hand washing technique. Hand washing is easy to learn, cheap and very effective at stopping the spread of disease-causing germs.

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## Teacher Resource Sheet 1

### Importance of washing hands

Hands spread an estimated 80% of common infectious diseases like the common cold and flu. For example, when you touch a doorknob that has the flu virus on it and then touch your mouth, you can get sick. But these disease-causing germs slide off easily with good hand washing technique. Hand washing is easy to learn, cheap and incredibly effective at stopping the spread of disease-causing germs. Hand washing is a simple habit, something most people do without thinking. Yet hand washing, when done properly, is one of the best ways to avoid getting sick. This simple habit requires only soap and water.

Good, frequent hand washing is the single best way to prevent the spread of many common diseases. Washing your hands is the best way to STOP germs from spreading. Schools are full of germs and students have some power in stopping the germs from spreading. A germ reduced classroom will reduce students from missing school and learning.

### The dangers of not washing your hands

Despite the proven health benefits of hand washing, many people don't practice this habit as often as they should — even after using the toilet. Throughout the day you accumulate germs on your hands from a variety of sources, such as direct contact with people, contaminated surfaces, foods, even animals and animal waste. If you don't wash your hands frequently enough, you can infect yourself with these germs by touching your eyes, nose or mouth. And you can spread these germs to others by touching them or by touching surfaces that they also touch, such as doorknobs.

Infectious diseases that are commonly spread through hand-to-hand contact include the common cold, flu and several gastrointestinal disorders, such as infectious diarrhea. While most people will get over a cold, the flu can be much more serious. Inadequate hand hygiene also contributes to food-related illnesses, such as salmonella and E. coli infection, which can cause symptoms of nausea, vomiting and diarrhea.

### When should you wash your hands?

Although it's impossible to keep your bare hands germ-free, there are times when it's critical to wash your hands to limit the transfer of bacteria, viruses and other microbes.

Always wash your hands:

- after using the toilet
- after changing a nappy — wash the nappy-wearer's hands, too
- after cleaning up a child who has gone to the bathroom
- after touching animals or animal waste
- before and after preparing food, especially before and immediately after handling raw meat, poultry or fish
- after blowing your nose
- after coughing or sneezing into your hands
- before and after treating wounds or cuts
- before and after touching a sick or injured person
- after handling rubbish
- when using public restrooms
- after playing outside
- before eating food

## Kids need clean hands, too

You can help your students avoid getting sick by insisting that they wash their hands properly and frequently. To get students into the habit, teach by example. Wash your hands with your children and supervise their hand washing. Place hand-washing reminders at children's eye level, such as a chart by the bathroom sink for children to mark every time they wash their hands. Make sure the sink is low enough for children to use, or that it has a stool underneath so that children can reach it. Tell your children to wash their hands for as long as it takes them to sing Twinkle Twinkle Little Star or the Fenthiki song. This works especially well with younger children, who may rush when washing their hands.



## 4.3 Topic: Personal hygiene

### Learning Objectives:

- Students understand examples of good personal hygiene.
- Students understand examples of bad personal hygiene.
- Students understand the importance of maintaining good personal hygiene.

### Grades: 1-5

### Time:

- Activity 1: 30 minutes

### Materials needed:

- 'Kilaa Handi' storybook - for the beginning of the Activity.
- Teacher Resource Sheet 1- read to familiarize yourself with the background to the topic.

### Introduction:

Start by explaining to students that hygiene is the practice of keeping oneself and one's surroundings clean, especially in order to prevent illnesses or the spread of diseases (Postma et al, 2004). This includes brushing your teeth, washing your hands, and looking after hair and nails. If you learn good practices when you are a child you can take these lessons throughout your whole life.

### What to do:

#### Activity 1: 'Kilaa Handi'

Have the children sit in a circle around the teacher and read the storybook 'Kilaa Handi'. Allow adequate time for the students to see the illustrations on each page.

When you have finished reading the story, ask the students to discuss:

- What do you feel when you hear this story?
- What did you think of Kilaa Handi?
- Why did Super Fenthiki take Thiththi Handi on a flight?
- Why didn't Super Fenthiki take Kilaa handi on a flight?
- What are the things used by Kilaa handi to get clean?
- What is the main message of this story?

### Conclusion:

Remind students that taking care of personal hygiene is important to stay healthy. Good habits include washing your hands, brushing your teeth, washing and combing your hair and not biting your nails.





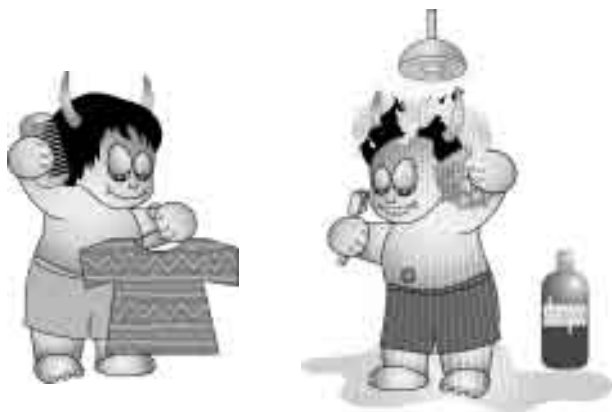
# Teacher Resource Sheet 1

## Importance of Good Hygiene in Children

Teaching children to keep their body's clean is an important part of keeping them and their families healthy and helping them to feel good about themselves. Teaching children to care about the way they look is important to their self esteem (i.e. what children think about themselves).

Parents and teachers can influence the way in which children approach personal hygiene, which will stay with them for life. Educating children on good hygiene is the best way to avoid the spread of infection and disorders and not just for childhood complaints; teaching the principles of correct hygiene at an early age can help keep individuals remain healthy in later life, and be taught to future generations. Principles of hygiene should be made part of everyday life and the best way for parents to teach their children about good hygiene is to lead by example.

The incidence of illness relating to areas of personal hygiene is more noticeable in children as they are learning to take care of themselves and are exposed to many germs whilst in the school environment or in a play area.



## Important Considerations

### Smelling clean

According to the experts young kids may sweat but they don't start having body odour until they reach puberty. That's when special sweat glands start pouring out sweat which smells!

### Clothes

Even if you do not sweat heavily, clothes can get stained, dirty and generally grubby, so children need to change them often.

Underclothes are right next to skin and collect dead skin cells, sweat and possibly other unmentionable stains. Overnight bacteria start to work on these stains

so clothes do not smell as nice on the second day of wearing. Therefore students should change clothes and underclothes often.

### Feet

Students need to wash their feet well at least once a day and then dry them carefully, especially between the toes where more bacteria collect than anywhere else.

If students use public toilets, they need to be particularly careful to wash their feet and dry them well. It is a good idea to wear shoes on their feet too. Lots of other people walk in bare feet in these places and students can easily pick up fungal infections or other problems, such as warts!

### Shoes

Students spend a lot of time on their feet and their shoes are very close to the place where the largest collection of sweat glands lives – on feet! Sweat gets into their shoes and then bacteria arrives which love the moist leather or fabric so much that they start multiplying quickly.

If students have one pair of shoes then try to get them off as soon as you get home so that they can air and dry out overnight. If students have more than one pair then use them on alternate days to give them a better chance of drying out.

Students may want to use foot powder on their feet and inside their shoes. This can help too. Most school shoes or running shoes will survive being washed by hand or even in the washing machine. Keep shoes clean by brushing, polishing or washing. They will look better, last longer and be less likely to smell.

### Oral Hygiene

Students' milk teeth are likely to fall out and so they must know how to prevent this happening to their adult teeth. Along with good brushing technique, the importance of dietary influences should be explained and alternatives to sweets, biscuits and fizzy drinks should be made available. Students should brush their teeth twice a day - after breakfast and before going to bed. During the day, students should fill their mouth with water and swish it around to get rid of anything sticking to their teeth.

When students cough or sneeze they should be encouraged to put their hand over their mouth, to try and minimize germs passing into the air. Once the germs are in the air, they can be easily passed on to other students. Also if students are sick, they should be encouraged to stay at home, to minimize the risks to other students.

## Hand Washing

Hand-washing is the single most important factor relating to the spread of infection, not just for children but for adults of all ages. Children should be encouraged to wash their hands before eating, after using the toilet, after handling animals, if they are ill or if they are spending time with a newborn.

When a child is ready to go to school, they are expected to be able to use the toilet themselves and wash their own hands; parents must make sure this is happening or infections and diseases can spread.

## Fungal Infections

Athlete's foot and ringworms are also less likely to spread if correct hand washing is achieved. Children should be taught how to effectively wash their hands, including between the fingers and under the nails; employ the use of a nail brush if needed. Drying properly is also important to prevent fungal infections from becoming worse. Children should understand the importance of these actions also, as well as using an individual towel if they have a fungal infection.

## Nails

Nail biting should be discouraged, particularly if the nails are being swallowed. The nails and nail beds offer a perfect environment for germs to live and breed. Nail biting allows the transfer of these bugs to the mouth which can then lead to the digestive tract causing many problems. An incidence of diarrhoea can badly affect a child and they can become quite ill from dehydration; this can happen very quickly in the young. Even if correct hand washing takes place, there will continue to be some germs under and around the nail, if left they will not normally cause any harm, but transfer to the mouth can cause problems. Keeping nails short will help to reduce the amount of germs under the nail.

## Hair Care

A suitable hair length and style, such as a bun, is a very easy way of minimizing the risk of nits. These creatures are spread by contact so by reducing the amount of hair available to have contact with others will decrease the chance of transmission. Hair does not have to be washed daily as this can induce flaking of the scalp, itching and removal of the natural oils.

The hair follicles [which the hair grows from] produce oil which keeps the hair smooth. Students also have sweat glands in your scalp, and dead skin cells come off the scalp. The oil, sweat and dead cells all add together and can make the hair greasy and look dirty unless washed regularly.

There is no harm in bathing every day, but it is more sensible to wash the hair every other day, using a frequent use shampoo.

To keep hair clean:

- wash regularly with shampoo (cheap ones are often as good as very expensive ones)
- massage scalp well to remove dead skin cells, excess oil and dirt
- rinse well with clear water
- conditioner is helpful for longer hair as it makes the hair smoother and easier to comb, but hair doesn't need to have conditioner
- use a wide toothed comb for wet hair as it is easier to pull through.

## Food Hygiene

Children should be encouraged to wash their hands before meals and snacks, and should be discouraged from eating off the floor; this is especially important if there are pets in the house. Using cutlery allows the child to learn table manners and will lessen the chance of the transfer of germs from the hands to the mouth.

Teaching the correct principles of hygiene should begin at as early an age as possible. It will help to prevent the spread of infections and diseases. Children will follow the example set to them, so adults should lead by example. Less incidence of illness means fewer absences from school.

## 4.4 Topic: Hygiene and Sanitation

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### Learning Objectives:

- Students understand the link between hygiene and sanitation and their own health.
- Students consider ideas about water, health and sanitation using the PMI (plus, minus, interesting) approach.

### Grades: 4-5

### Time:

- Activity 1: 1 hour
- Activity 2: 2 hours

### Materials needed:

- 'UNICEF clips' on CD/DVD and TV/DVD player - for the beginning of Activity 1
- Student Work Sheet 1 - PMI cards for each participant for Activity 1
- Student Work Sheet 2 - Role cards for the different groups for Activity 2.
- Teacher Resource Sheet 1 – read to familiarize yourself with the background to the topic.

### Introduction:

Start by introducing the idea that our personal hygiene practices can affect our own health, or the health of our family.

Dr Edward de Bono (who created the PMI thinking activity) suggests that when people are first exposed to an idea, their natural reaction would be to either approve or disapprove of it. The PMI process helps students to explore ideas in a more structured way, by identifying the good points (P = plus), the bad points (M = minus), and the interesting points (I = interesting) about the issue or idea.

This activity applies the PMI process to a series of water, health and sanitation TV advertisements that were produced by UNICEF in the Maldives. The activity is the beginning of the process of critically thinking about the advertisements and the issues that they relate to.

### What to do:

#### Activity 1- PMI

1. Watch the UNICEF TV advertisements.
2. Conduct a PMI on the advertisements (you may wish to watch them several times). The PMI requires students

to write down the plus, minus and interesting aspects of the ideas contained in the advertisements (on the cards provided). This can be done individually or in small groups.

- P= Plus: The things that you thought were good about the ideas in the advertisements
  - M= Minus: The things that you thought were negative about the ideas in the advertisements
  - I= Interesting: The ideas that were neither good nor bad but are worth noticing
3. Collate a big list of the students' results on the board under the headings plus, minus and interesting.
  4. Undertake a discussion about the PMI results with participation of the entire class. Ask students to think about their initial reactions to the advertisements by providing the reasons for their PMI results. Why did you think the plus ideas were good? Why didn't you like or agree with the minus ideas? What exactly was interesting about the interesting ideas?

In the discussions try to focus on plus points first, then the minus points, and then the points that are neither good nor bad but interesting. There may be instances where one student identifies an idea as 'plus' while another identifies the same idea as a 'minus.' There are no definite answers in this activity, and the emphasis should be placed on students explaining their ideas and giving their opinions.

5. Organize the students into small groups. Ask each group to think of questions that they might have relating to the ideas in the advertisements. What would the students like to know more about? Share the questions with the class and think of ways in which you could find answers to these questions.

#### Activity 2- Role Play: TV production crew

1. Organize the students into small groups and provide each group with one or two of the UNICEF advertisements to view.
2. Explain to each group that they are going to play the role of the television production crew responsible for creating the UNICEF advertisements. In this role they will closely examine the material in their advertisement so that they can be interviewed by the media (the other students) and answer questions about it. Each group should include students playing the following roles (Student Work Sheet 2):

- **Writer/s:** develop the words and story in the advertisement (spoken by the characters, written on screen or narrated).
  - **Film director/s:** determine the images that are shown and the type of 'shots' that are taken (camera placement, character movements etc)
  - **Audio & music director/s:** decide on the choice of music and sound effects to support the advertisement and message
3. Hand out the role play cards to each group and ask group members to take on their particular TV production roles and examine the advertisements. They will need to understand them very well so that they can answer questions asked about the advertisements by the media. This will include answers to the questions written on their role play cards (and any other questions asked by the students).
  4. When each group has thoroughly considered their advertisement and their role, they will be ready for the 'press conference.' Encourage the students to dress up for their roles and organize the classroom to look like a television studio. Each group will show, act out (or describe) their advertisement and provide some commentary about it. When it has concluded the rest of the class (the media) will ask them questions regarding it. The questions can be prompted by the teacher if necessary (ensure that the key questions written on each role play card are asked).
  5. Each group should have a turn as the production crew, while everyone else will be involved in the role play as 'the media.'
  6. After the role play is completed conduct a classroom discussion:
    - Do you agree with the messages and ideas in the advertisements?
    - Why are these messages important? (Or why not?)
    - How relevant are the points made by UNICEF in our community?
    - What practical experiences do you have that relate to these issues?

### **Conclusion:**

Finish the activities by reminding students that our personal hygiene practices can affect the health of our families and communities. Remind students that it is also important to use sanitation facilities where they are available (e.g. toilets connected to septic tanks or sewerage systems) so that human waste is channeled away from human contact.

## Teacher Resource Sheet 1

### Preparation for UNICEF hygiene and sanitation TV advertising clips for the Maldives

Please familiarize yourself with the UNICEF hygiene and sanitation TV advertising clips. You can choose to use any number of them. It is recommended to use them in the following order:

1. Animated. Boy leaves toilet, shuts the bathroom door, walks to the table with fruit, and while he reaches for the fruit, the fruit screams. Then, green dots on the boy's hands are shown that symbolize the bacteria left on his hand when not washing his hands after using the bathroom with soap and drying with a towel.
2. Actors not animated. Father leaves the bathroom, sits down at the table and wants to eat. Son stops father with magnifying glass and looks at the father's hand. Animated black spots on the father's thumb symbolize the bacteria that are left when he does not wash his hands with soap and dry them with a towel after using the bathroom (although bacteria cannot be seen with a magnifying glass in reality).

3. Animated. Boy squats on beach instead of using toilet facilities, bird falls out of the sky dead due to bad smell. Next, boy is seen using toilet facilities.
4. Animated. Boy squats on sand instead of using toilet facilities. Green dots/balls symbolizing bacteria can be seen spreading from the ground and contaminate well water. Issues dealt with here: Well water contamination, spreading of disease when eating with unclean hands, spreading of bacteria via flies. Last image shows mother, child and father affected by disease.



# Student Work Sheet 1

Cut up these strips and provide each student with 3 slips  
(One Plus, One minus, One Interesting)

Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting
Plus (+)	Minus (-)	Interesting

## Student Work Sheet 2

Organise students into small groups and provide each group with a card.

### Script writer/s

You are the script writers who researched and developed the words and story in the advertisement. You will be interviewed by the media about your role in the development of the advertisement. You will need to answer questions including: What issue is the advertisement about? What is the main message of the advertisement? Why did you choose the script / words that were featured? How did you try to make the audience take notice of the advert?

### Film director/s

You are the artistic film directors who researched the issues and determined the images that are shown and the type of 'shots' that are taken (camera placement, character movements etc)

You will be interviewed by the media about your role in the making of the advertisement. You will need to answer questions including: What is the main message of the advertisement? What special effects did you use to make the advertisement? What was the significance of a particular shot or image?

### Audio & music director/s

You are the artistic audio and music directors who researched the issues and decided on the choice of music and sound effects to support the advertisement and messages.

You will be interviewed by the media about your role in the making of the advertisement. You will need to answer questions including: What is the main message of the advertisement? How did you use sounds and music in the advertisement? Do you feel that the soundtrack makes an impact on the audience?

## 4.5 Topic: International year of Sanitation 2008

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### Learning Objectives:

- Students recognize that 2008 is the International year of sanitation.
- Students utilize the International year to raise awareness of hygiene and sanitation issues in their school and community.

### Grades: 6-7

### Time:

- Activity 1: 1 hour
- Activity 2: 2-3 hours (depending on awareness materials selected)

### Materials needed:

- Teacher Resource Sheet 1 and 2– read to familiarize yourself with the background to the topic.
- Student Work Sheet 1 - Question sheet for each group for Activity 1

### Introduction:

Start by explaining to students that the word ‘sanitation’ means the hygienic means of preventing human contact from the hazards of wastes. The introduction of sanitation systems into our communities (e.g. septic tanks, sewerage systems, waste collection) has had a major impact on our health and our development. Almost everyone living in the developed world has access to a private, flush toilet served by a continuous supply of piped water with taps and toilets in close proximity. Human waste is channeled by pipes into sewerage systems and treatment facilities, ensuring that drinking water is separated from the pathogens carried in faecal material. Today 2.6 billion people, including almost one billion children, live without even basic sanitation.

### What to do:

#### Activity 1- Sanitation and hygiene issues on my island

As a class research the sanitation and hygiene issues on your island. Split students up into 3 groups and discuss what problems there are with sanitation and hygiene on your island using Student Work Sheet 1.

1. Ask each group to report its findings to the class. These can be summarised on the board in columns.

### Activity 2- Planning an awareness campaign

By now, the students will have a good understanding of the issues surrounding sanitation and hygiene issues on their island. They are now in the position to formulate an action plan of what they can do to improve sanitation and hygiene issues. They identify here what they need to do at home, at school, or at the community level to improve the hygiene situation. Based on the list of issues developed in Activity 1, their task is to agree on at least three issues that need increased awareness raising in their school and community.

Throughout 2008 there are several international days celebrated, which you may be able to use to highlight sanitation and hygiene issues:

- World Water Day on 22 March with a focus on sanitation in 2008
- World Health Day on 7 April
- World Environment Day on 5 June
- International Literacy Day on 8 September
- World Habitat Day on 6 October, and
- International Day for Disaster Reduction on 10 October

Things to do could include for example:

- Design an awareness campaign and create stickers, posters, songs, plays, radio messages, TV spots, anything that can be used by your community to educate people about hygiene and sanitation and to give them ideas about what they can do.
- Conduct an information day for the parents.
- Paint a mural.
- Write an article for your local newspaper or newsletter or encourage your newspaper to cover sanitation issues.

### Conclusion:

Remind the students that we all have a responsibility to practice good hygiene and sanitation habits in our homes and schools. Students can also be ‘agents of change’ to improve hygiene and sanitation habits in our communities. By preparing a hygiene and sanitation awareness campaign, students are participating in community problem solving and actively applying their new knowledge their island environment.



## Teacher Resource Sheet 1

**Sanitation** is the hygienic means of preventing human contact from the hazards of wastes to promote health. (Wikipedia)

Sanitation is the most important medical advance since 1840. Improved sanitation reduces cholera, worms, diarrhoea, pneumonia and malnutrition, among other illnesses, that cause disease and death in millions of people. Today 2.6 billion people, including almost one billion children, live without even basic sanitation. Every 20 seconds, a child dies as a result of poor sanitation. That's 1.5 million preventable deaths each year.

### Sanitary Facilities

Toilets may seem like an unlikely catalyst for human progress—but the evidence that they are is overwhelming. Almost everyone living in the developed world has access to a private, flush toilet served by a continuous supply of piped water—with taps and toilets in close proximity. Human waste is channeled by pipes into sewerage systems and treatment facilities, ensuring that drinking water is separated from the pathogens carried in faecal material. Meanwhile, taps located in sanitation facilities enable people to maintain personal hygiene. But at the other end of the sanitation spectrum are the millions of people forced to defecate in bags, buckets, fields or roadside ditches.

### Water Quality

A vicious cycle of health impacts is established when human waste is not treated properly. Bacteria, viruses and parasites from human excreta (waste) enter the environment, where they might remain for some time in water or soil. By drinking contaminated water, or eating food that has been irrigated with untreated water, these micro-organisms infect people, who in turn will contaminate the environment via their faeces and/or urine. When wastewater is not handled properly it directly affects the local living environment and groundwater where the waste is produced. Discharge via a sewer or drain to a lagoon is often chosen as an easy solution: the 'out of sight-out of mind' approach. However, this directly affects the marine environment. Economic losses also result from untreated wastewater such as: increased health care costs, lower productivity and income losses due to illness, drop in fish production, declines in tourism, etc.



### Solid Waste sanitation

Solid waste (e.g. kitchen waste, cans, plastic bottles) can cause a nuisance and look untidy, but can also pose serious health problems if not properly managed. So there is a need for solid waste sanitation systems too! Solid waste, especially organic waste (such as kitchen waste) can encourage fly breeding and attracts rats and other animals that may transmit disease.

## Teacher Resource Sheet 2

### Water, sanitation and hygiene links to health

Facts and figures (updated November 2004)

*“Water and Sanitation is one of the primary drivers of public health. I often refer to it as “Health 101”, which means that once we can secure access to clean water and to adequate sanitation facilities for all people, irrespective of the difference in their living conditions, a huge battle against all kinds of diseases will be won.”* Dr LEE Jong-wook, Director-General, World Health Organization.

#### Diarrhoea

- 1.8 million people die every year from diarrhoeal diseases (including cholera); 90% are children under 5, mostly in developing countries.
- 88% of diarrhoeal disease is attributed to unsafe water supply, inadequate sanitation and hygiene.
- Improved water supply reduces diarrhoea morbidity by between 6% to 25%, if severe outcomes are included.
- Improved sanitation reduces diarrhoea morbidity by 32%.
- Hygiene interventions including hygiene education and promotion of hand washing can lead to a reduction of diarrhoeal cases by up to 45%.
- Improvements in drinking-water quality through household water treatment, such as chlorination at point of use, can lead to a reduction of diarrhoea episodes by between 35% and 39%.

#### Malaria

- 1.3 million people die of malaria each year, 90% of whom are children under 5.
- There are 396 million episodes of malaria every year, most of the disease burden is in Africa south of the Sahara.
- Intensified irrigation, dams and other water related projects contribute importantly to this disease burden.
- Better management of water resources reduces transmission of malaria and other vector-borne diseases, such as Dengue fever.

#### Access to water supply as of 2002

- In 2002, 1.1 billion people lacked access to improved water sources, which represented 17% of the global population.
- Over half of the world's population has access to improved water through household connections or yard tap.

- Of the 1.1 billion without improved water sources, nearly two thirds live in Asia.
- In sub-Saharan Africa, 42% of the population is still without improved water.
- In order to meet the water supply MDG target, an additional 260 000 people per day up to 2015 should gain access to improved water sources.
- Between 2002 and 2015, the world's population is expected to increase every year by 74.8 million people.

#### Access to sanitation as of 2002

- In 2002, 2.6 billion people lacked access to improved sanitation, which represented 42% of the world's population.
- Over half of those without improved sanitation – nearly 1.5 billion people – live in China and India.
- In sub-Saharan Africa sanitation coverage is a mere 36%.
- Only 31% of the rural inhabitants in developing countries have access to improved sanitation, as opposed 73% of urban dwellers.
- In order to meet the sanitation MDG target, and additional 370 000 people per day up to 2015 should gain access to improved sanitation.

#### Emergencies and disasters

- Almost two billion people were affected by natural disasters in the last decade of the 20th century, 86% of them by floods and droughts.
- Flooding increases the ever-present health threat from contamination of drinking-water systems from inadequate sanitation, with industrial waste and by refuse dumps.
- Droughts cause the most ill-health and death because they often trigger and exacerbate malnutrition and famine, and deny access to adequate water supplies.
- Disaster management requires a continuous chain of activities that includes prevention, preparedness, emergency response, relief and recovery.

#### Millennium Development Goals (MDGs)

By including water supply, sanitation and hygiene in the MDGs, the world community has acknowledged the importance of their promotion as development interventions and has set a series of goals and targets.

*NB. Teacher resource sheet information from <http://www.who.int/>*

# Student Work Sheet 1

Use this table to gain information about the current status of water, sanitation and hygiene issues on your island.

Research Questions	Answers
<p>1. Waste Disposal</p> <p>How is waste disposed on my island?</p> <p>Describe any negative effects of current practices on the environment and community health.</p>	
<p>2. Getting Clean Water</p> <p>Where do I get clean water from?</p> <p>Where does the school get clean water from?</p> <p>Are water sources on my island polluted?</p> <p>What substances can pollute our water?</p> <p>Describe any negative effects of current practices on the environment and community health.</p>	
<p>3. Sanitation (management of human waste)</p> <p>What happens to human waste from our homes? Or schools? Where does it go?</p> <p>Describe any negative effects of current practices on the environment and community health.</p>	



# 5

## PARTICIPATORY ACTIVITIES AND TOOLS: WATER

### Introduction

The purpose of this chapter is to develop the students' understanding of the issues surrounding water and their health. They will learn ways of protection, collection, handling and use of water at a household and community level.

### Learning objectives

The objectives of the chapter are to:

- Foster knowledge and awareness of issues about water on their island
- Link classroom activities to our student's community and environment
- Create opportunities to investigate and research water problems

### Overview of topics

- Why is water important?
- Well water contamination
- Water contamination by faeces
- Water treatment
- Water sources on my island
- Rainwater contamination
- Water collection methods, storage and handling
- Water use and reuse in the home

## 5.1 Topic: Why is water important?

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### Learning Objectives:

- Students understand the water cycle.
- Students understand the importance of water on their island.

### Grade: 4-7

### Time:

Activity 1: 1 hour

Activity 2: 30 minutes

### Materials needed:

- Poster showing the water cycle
- Teacher Resource Sheet 1 – read to familiarize yourself with the background to the topic.

### Introduction:

Start by explaining to students that water is essential for life. Water is one of the most basic of human needs. Without water, life could not exist. It is the most valuable resource on Earth. Earth's water is always in movement, and the water cycle, also known as the hydrologic cycle, describes the continuous movement of water on, above, and below the surface of the Earth. Since the water cycle is truly a "cycle", there is no beginning or end. Humans and all other organisms (animals and plants) depend on water for their survival.

### What to do:

#### Activity 1: Water and my community

##### *Drama 1*

Each person takes on a different role in the community: mother, father, young person, baby, elder/chief, business person, government official and maybe also include tree, bird, insect or mammal.

Now imagine yourself in your community with lots of fresh and clean water.

Imagine drinking all you need, doing a lot of washing, cleaning, cooking, and swimming and imagine enough water for everyone.

Maybe ask: what would your relationships to other people be like?

##### *Now imagine another scenario:*

There was a drought and the freshwater lens went salty, the tanks were empty and there was no rain.

What would you do? What would your relationships to others be like?

##### *Act out this drama.*

After this exercise: take turns explaining what happened and how you felt about the scenario. What issues or problems arose and how did you deal with it? Has this situation ever occurred before?

##### *Drama 2*

Explore the importance of fresh water in the natural environment.

*Role play:* half the group are humans and half are animals and plants.

Imagine the consequences if one group used up all the water e.g. if humans used up all the water from the environment without enough left for the rivers or streams or for the animals. What would happen?

This exercise may explore the inter-connectedness between humans/plants/animals and water.

After this exercise: take turns explaining what happened and how you felt about the scenario. What issues or problems arose and how did you deal with it? Has this situation ever occurred before?

#### Activity 2: The water cycle

Show the poster on the water cycle to the students.

Explain to students the water cycle in the Maldives.

Highlight that our main source of freshwater is from the freshwater lens and from rainwater. Both sources of water are vulnerable to pollution.

Ask students the following discussion points:

- A. How much water is available on the planet?
- B. How much of the water available in the planet is fresh water?
- C. Why is water important for us and the planet?
- D. Where does your drinking water come from?
- E. Can human activities affect water quality? How?

### Conclusion:

Remind the students that water is essential for life, all life- but that it can easily become contaminated and cause illness. In the Maldives our sources of freshwater are limited and are vulnerable to pollution, so we must protect these freshwater sources.

## Teacher resource Sheet 1

Water is one of the most basic of human needs. Without water, life could not exist. It is the most valuable resource on Earth. Earth's water is always in movement, and the water cycle, also known as the hydrologic cycle, describes the continuous movement of water on, above, and below the surface of the Earth. Since the water cycle is truly a "cycle," there is no beginning or end. Water can change state among liquid, vapor, and ice at various places in the water cycle, with these processes happening in the blink of an eye and over millions of years. Rain water that soaks into the ground runs off the land and flows into streams, rivers, lakes, ponds or into the sea. The sea, oceans or other surface waters are heated by the sun and water (vapour) rises up into the atmosphere to form clouds. When it rains again the process starts all over again. As shown in the illustration, the water cycle consists of the following:

### 1. Transpiration

Plants draw water in at the roots where it moves up to the leaves and then evaporates. This process is called transpiration and is responsible for much of the water that enters the atmosphere. If plants are removed, particularly trees, then this part of the water cycle is disrupted, there is less transpiration and therefore less rain.

### 2. Evaporation

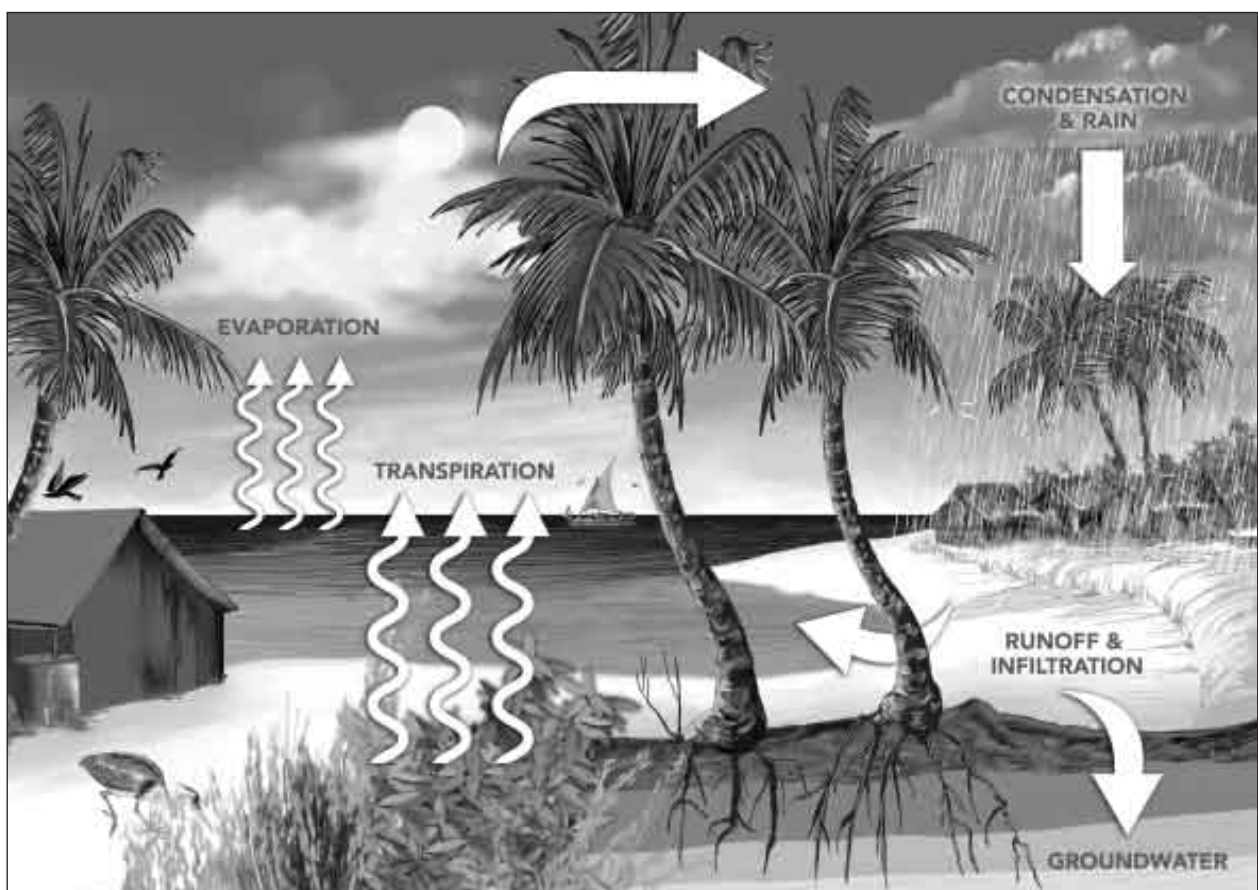
Energy supplied by the sun helps water to rise up (evaporate) from water surfaces such as lakes, seas and oceans, into the atmosphere. (Note that rainwater is always fresh and not salty).

### 3. Condensation and rain

These drops of water in the atmosphere form (condense) into clouds. The sun also provides the energy which drives the weather systems to move the water vapor (clouds) inland (otherwise, it would only rain over the oceans). Once water condenses, it gets heavier, gravity takes over and the water is pulled to the ground as rain water.

### 4. Runoff and infiltration

Rain water runs off the land and flows into oceans, lakes and rivers. Rainwater can also soak into the soil, subsoil and rock to become groundwater. The water moves down into the ground because of gravity, passing between particles of soil, sand, gravel, or rock until it reaches impervious rock. This area becomes filled, or saturated with water. This ground water may be very near the ground's surface or it may be hundreds of feet below. Wells that are sunk in the ground tap into this groundwater, or sometimes groundwater makes its way to the surface and forms a spring.



## 5. Groundwater

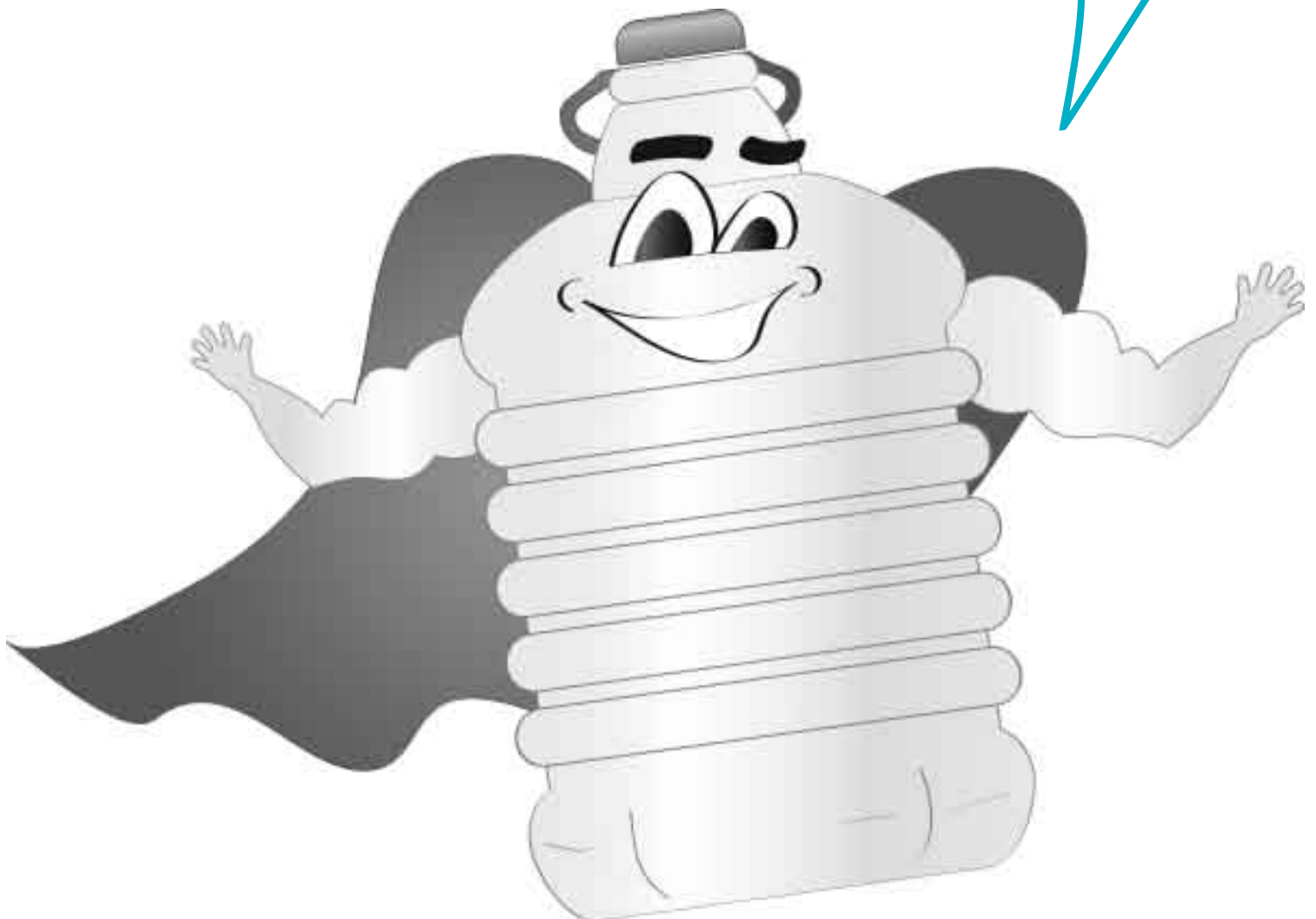
Most groundwater is clean, but it can become polluted, or contaminated. It can become polluted from sewage, or when people apply too much fertilizer or pesticides to their fields. When pollutants leak, spill, or are carelessly dumped on the ground they can move through the soil to contaminate the water. Because groundwater is deep in the ground, groundwater pollution is generally difficult and expensive to clean up. Sometimes people have to find new places to dig a well because their own becomes contaminated.

## 6. Storage

Huge quantities of water are stored in rivers, oceans, lakes and glaciers.

### Water Facts

- Water covers 75% of the Earth's surface, so we really are a water planet.
  - Over 97% of Earth's water is salt water.
  - 2% is stored in glaciers and icecaps.
- 1% of the Earth's water is freshwater stored in groundwater or surface water.



## 5.2 Topic: Water sources on my island

### Learning Objectives:

- Students understand that there is a freshwater lens underneath coral islands.
- Students understand the possible sources of freshwater on their island.
- Students understand that freshwater sources can be polluted.

### Grade: 4-7

### Time:

- Activity 1: 30 minutes
- Activity 2: 1 hour
- Activity 3: 2-3 hours

### Materials needed:

- Poster showing the freshwater lens
- A map of the island.
- Coloured pens or pencils.
- Teacher Resource Sheets 1 and 2– read to familiarize yourself with the background to the topic.

### Introduction:

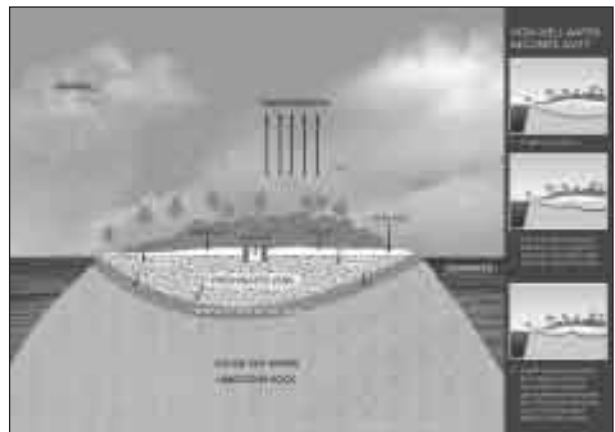
Start by explaining to students that source water is untreated water from streams, lakes, or groundwater that people use to supply private wells and public drinking water systems. Source water comes from one of two sources: surface water or groundwater. Surface water is water that is open to the atmosphere and includes lakes, rivers, streams and creeks. Groundwater is water found beneath the Earth's surface between the cracks and spaces in soil, sand and rock. In the Maldives our source water mainly comes from rainwater or from groundwater, as we do not have rivers or freshwater lakes. Some Islands, including Male', use *desalination*. This technology can turn salty water into clean drinkable water.

### What to do:

#### Activity 1: The freshwater lens

Show the poster on the Freshwater lens to the students.

Explain to students how a lens of freshwater is formed on coral islands in the Maldives. Explain that a freshwater lens is a natural feature that makes it possible for life on many small Maldivian Islands. The fresh water collects



below the ground and on top of the sea water, and is good enough quality for plants, animals and communities to use. This supply is replenished by rainfall which percolates down through the coral and sand. Freshwater lenses are a particularly important source of water on atoll islands, which often have no surface water.

Talk about ways that the water in the freshwater lens can be polluted (e.g. going salty, from leaking septic tanks etc).

Ask the students to draw a picture of the freshwater lens in their notebooks.

#### Activity 2: Rainwater tanks

Start by explaining to students that rainwater provides the main drinking water supply for 99% of all households in the Maldives outside of Male'. It is the most important water for the family, as it has the most direct effect on family health.

Divide the students into 4 groups and allocate the groups to different sections of the island. In groups, walk around the community and count how many rainwater tanks the householders use. Students should ask 4 householders the following questions:

- Is rainwater their main source of freshwater at their house?
- Is there enough water to last each year? If no, why not?
- How is the quality of their rainwater?

Return to the classroom and collate the number of tanks on their island and the response to the questions. Students should now have a greater awareness of the importance of rainwater.



### Activity 3: My water sources\*

- Ask the students to identify which types of water sources are found in their communities: a communal well, a mosque well or water tank etc. Ask the students to form groups according to the type of source in their area.
- Invite each group to depict their source in the way they prefer, for example by making a drawing using markers, paint or pencils, using tear and cut/paste methods, or making a three dimensional small-scale model using material that is available in school, at their homes and in the community.
- When each group has depicted their source, ask them to identify the practices in the community that contaminate the source and the uses that people make of water from the source (water uses).
- Ask them to use either different colored cards for contaminating and water drawing/water uses or write in two colors to show the different types of use (contaminating uses and other, productive uses). They can depict the items as drawings and add a label for each drawing, or use only labels. Ask the students to identify their own homes and water sources like wells, septic tanks and rainwater tanks.
- Let each group present its product in class, explaining the different uses and how these may affect the quality and quantity of the water available now and in future.
- Ask them to mention also the environmental, economical, social and health consequences. (Who will be affected negatively by which uses?)
- Monitor each presentation and invite the other students to add uses and/or contaminating practices.
- To consolidate learning, ask the class to summarize the contaminating practices and the environmental, social, economic and health consequences on the board and in their notebooks.
- Let students present their work to the more junior classes, to the PTA, to community leaders and/or at a parents' meeting to generate awareness, and to promote analysis and problem solving on integrated water resource management.



*Rainwater is a source of freshwater*

### Conclusion:

Remind the students that water is essential for life, so we need to protect our water sources. In the Maldives we are surrounded by water, but we have limited supplies of freshwater, so we must be very careful to protect our freshwater lens and our rainwater.

\* NB. Adapted for the Maldives from activity 'Wash and drain?' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

# Teacher resource Sheet 1

## What is Source Water?\*

Source water is untreated water from streams, lakes, or groundwater that people use to supply private wells and public drinking water systems. Source water comes from one of two sources: surface water or groundwater. Surface water is water that is open to the atmosphere and includes lakes, rivers, streams, creeks and oceans. Groundwater is water found beneath the Earth's surface between the cracks and spaces in soil, sand and rock. In the Maldives our source water mainly comes from rainwater or from groundwater.

## Sources of Freshwater

### Surface Water

Surface water is any water that is stored on the Earth's surface (including oceans). Fresh surface water includes lakes, rivers, streams, ponds, pools and wetlands. It also includes surface runoff, water that falls as precipitation and flows across the land rather than soaking in.

### Ground Water

14% of all fresh water is stored underground! Groundwater is one of the world's most important sources of fresh water – one third of the people in the world rely on it. Ground water is stored in rock pores, cracks and openings, which act like a huge underground sponge. People take out this water by digging wells, bores or by putting in pumps. Ground water is replenished by rain fall, which soaks into the ground.

Compared to surface water, ground water moves very slowly, sometimes only centimetres every year. The speed at which ground water moves depends on the rock type and gravity – some of the water deep in the ground may have been there for thousands of years!

### Water Table

When all the spaces between soil particles and rock fractures fill up with water, the soil is said to be saturated. The top of this zone is called the water table. The water table can be centimetres or meters below the surface, depending on rainfall and how much water is being used. This water may be only days, weeks or months old.

### Freshwater Lens

A freshwater lens is a natural feature that makes it possible for life on many small Maldivian Islands. The fresh water collects below the ground and on top of the sea water, and is good enough quality for plants, animals and communities to use. This supply is replenished by rainfall which percolates down through the coral and sand. Freshwater

lenses are a particularly important source of water on atoll islands, which often have no surface water.

## The Importance of source water protection

Protecting water at the source is an important way to ensure the health of humans, ecosystems and economies. Source water protection also works to ensure that a clean and safe environment is available for future generations.

### Human Health

Protecting sources of water is essential to ensuring human health. According to the 3rd World Water Forum, held in 2003, every year at least five million people die from water-related diseases worldwide. These diseases are transmitted either directly, as a result of infection from consuming contaminated water or food, or indirectly, by ingesting disease-carrying organisms. The majority of those affected by water related mortality and morbidity are children under the age of five.

Preventing contaminants from entering water sources is an effective way to help ensure clean drinking water and thus prevent human disease. This is important because conventional water treatment methods cannot effectively remove many hazardous chemicals. While source water protection works to everyone's benefit, it is of particular concern for island consumers whose geographic location may prevent them from having access to municipally treated water/ desalinated water.

### Ecosystem Health

An ecosystem is a biological community consisting of interacting organisms and their surrounding physical environment. Ecosystems have four main components: air, water, land and living creatures (i.e., plants and animals, including humans). Each component of an ecosystem performs or contributes to a unique service or function upon which all life depends.

Every ecosystem on Earth depends on water, of varying amounts, for its survival. If either water quality or water quantity is in any way degraded, this can have a serious adverse impact on an ecosystem. Similarly, when ecosystems become degraded, this has a negative impact on water.

### Economic Health

While there are costs associated with protecting water sources, they are investments that serve to generate economic vitality and growth. Communities with clean water sources attract human settlement, development and business.

*NB. Teacher resource sheet information from <http://www.pollutionprobe.org/Reports/swpprimer.pdf>*

Economic benefits of source water protection measures can also be measured in terms of cost savings — that is, the damage costs that may have resulted if water sources

were not protected. Preventing contamination at the source also reduces the costs of treating water later in the drinking water treatment process.



## Teacher resource Sheet 2

Water is essential for life. We are all aware of this fact, and yet it is all too often taken for granted. The Maldives is a unique island nation surrounded by the Indian Ocean and wherever we look we see water. But ironically, the Maldives has very limited freshwater resources that can be used to sustain human life.

Traditionally we have relied on rain water and the thin and fragile layer of freshwater that forms a 'freshwater lens' just beneath the ground. Heavy rains may occur during our monsoon periods, but the amount of rain is unpredictable, and the wet times are separated by months of dry weather, limiting the amount of rainwater available. The freshwater lens is accessed through the many wells that we have created. However the freshwater lens is thin and highly at risk to pollution that can seep in through our sandy soils. If we take too much of the freshwater out of the lens it very quickly becomes salty. This is because the sea water that sits underneath it rapidly moves in to fill the space if we take too much out.

Some Islands, including Male', use desalination. This technology can turn dirty and salty water into clean drinkable water. Maybe it is the answer? While this water

is clean, it is also very expensive and the cost raises some very important questions. Who will pay to produce this water? Can the community afford it? What are the environmental costs of this water? Is it a better alternative than looking after the water that we already have? Is it a solution for everyone?

Growing population and development in the Maldives has put increasing pressure on the fragile and limited freshwater supplies. This pressure reached a crisis point when the Tsunami swept onto our Islands in December 2004. Saltwater, sewerage and rubbish washed into wells and soaked into the ground and rainwater tanks were destroyed. People became aware of the importance of our fresh water supply. However, the impact of the Tsunami on water is small compared to the ongoing impacts of human activities. These include:

- Sewage disposal (e.g. toilet wastes)
- Rainwater collection
- Well management
- Extraction of groundwater (e.g. for desalination)
- Disposal of solid wastes (e.g. plastics, batteries, food scraps etc)
- Hygiene practices

## 5.3 Topic: Well water contamination

### Learning Objectives:

- Students know the importance of safe drinking water and the risks of drinking water that is less safe.
- Students know the main ways well water can become contaminated.

### Grades: 1-5 (activity 1,2) 6-7 (activity 3)

### Time:

Activity 1: 1 hour

Activity 2: 30 minutes

Activity 3: 2 hours

### Materials needed:

- Paper, pencils, paint or markers, scissors and glue and modeling clay (Activity 1)
- Sequence story cards 'Water Story'(activity 2)
- A map of the island(Activity 3)
- Teacher Resource Sheet 1- read to familiarize yourself with the background to the topic.
- Teacher Resource Sheet 2- read to familiarize yourself with the background to the topic.

### Introduction:

Start by explaining to students that well water is used by all households in the Maldives. Most communities use the well water for all non-drinking uses such as washing, bathing and toileting. Well water provides about 90% of the household water needs. Well water is therefore very important to the household.

Unfortunately, all surveys of well water show that well water is of worse quality than rainwater. It usually has about 100 times more bacteria in it and is 100 times more salty than rainwater. Some wells also contain contamination from septic tanks. Due to the presence of bacteria and other compounds from septic tank discharge it is always better to drink rainwater than well water. If you drink well water that contains too much bacteria then it will make you sick, and give you diarrhoea and vomiting.

### What to do:

#### Activity 1: My well water\*

- Discuss how well water is used on their island
- Ask each child to draw/model/cut and paste his or her well (techniques adjusted to age).



- Let them display their drawings on the wall or floor; older children may also group drawings by type of water source.
- Facilitate a discussion about what children and others do near wells, e.g. wash clothes, bathe, take drinking water, etc.
- Encourage the children to discuss what this means for the cleanliness of the water and what this may mean for their stomachs if they drink this water.
- Ask older children to write the names of water-borne diseases on the board/ cards.
- Let the students make a drawing on the importance of safer drinking water in whatever way they wish (free expression). Ask children to add messages.
- Let them take the drawings home to show and, if agreed, put it on the wall at home.
- The next day/lesson, facilitate an open discussion about what they have done at home with the drawing and how their parent(s) reacted.

\* Adapted for the Maldives from activity 'I drink...safe water!' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

## Activity 2: Water Story

Have the children sit in a circle around the teacher and read the 'water story' to the students using the sequence cards.

The people of Paradise Island lived beside a mosque with a well. They felt so blessed to have so much clean water close by for drinking and cooking... but 'danger' lived in the well too! The people could not understand why so many of them were sickly. Mothers spent so much time tending to their sick children that house work was neglected and families lived in confusion. With so many children getting sick, school work suffered and grades fell... Men lost their jobs because they spent so much time on sick leave. With so many of their bread winners out of work, the island chief called for an emergency meeting to discuss their problem. They also went to the mosque to pray for divine intervention. They even wrote to the government who sent a health worker to the island. She looked in the bushes, she looked in the trees, she sampled the air, she took samples from the mosque well... Then she found what she was looking for... That evening there was a meeting for the island community. Then the health worker told them about contaminated well water which was causing all their problems.

After telling the story, initiate a discussion with the students by asking some questions like:

- What caused confusion among the community members on Paradise Island?
- Why did they have difficulty identifying the cause of the problem?
- What might have led to the contamination of the mosque well?
- How could you prevent well water from getting contaminated?

After reading or telling of the story, organise the children in pairs, small groups or individually, and ask them to discuss and write down responses to the following points:



*Conducting a survey.*



- What do you like or do not like about the story?
- What is the relevance of water in this story?
- What are the main messages in this story?
- What could happen to the actors in this story if there was no positive outcome?

## Activity 3: Well water quality on my island

Explain that the main ways that well water quality can change is if substances from leaking septic tanks enter the water (e.g. bacteria, viruses) or saltwater enters the freshwater lens (if we pump out too much water) making it more salty.

Divide the students into groups and allocate the groups to different sections of the island. In groups, students visit 4 houses in different locations of the island. Observe the condition of each well (e.g. is it covered? does it have cracks in the concrete?).

Answer the following questions;

- Section of island (from the island map / or ward name)
- How many wells do the householders use?
- Are there pumps (electrical) connected to the well(s)?
- Is the well water salty?
- Does the water smell or taste unusual?
- Do they notice any differences in well water quality throughout the year?
- Has anyone in the house ever been sick after drinking well water?

Return to the classroom and each group can present their findings to the class. Summaries of the data collected should be listed in columns on the board. From the data ask the students whether it is likely that any wells on their island are contaminated? Are any parts of the island worse than others? Ask the students if they are surprised by their findings?

## Conclusion:

Remind the students that on coral islands everyone uses well water in one way or another. So it is important that the well water is protected. Well water can become contaminated by leaking septic tanks or by salt water. Once well water is polluted, it may no longer be suitable for certain uses.

## Teacher Resource Sheet 1

The freshwater lens and water going salty in the well

A proportion of the freshwater falling as rainfall on an island infiltrates into the sandy soils and accumulates as fresh groundwater. This freshwater, being less dense than saline seawater, floats on the saline groundwater that infiltrates the island from the sea. Because of density differences, a freshwater lens develops, which in general terms is thickest in the centre of the island, where groundwater levels are highest (compared to mean sea level).

Why is there fresh water in the ground?

All small islands are surrounded by the sea which is salty. The rain which falls on the island is fresh. About a third of this rainfall will soak into the ground and infiltrate into the coral sand. This water collects in the sand and forms a body of fresh water. The freshwater is not very thick however (typically 2-7m on smaller islands) and floats on salt water that is underneath it, that has entered the sand below the sea level. The infiltrated freshwater eventually flows to the sea.

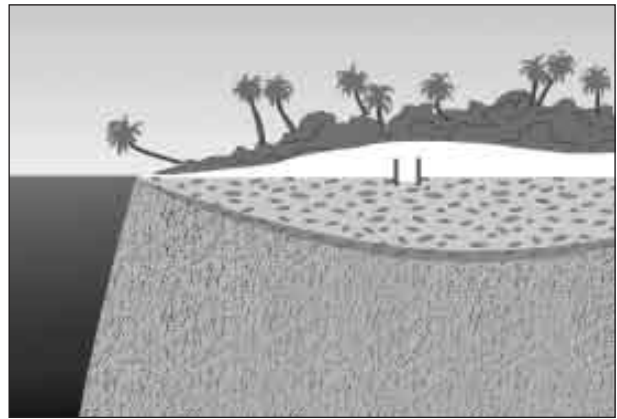
Why does the groundwater salinity vary across the island?

The freshwater body or lens is surrounded by the sea. The seawater also tries to get into the islands coral sand, but is pushed out by the freshwater entering from the rainfall. However the nearer you get to the coast the closer you are to the sea, and the easier it is for seawater to come into the land. At the coast there is no freshwater lens so the groundwater becomes salty. The further inland a well is located, the greater the thickness of the freshwater lens and the fresher the water.

## Well Water

i) When can I drink well water?

The saltiness or salinity of the well water varies from well to well depending on several factors which are explained below. You can use well water for drinking if it has a salinity reading of  $2,500 \mu\text{S}/\text{cm}$ . If it is more salty than this, drinking it will make you sick. You can still use the well water for non-drinking and non-cooking uses though.



ii) Why does my well water get more salty during the dry season?

During the dry season the amount of rainfall is reduced and this means the amount of freshwater entering the freshwater lens is also less. This means the freshwater flows within the groundwater are less and this means that more seawater can enter the island. The freshwater lens then gets smaller. If you live towards the edge of your island, you will notice your well water getting more salty during the dry season.

iii) Why are Dhani wells usually fresher than pumped wells?

Dhani wells tend to be fresher than pumped wells for two reasons. Firstly less water is taken from a dhani well than a pumped well. This means there is more freshwater left in the ground and so the lens stays fresher. The pumped well

takes out more groundwater, which reduces the amount of fresh groundwater available to push out the seawater, and so pumped wells tend to be slightly more salty.

Also pumped wells lower the water level in the well more than dhani wells. There is a relationship between the height of the freshwater level above sea level and the amount of freshwater in the lens below sea level. Generally for every 1cm of freshwater above mean sea level there is 20 cm below it. So when a pumped well lowers the water level in the well by too much, the freshwater lens thickness below the well reduces and saline water comes up and into the well. This is known as saline-up-coning. The more water you take from your well, the more likely it will become salty.

iv) How much water can I take before my well gets salty?

This is a difficult question to answer. It depends where your house is located on the island, what type of abstraction method you use (dhani or pump), whether you put rainwater overflow water in the well, how you operate your pump (continuously or on demand), how much water your neighbours are taking, and how much of the waste water you return back into the ground. If the island has a sewerage system, the whole island may be taking out too much groundwater to the sea. In this situation groundwater may continue to get more salty. MWSA (Maldives Water and Sanitation Authority) can provide a general household guide for abstraction once they have carried out a water resources assessment of the island.

v) How can I make my well less salty?

There are several simple things you can do to make your

well water as fresh as possible. These are listed below:

- a. Direct your rainwater tank overflow either directly into your well or into the ground next to your well. If you are not collecting all the water off your roof for rainwater harvesting then catch the rest and direct it into the well.
- b. Construct your well with small holes in the side of your well wall lining below the water level. This allows very shallow fresh water to enter the well. This will be fresher than water entering the well through its base alone.
- c. Use the dhani abstraction method in preference to the pump method.
- d. Make sure your pump is of as low an abstraction rate as possible. Large pumps will provide your water more quickly but reduce the water level in the well by a greater amount too.
- e. Ideally get your pump to feed a water storage tank next to your roof, and pump to it at a constant rate all day and night. The storage tank can then provide your daily supply under gravity. This will minimise the lowering of the well water level.
- f. Only take the water you need. Do not waste water.
- g. Put your washing water into a catch pit or trench in your household plot (but away from the well). Do not put used washing water into the septic tank or the sewer line. Washed water is freshwater (if it does not contain faeces or urine) and can recharge the freshwater lens. Putting it in the sewer line will send it into the sea and it will be lost from the island.
- h. Use smaller flush tanks (small 6 litre tanks) for the toilet as less water is required for flushing than if you use a 12 litre tank.

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## Teacher Resource Sheet 2

### Well contamination and how to prevent it:

There are a number of factors which affect the vulnerability of your well and therefore the likelihood of your well becoming contaminated. These are:

#### 1. Condition of the well

- Any cracks in the wall will enable water to enter the well without first passing through the ground.
- Water often gets spilt around the well, when pouring the dhani into jugs and bowls. This water falls onto the ground and this will infiltrate back into the well. This water may carry contaminants from household activities with it.
- The concrete floor around the well must be free from

cracks to avoid contamination of the well from used water.

- Water used after washing often cause puddles around the well if there is no proper drainage channel to direct water away from the well.
  - Many wells do not have a cover on them.
  - Disposing of faeces or cleaning soiled clothes must not be done near the well. All of these are causes of microbiological contamination of the groundwater.
- #### 2. Location of the well
- Any well close to the toilet/bathroom, septic tank, washing water soakage pit, waste pile or puddles, will be more likely to be contaminated than one further away.
  - Wells located in the garden, near the house and away from the septic tank will be less polluted.

- Talk to your neighbors to agree on the best location for all your septic tanks.

Ideally the septic tank should be 15m from your well. The further away the better. *(Based on MWSA - Maldives Water and Sanitation Authority -guidelines)*

### 3. Additional sources of contamination

- The most significant sources are likely to be fuel oils and chemicals. Some locations, such as the power house will store more of these fluids than others.
- Fuels and chemicals will interfere with the treatment process in the septic tank and enter the groundwater.
- The concrete slab should have a banded edge which would enable all the fuel to be held within it should the fuel store leak. Any leak can then be cleared up and removed to the island waste site.
- Washing water will contain detergents. The washing water catch pit can also contaminate your groundwater but to a much lesser extent than the septic tank.

### 4. Septic tank discharge

- Surveys show that the main source of contamination of well water is septic tanks.
- The condition, size and maintenance of the household septic tank are contributing factors to affecting the water quality in your well.
- If the septic tank is cracked or broken then untreated effluent will leak from the tank into the ground.
- If you don't clean out the sludge from your tank then it won't treat the effluent so effectively.

### Actions to reduce well contamination and improve well water quality

There are some easy steps you can take to improve the protection of your well and therefore improve its water quality. These are listed below:

- a) Repair all cracks to the well walls regularly and make sure it is adequately sealed.

- b) Remove all debris from around the well.
- c) Put a metal well cover with a hinged lid on the top of the well.

- d) Build a concrete apron around the well which will direct spills and rainwater away from the well.

These can be channeled into a pipe and flow further away from the wellhead.

- e) Clean the dhani, ideally with bleach, once a week.
- f) Repair any cracks seen on the septic tank.
- g) Make sure the dhani does not stand on the floor and has a hanger to keep it in the air.
- h) Empty the septic tank at least once a year of its sludge and dispose appropriately.
- i) If you build a new septic tank make sure it is big enough for your household. MWSA

(Maldives Water and Sanitation Authority) can advise you on the design of your septic tank.

- j) If you build a new septic tank locate it as far away from your well as possible. Check with your neighbours on the locations of their wells as these might be close to where you intend to put your tank.
- k) Move the washing water catch pit away from the well area.
- l) Store fuel oils and chemicals away from the well area.
- m) If you dig a new well make sure it is near the house and far away from the septic tank.
- n) Put the rainwater tank overflow pipe into the well. Rainwater has less salt and bacteria than groundwater and contains no nitrate and ammonia. The rainwater will dilute the groundwater and improve the well water quality. It will also help keep the septic tank effluent in the groundwater away from the well.
- o) Do not dispose of waste or human waste (e.g. nappies) near the well (at least 15m).
- p) Repair any cracks on the concrete floor around the well.





## 5.4 Topic: Rainwater contamination

### Learning Objectives:

- Students can outline factors that result in unsafe rainwater.
- Students feel able to evaluate good and bad behaviors related to the collection of rainwater.

### Grades: 1.4 (activity 1-2), 5-7 (activity 3)

### Time:

- Activity 1: 30 minutes
- Activity 2: 30 minutes
- Activity 3: 2 hours

### Materials needed:

- Sequence cards Two A4 cards showing good and bad rainwater collection practices (activity 2)
- Map of the island and notebooks (activity 3)
- Teacher Resource Sheets 1 and 2– read to familiarize yourself with the background to the topic.

Introduction: Start by explaining to students that rainwater provides the main drinking water supply for 99% of all households in the Maldives outside of Male'. It is the most important water for the family, as it has the most direct effect on family health. Despite this, 70% of all households report their water tanks becoming empty in the dry season, and up to 50% of tanks tested on some islands show poor biological water quality. Surveys confirm rainwater is 100 times fresher than groundwater, and 100 times cleaner than groundwater from bacteria. When rain falls it is very clean and contains no bacteria and very little salt. But when it lands on your house it flows over the roof into the gutters, down the down-pipe and into the tank, it picks up dirt and bacteria.

### What to do:

#### Activity 1: Water Collection\*

- Skit (little drama)
- Identify seven children who want to do a skit.
- Share the story below or a similar story. Give each child a role.
- Support the group to emphasize the sounds and noises for effect and humor.

The scene opens near the communal rainwater tanks there is a long queue of people waiting to collect water (children 1-3). Mariyam (child 4) is in the queue and talking to the

neighbors. There is a big Nika tree on top of the roof of the island office where the water flows into the rainwater tanks and rats (child 5) and bats (child 6) were happily enjoying the Nika fruit and defecating on the roof. A family of cats was also playing on the roof. The gutters were old and leaking. At this moment a local teacher (child number seven) comes in and silently observes the group.

- Ask the group to stop what they are all doing. Draw attention to activities that are going on using rhetorical questions such as, are you really going to collect water here when you see that the roof has not been cleaned and rats and bats are defecating on the roof.
- Explain the source of the contamination levels stepwise, which can result from defecation near the water source, overhanging branches, old and leaking gutters, animals playing on the overhanging branches and the roof.
- Ask students what can happen when other people drink this water.

#### Activity 2: Spot the difference

Show students the sequence cards showing 'bad' rainwater collection practices. Ask students to name all of the bad rainwater collection practices they can see. List these in one column on the board.

Now show students the sequence cards showing 'good' rainwater collection practices. Ask students to name all of the bad rainwater collection practices they can see. List these in one column on the board.

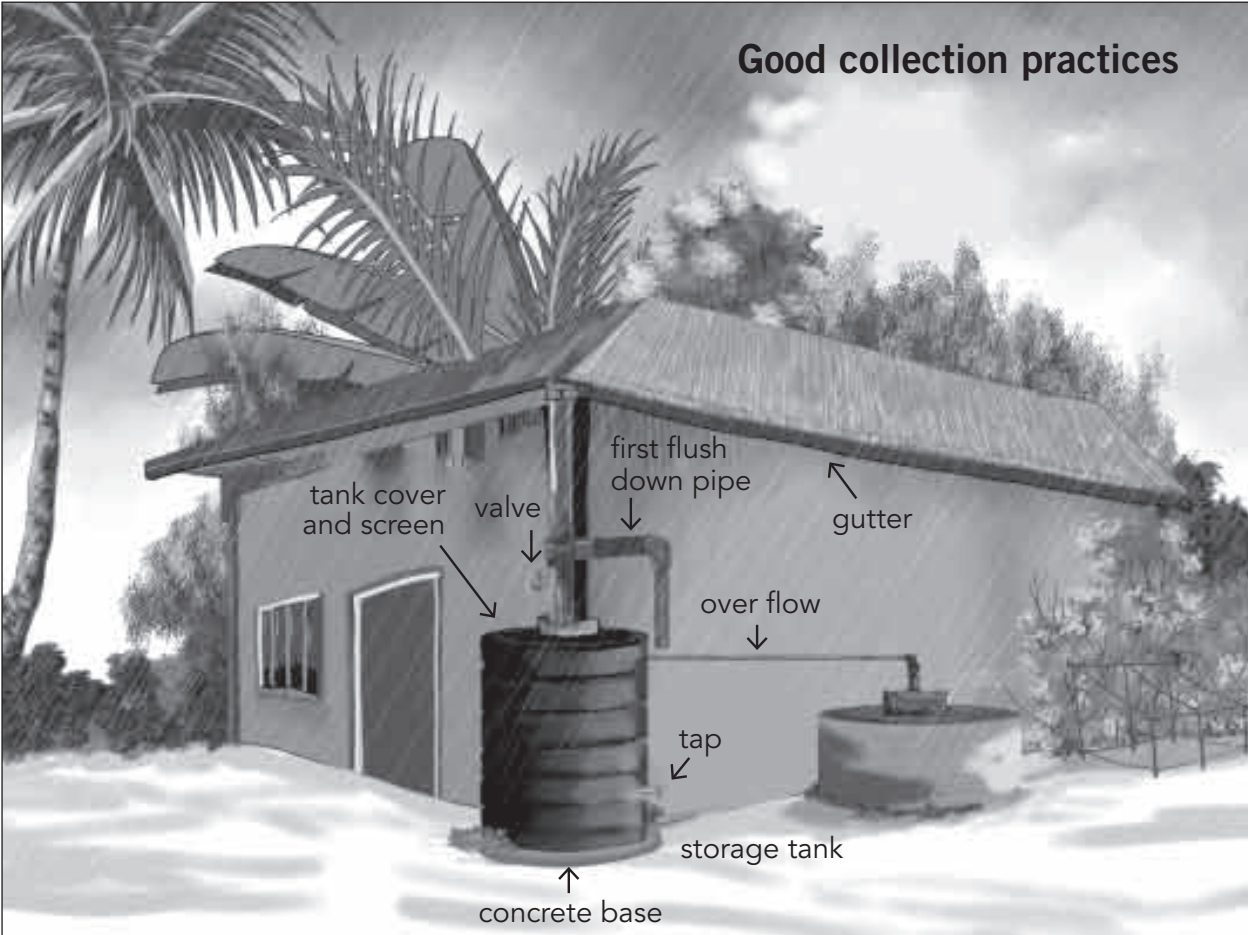
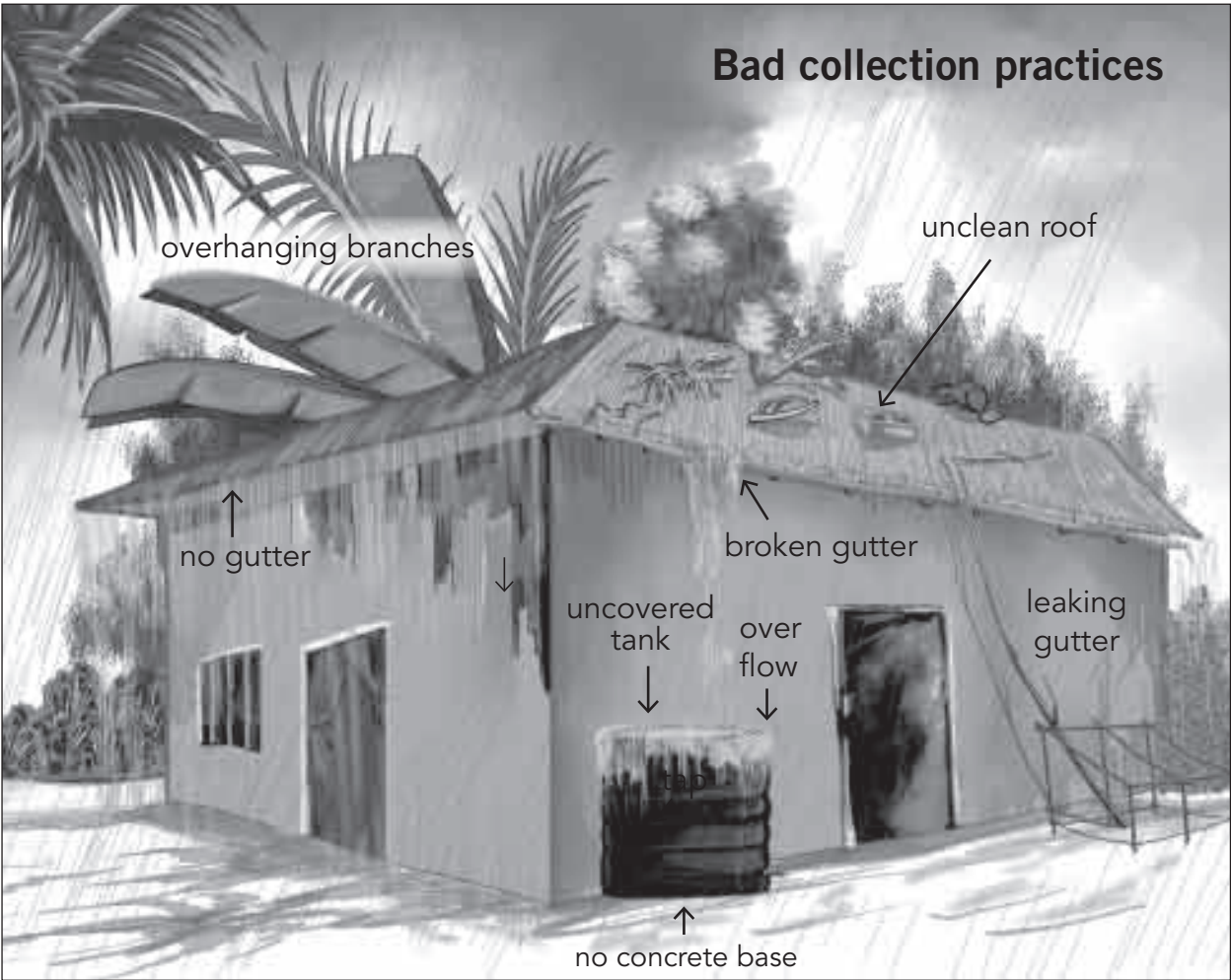
Ask students what would happen if they used bad rainwater collection practices? Ask students what would happen if they used good rainwater collection practices? Ask students if they have seen examples of good and bad rainwater collection practices around their island?

#### Activity 3: Rainwater on my island

Explain that there are many ways that rainwater can be contaminated (e.g. animal waste, receiving 'first-flush storm water which contains contaminants, overhanging branches dropping leaves into gutters).

Divide the students into groups and allocate the groups to different sections of the island. In groups, visit 3 house holds in the island and observe and record how rainwater is being collected.

*\*Adapted for the Maldives from activity 'The rainmakers?' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.*



Write answers to the following questions;

1. Is the rainwater tank covered?
2. Are there over hanging branches above the tank?
3. Is the rain water tank clean?
  - The area surrounding rain water tank is clean?
  - The roof and gutters are clean?
  - Top of the tank is clean?
4. Is there a first flush valve connected to the tank?

### Follow-up questions

Return to the classroom and each group can present their findings to the class. Summaries of the data collected should be listed in columns on the board. Ask students

from their observations, what are the threats to rainwater? What recommendations would they give to the households to safeguard their rainwater? Ask the students if they are surprised by their findings?

### Conclusion:

Remind students that keeping the rainwater as clean as possible, is very important. When rain falls it is very clean and contains no bacteria and very little salt. But when it lands on your house it flows over the roof into the gutters, down the down-pipe and into the tank, it picks up dirt and bacteria. So it is important to collect and store drinking water safely. Otherwise we can become sick. Remind the students of good and bad practices for collecting rainwater.

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## Teacher Resource Sheet 1

### Securing rainwater drinking water supplies

Rainwater provides the main drinking water supply for 99% of all households in the Maldives outside of Male'. It is the most important water for the family, as it has the most direct effect on family health. Despite this, 70% of all households report their water tanks becoming empty in the dry season, and up to 50% of tanks tested on some islands show poor biological water quality.

- Surveys confirm rainwater is 100 times fresher than groundwater, and 100 times cleaner than groundwater from bacteria.
- Make sure your rainwater harvesting is correctly sized to provide water throughout the dry season, and that you keep the roof and tanks clean. Keeping the rainwater as clean as possible is very important.

Keeping rainwater as clean as possible

- When rain falls it is very clean and contains no bacteria and very little salt. But when it lands on your house it flows over the roof into the gutters, down the down-pipe and into the tank, it picks up dirt and bacteria.

#### 1. Clean the roof and gutters

- Reduce the amount of dirt and bacteria going into your tank. Clean the roof once a month, and your gutters once a week.
- Make sure the First Flush valve is open before you wash the roof – as you do not want wash water in the tank.
- Make sure no branches hang over the roof as these will attract birds, bats and insects, and allow rats to jump onto the roof.

#### 2. Put in a downpipe filter

- Put a small grill over the entrance to the down pipe.
- A filter which allows the water through but no mosquitoes will be even better.

#### 3. Use a 'first flush' valve

- This is a valve which when open prevents the water from entering the tank.
- You should leave this valve open, when it is not raining.
- When it starts to rain, let the water flow off the roof and past the open-valve for a few minutes. This prevents the dust and dirt which may be on the roof entering your tank. Then close the valve and the water will flow into the tank.
- This will stop mosquitoes and other insects getting into the tank through the open end of the First Flush downpipe.

#### 4. Raise the tank and the tap of the ground

- Raise the tank off the ground by 20-30cm.
- Have the tap not at the very base of the tank, but 10-20cm above it. This prevents the tap from providing water from the very base of the tank, where debris might sink and collect.
- A draining tap can be put at the base of the tank to drain off any sediment collecting at the base of the tank.

#### 5. Use a spill collector

- Construct a small concrete trough under the tap, which collects the spilt water and channels it away from the tank. This will keep the area around the tank dry and clean.

## 6. Cleaning of the tank

- Clean the tank once a year. You will need to get inside the tank and scrub the walls. If you can afford bleach, then you can mix this with water to clean the tank.
- Keep the top of your tank clear from debris.

## 7. Fit an overflow pipe with a filter<sup>787</sup>

- Make sure your tank has an overflow pipe, so that when it is full it can fill a second tank or divert water to freshen your well. If the overflow pipe is open to the air (that is if it is not in the next tank) it should be fitted with a filter to prevent insects and small animals getting back into the tank.
- Make sure your tank will not be empty during the dry season: whilst it is important to ensure the water quality in your rainwater tank is of as good a quality as possible, if your tank goes dry you will not have any water at all.

Given the importance of rainwater to each household and the poor quality of most groundwater in the Maldives, it is



*A house with a good gutter.*

important that rainwater collection is maximized.

This can be done by:

- i) Adding a gutter to the entire roof area
- ii) Adding a second tank
- iii) Setting up communal tanks

## Teacher Resource Sheet 2

### How to clean your rainwater tank

Students should not be encouraged to clean their rainwater tank. An adult should be responsible for this task.

Remember to clean your water tank once a year.

You will need:

- Liquid chlorine (such as Dash or Janola) or chlorine tablets
- Buckets
- Brush
- Eye and hand protection (glasses, rubber gloves)

1. Drain any water in the tank to level at top. Transfer water to clean contaminant free storage or temporary vessel.
2. Add 1 bottle of bleach or x number of chlorine tablets to the remaining water in the tank.
3. Climb inside the tank. Using a brush thoroughly scrub the bottom and sides of the tank.
4. Remove the water and bleach solution with a bucket.
5. Refill the tank with rain water.
6. Leave the water to settle overnight before use.

### Disinfecting your rainwater tank

You should disinfect your tank only when one or more of the following situations are present:

- People are getting sick from drinking the water with sore stomachs and diarrhea.
  - Animal or human waste including bird droppings have entered the tank.
  - After tank repairs or maintenance where people have entered the tank.
  - The water has been tested and there is a known bacterial contamination
1. Calculate the volume of water in your tank.
  2. Add ½ bottle (125ml) of plain household grade unscented and uncolored bleach (with 4% active chlorine) to every 1000 litres of water currently in your tank.

<b>Amount of water in the tank</b>	<b>Amounts of bleach</b>
1000 litres	125 ml
2000 litres	250 ml
3000 litres	375 ml
Etc	Etc

3. Wait 24 hours after putting in the chlorine to allow enough time to disinfect the water before you drink it. Any chlorine smell and taste in the water will go away after a short time, if you find the taste of chlorine unacceptable boil the water for at least 5 minutes before drinking it.

## 5.5 Topic: Water contamination by faeces

### Learning Objectives:

- Students become aware of how water sources can be contaminated by faeces.
- Students can identify some diseases associated with drinking contaminated water.

### Grades: 1-5 (activity 1) 6-7 (activity 2)

### Time:

- Activity 1: 1 hour
- Activity 2: 1 hour

### Materials needed:

- Sheets of (white or brown) paper, felt-tipped pens, finger-paint or pencils in different colors, natural materials available near school or homes such as pebbles, twigs, sand/soil, an old tin, glue and scissors (optional), small cards or slips of paper, in two colors, a map of the island.
- Teacher Resource sheet 1- read to familiarize yourself with the background to the topic.

### Introduction

According to UNICEF (1999) one gram of faeces can contain 10, 000, 000 viruses, 1, 000, 000 bacteria, 1, 000 parasite cysts, 100 parasite eggs! Infectious diarrhoeas (including dysentery, cholera and typhoid) are caused by infectious agents like viruses, bacteria and parasites. These agents get into humans via the mouth and are passed out in faeces. So faeces is enemy no. 1! Ensuring that faecal material does not get into water supplies at the source is probably far more effective than boiling, filtering, and covering water tanks. We need to protect well water and rainwater from faecal contamination.

### What to do:

#### Activity 1: What's in your water?\*

This activity involves a role-play for the students to act out. Older children can make their own dramas. The play has the following acting parts:

- Aisha (a mother)
- A baby child

The role-play is set in an island where Aisha is washing the babies' clothes and some soiled nappies are lying on top

of the well. The nappy falls accidentally into the well. The soiled bed clothes are placed on top of the well and water from the soiled clothes is dripping into the well. Aisha is bathing the baby and the remaining dirty water in the dhani is going back into the well. Water gets spilt around the well, in the process of bathing the baby using the dhani. This water falls onto the ground and this infiltrates back into the well because there are cracks on the concrete floor near the well. Water used after washing causes puddles around the well and there is no proper drainage channel to direct water away from the well.

After the role play ask questions to help children to reflect critically on the role play presented. For example, ask the students to explain what some of the bad practices around the well were.

Explain that in the role play faeces entered the well water after washing soiled clothes. However the most common way faeces contaminate our well water is from leaking septic tanks. Briefly explain that septic tanks are enclosures that store and process wastes where no sewer system exists, such as in islands or on boats. Treatment of waste in septic tanks occurs by bacterial break down. The resulting material is called sludge.

Ask the children for local names of diseases that may be transmitted by drinking contaminated water. Link the story with an overview and explanation of the diseases that can come from drinking contaminated water. Depending on age, include official names, symptoms, transmission, prevention and treatment. Invite questions from all children to get them to understand how many diseases can result from contaminated water.

#### Activity 2: Where does it go?

In your school grounds investigate whether your well water may potentially be contaminated by faeces. As a class, walk into the school ground and locate your nearest well.

Write answers to the following questions;

- What is the well water used for (i.e drinking)?
- Does the well water smell or look unusual?
- How close is the nearest toilet or septic tank?
- How often is the septic tank sludge pumped out?
- Has anyone ever tested the quality of the well water?

*\*Adapted for the Maldives from activity 'What's in your water?' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.*

- Does sewage effluent discharge into the lagoon?
- Are there any effects of sewage being discharged into the lagoon?

Return to the classroom. Discuss the answers to the questions. Discuss with the students whether they think there is a possibility that their well water may be contaminated. Speak to the local Health Post about testing the well water.

## Conclusion:

Remind the students that water is essential for life, but that well water can become contaminated by faeces from nappies, soiled clothes or leaking septic tanks. If we drink contaminated water we can become sick. There are many diseases associated with drinking contaminated water. We must all be careful not to let faeces (human waste) enter our water supplies.

## Teacher Resource Sheet 1

### Water contamination by sewage (faeces)

According to UNICEF (1999) one gram of faeces can contain 10, 000, 000 viruses, 1, 000, 000 bacteria, 1, 000 parasite cysts, 100 parasite eggs! Infectious diarrhoeas (including dysentery, cholera and typhoid) are caused by infectious agents like viruses, bacteria and parasites. These agents get into humans via the mouth and are passed out in faeces. So faeces is enemy no. 1! Ensuring that faecal material does not get into water supplies at the source is probably far more effective than boiling, filtering, and covering water tanks (UNICEF, 1999).

### Septic Tanks

In the Maldives most houses have a septic tank to capture sewage (faeces) from the house. Septic tanks are enclosures that store and process wastes where no sewer system exists, such as in islands or on boats. Treatment of waste in septic tanks occurs by bacterial break down. The resulting material is called sludge.

### Contamination of water from septic tanks occurs under various conditions:

**Poor placement of septic leach fields** can feed partially treated waste water into a drinking water source. Leach fields are part of the septic system for land based tanks and include an area where waste water percolates through soil as part of the treatment process.

**Badly constructed percolation systems** may allow water to escape without proper treatment.

**System failure** can result in clogging and overflow to land or surface water.

Why are septic systems a problem?\*

In the islands it is particularly important to maintain your

septic system properly because soil and water conditions near shore may make the system less efficient in treating wastewater. Incomplete treatment can result in health risks for humans and water quality problems.

Potential health risks are the most serious concern related to failing septic systems. Hepatitis, dysentery, and other diseases may be spread by bacteria, viruses, and parasites in wastewater. These disease-causing organisms, called pathogens, may make nearshore water unsafe for recreation. Flies and mosquitoes that are attracted to and breed in wet areas where wastewater reaches the surface may also spread disease.

Inadequate treatment can also allow excess nutrients to reach your lagoon, promoting algae or weed growth. Algal blooms and abundant weeds not only make the lagoon unpleasant for swimming and boating, but they also affect water quality for fish and wildlife habitat. As plants die, settle to the bottom, and break down, they use up oxygen that fish need to survive.

Maintain the septic tank:

- **Discharge all sewage waste from the house into the septic tank.** Don't run wastewater from laundry or directly into the drain field as the detergent or soap scum will quickly clog soil pores and cause failure.
- **Do not add "starters" to your septic system.** Enough bacteria are available in the wastes flushed into the septic tank. Even after the tank has been pumped, enough bacteria will be provided when you use the system again.
- **Do not use additives in your system.** They are of no benefit and may harm the system. Additives that cause the accumulated sludge to increase in volume or float will result in sludge being flushed into the drainfield, plugging soil pores. Also, some additives, particularly degreasers, may be carcinogens that will flow into ground water with treated wastewater.

\*Teacher resource sheet information from <http://extoxnet.orst.edu/faqs/safedrink/sewage> and <http://www.extension.umn.edu/distribution/naturalresources/components/DD6946b>

- **Remove the manhole cover when having the tank pumped** to make sure that all solids have been removed. The sludge in the tank should be mixed during pumping. A tank cannot be adequately cleaned through a 4-inch inspection pipe. Pumping through the inspection port may clog the outlet baffle with scum and grease.

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## Teacher Resource Sheet 2

### Health risks from contaminated water

Well water is used by all households in the Maldives. Most communities use the well water for all non-drinking uses such as washing, bathing and toileting. Well water provides about 90% of the household water needs. Well water is therefore very important to the household.

Unfortunately, all surveys of well water show that well water is of worse quality than rainwater. It usually has about 100 times more bacteria in it and is 100 times more salty than rainwater. Some wells also contain contamination from septic tanks. Due to the presence of bacteria and other compounds from septic tank discharge it is always better to drink rainwater than well water.

If you drink well water that contains too much bacteria then it will make you sick, and give you diarrhoea and vomiting. This can lead to dehydration and for vulnerable people (children and the elderly) even death. When people get infected with diseases such as diarrhoea, typhoid and hepatitis A, their excreta will contain large amounts of the germs which cause the disease.

When people defecate in the open, flies will feed on the excreta and can carry excreta on their bodies. When they touch food excreta and germs are passed on the food. Where there are germs there is always a risk of disease. During the rainy season, excreta may be washed away by rainwater and can run into wells, thus contaminating the wells.

In many cultures it is believed that children's faeces are harmless and do not cause disease. This is not true. A child's faeces contain as many germs as an adult's, and it is very important to collect and dispose of children's faeces quickly and safely.

Many common diseases that can give diarrhoea can spread from one person to another. Disposing of excreta safely, preventing faecal contamination of water supplies and improving personal hygiene particularly hand washing with soap (at critical times such as after going to the toilet, before eating and food preparation) would greatly reduce spread of diseases significantly.

Water which is too salty will make you vomit, and may make your skin itchy and sore. Most well water in the Maldives is not too salty for drinking. Your health post may be able to test your well for salt. People can drink salty water with a conductivity reading up to 2,500  $\mu\text{S}/\text{cm}$ . (WHO guidelines suggest a maximum Chloride content of 250 mg/l for potable uses which equates to a salinity of approximately 1,500  $\mu\text{S}/\text{cm}$ . However experience in other small island states confirms whilst this is desirable, a more realistic limit is 2,500  $\mu\text{S}/\text{cm}$ .)

### Waterborne diseases

We are often unaware of how unsafe our water supplies can be to our health. There are five broad categories of water related diseases:

Group 1: Water-borne infections e.g. cholera, typhoid and hepatitis.

Group 2: Water-shortage diseases e.g. skin infections, trachoma.

Group 3: Water-impounding diseases e.g. schistosomiasis, guinea worm.

Group 4: Water-arthropod diseases e.g. malaria, dengue fever

Group 5: Chemical contaminants in excess or shortage e.g. fluoride.

Some examples of water related diseases common in the Maldives:

### Typhoid

Typhoid is an infection of the intestinal tract and bloodstream caused by bacteria. Clean water, hygiene, and good sanitation prevent the spread of typhoid. Contaminated water is a major reason for the spread of the disease. People become infected after eating food or drinking beverages that have been handled by a person who is infected or by drinking water that has been contaminated by sewage containing the bacteria. Typhoid is common in the Maldives, principally because of the problem of unsafe drinking-water and inadequate sewage disposal.



*Drinking contaminated well water can make you sick.*

## **Diarrhoea**

Diarrhoea is the passage of loose or liquid stools more frequently than is normal for the individual. It is primarily a symptom of gastrointestinal infection. Depending on the type of infection, the diarrhoea may be watery (for example in cholera) or passed with blood (for example in dysentery). Severe diarrhoea may be life threatening due to fluid loss in watery diarrhoea, particularly in infants and young children, the malnourished and people with impaired immunity.

Diarrhoea is a symptom of infection caused by a host of bacterial, viral and parasitic organisms most of which can be spread by contaminated water. It is more common when there is a shortage of clean water for drinking, cooking and cleaning and basic hygiene is important in prevention. Water contaminated with human faeces for example from municipal sewage, septic tanks and latrines is of special concern. Diarrhoea can also spread from person to person, aggravated by poor personal hygiene. Water can contaminate food during irrigation, and fish and seafood from polluted water may also contribute to the disease.

For the reduction of diarrhoea, proper sanitation facilities have to be used. Another aspect that should be looked at is food safety and personal hygiene. (Health Master Plan 1996 – 2005)

## **Cholera**

Cholera (also called Asiatic cholera) is a water-borne disease caused by the bacterium *Vibrio cholerae*, which is typically ingested by drinking contaminated water, or by eating improperly cooked fish, especially shellfish. The infection is often mild or without symptoms, but sometimes it can be severe. It has a short incubation period, from less than one day to five days, and produces an enterotoxin that causes a copious, painless, watery diarrhoea that can quickly lead to severe dehydration. Approximately one in 20 infected persons has severe disease characterized by profuse watery diarrhoea, vomiting, and leg cramps. In these persons, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours.

Most persons infected with *V. cholerae* do not become ill, although the bacterium is present in their faeces for 7-14 days. When illness does occur, more than 90% of episodes are of mild or moderate severity and are difficult to distinguish clinically from other types of acute diarrhoea. Less than 10% of ill persons develop typical cholera with signs of moderate or severe dehydration.





*Mosquitoes can breed in water around the house.*

## **Hepatitis A**

Hepatitis A is an enterovirus and can be transmitted through contaminated food and water. It causes an acute form of hepatitis (inflammation of the liver), does not have a chronic stage, and will not cause any permanent damage to the liver. Young children who catch hepatitis A often have a milder form of the disease, usually lasting from 1-3 weeks, whereas adults tend to experience a much more severe form of the disease. They are often confined to bed and minimal activity for about 4 weeks and have to stop their work for from one to three months or longer. Many adults take up to 6-12 months and occasionally longer to recover entirely.

## **Skin problems**

There can also be skin problems due to high salinity levels.

## **Worm infestations**

Worm infestations are an area of concern. Intestinal parasite not only result in diarrhoea but may also be one of the causes of the high level of anaemia in the country. A survey conducted in 1992, showed that in Laamu Atoll, 68% of children under 3 years of age were suffering from worm infestations. This was mostly ascaris, trichuris and hookworms. Recent estimates indicate 50-75% of children below 5 years of age to be affected by intestinal parasites.



To combat the high worm infestation existing in the country, there have been recent efforts at providing children with worm treatment. In Faafu, Laamu and Vaavu atolls, all children under five were provided with worm treatment. While this form of intervention does temporarily improve the situation, unless the sanitation situation is improved, hand in hand with mass deworming, there will not be a significant reduction in worm infestation, as those who carry worms in their system will expel them in their faeces, and these get ingested through contaminated food and water, infecting others and thereby continuing the cycle.

The programmes implemented for the control of worm infestations have relied mainly on the deworming of children below 5 or 3 years of age. While this alleviates the problem to some extent, the lack of adequate attention to sanitation and also education in the area of personal hygiene means the situation will not be sustained. Future interventions should, therefore, integrate deworming with the provision of sanitation facilities and must go hand in hand with effective education. (Health Master Plan 1996 – 2005)

### **Diseases spread by mosquitoes**

Mosquitoes are a nuisance in most islands. This also gives way to the breeding of mosquitoes transmitting dengue and other diseases. There are several islands where the mosquito population is so dense that it is impossible to stay outdoors after it is dark. An integrated approach to mosquito control combining chemical, biological and environmental strategies need to be implemented in a phased manner to eliminate mosquito breeding in at least those islands where the mosquito density is extremely high. (Health Master Plan, 1996 – 2005).

### **Dengue Fever**

Dengue is the most common mosquito-borne viral disease of humans that in recent years has become a major international public health concern. Globally, 2.5 billion people live in areas where dengue viruses can be transmitted.

Dengue fever is endemic in the Maldives, though no clear-cut epidemic pattern has been identified. *Aedes aegypti* and *Aedes albopictus*, the main vectors for the disease, are widespread in the country. The first cases of dengue were identified in 1979. Following this, in 1988 a major epidemic of dengue hemorrhagic fever occurred with more than 200 cases and 9 deaths. Since then there have been no major outbreaks, although sporadic cases have been reported. However, in the last three to four years dengue fever (DF) and dengue haemorrhagic fever (DHF) has been identified. In 2003, 38 cases of DF/DHF were reported and in year 2002, 27 cases of DF/DHF were notified compared to 180 and 73 cases in 2000 and 2001 respectively. There is a consistency seen in the incidence of DF/DHF where the highest incidence rates are seen during the months of June and July where the country experience monsoonal rains. On average, 17 cases of DF/DHF were reported in June during the 2000-2003 period and about 11 cases were reported in May and July during the same period.

### **Quick facts about Dengue fever**

Dengue is a flu-like viral disease spread by the bite of infected mosquitoes. Dengue hemorrhagic fever is a severe, often fatal, complication of dengue.

Prevention from Dengue centres on avoiding mosquito bites in areas where dengue occurs or might occur and eliminating breeding sites.

The mosquitoes that transmit dengue live among humans and breed in discarded tires, flower pots, old oil drums, and water storage containers close to human dwellings. Unlike the mosquitoes that cause malaria, dengue mosquitoes bite during the day.

Dengue fever usually starts suddenly with a high fever, rash, severe headache, pain behind the eyes, and muscle and joint pain. The severity of the joint pain has given dengue the name “breakbone fever.” Nausea, vomiting, and loss of appetite are common.

Most dengue infections result in relatively mild illness, but some can progress to dengue hemorrhagic fever. With dengue hemorrhagic fever, the blood vessels start to leak and cause bleeding from the nose, mouth, and gums. Bruising can be a sign of bleeding inside the body. Without prompt treatment, the blood vessels can collapse, causing shock (dengue shock syndrome). Dengue hemorrhagic fever is fatal in about 5 percent of cases, mostly among children and young adults.

There is no specific treatment for dengue. Persons with dengue fever should rest and drink plenty of fluids. They should be kept away from mosquitoes for the protection of others. Dengue hemorrhagic fever is treated by replacing lost fluids. Some patients need transfusions to control bleeding.

### **Chikungunya**

Chikungunya is a virus spread by mosquitoes. The symptoms of Chikungunya (also called as Chicken Guinea) include fever, which can reach 39°C, (102.2 °F), a rash usually involving the limbs and trunk, and arthritis affecting multiple joints which can be unbearable. There can also be headache, conjunctival infection and slight sensitivity to light. Fever typically lasts for two days and abruptly comes down, however joint pain, intense headache, insomnia and an extreme degree of prostration lasts for a variable period.

The mosquito species that transmits the Chikungunya virus is the *Aedes albopictus*, commonly known as the Asian tiger mosquito or forest mosquito. There being no vaccine or preventive drug for chikungunya at present, the best way to avoid the infection is to control the mosquito population in the island and prevent mosquito bites.

## 5.6 Topic: Water collection methods, storage and handling

### Learning Objectives:

- Students understand the possible sources of contamination if water is not collected or stored safely.

### Grades: 1-5 (activity 1-3) 6-7 (activity 4)

### Time:

- Activity 1: 30 minutes
- Activity 2: 1 hour
- Activity 3: 1 hour
- Activity 4: 1 hour after school, then 1 hour in class

### Materials needed:

- Teacher Resource Sheet 1– read to familiarize yourself with the background to the topic.
- Super fenfulhi puppet.
- Cards or slips of paper.
- Student Worksheet 1 – Safe and unsafe practices chart

### Introduction:

When rain falls it is very clean and contains no bacteria and very little salt. But when we collect water, we can accidentally contaminate our drinking water by using bad water collection practices. For example we can use a dirty water collection container, leave the lid of the container off or touch the water with unclean hands. By doing these things germs from surfaces or on our hands can move into our drinking water. So when we drink it we may become ill.

### What to do:

#### Activity 1: Super fenfulhi story\*

Use the Super fenfulhi puppet to tell the story about a typical unsafe way of locally storing and drawing water.

Once upon a time there was a beautiful green island called Kanakuri with very happy people. It was the dry season and there was a lot of work to be done. In one of the homes there lived a very beautiful lady called Amina who used to be the beauty of the village. She was married at the very young and tender age of thirteen to a much older man called Aboo Bakuru. He did not want her to go to secondary school because he was not educated himself and saw no



*Puppets can be used to tell stories.*

purpose in it. He also felt that there was too much work to do around the house and on his agricultural plot.

One day, as many other days during the dry season, Amina returns from collecting fire wood at 7.00 o'clock to prepare morning breakfast. Her husband is waiting outside the house impatiently. He demands that she gets him breakfast before he goes to work in the plot. However there was no flour in the house and he asks Amina to go to the shop and get the flour. Although Amina is tired from her work, she obeys him and leaves the homestead. While Aboo Bakuru is sitting under the tree waiting for Amina to come back his five-year-old son wakes up and asks him for a cup of water. Aboo Bakuru goes to the bandiyaa and removes the lid. He draws water using an old, dirty tin. His son drinks the water and gives back the tin. Aboo Bakuru puts the tin back into the bandiyaa. He does not bother to replace the lid on the bandiyaa. Half an hour later two neighbors come to his home to discuss the election of the local island council. They are interested in gaining Aboo Bakuru's support. As they look for chairs they ask him, "Where is the tea in this house?" Aboo Bakuru quickly explains that his wife is away but he can offer them some water.

As they follow him to the bandiyaa, they notice that there is no lid. Aboo Bakuru puts his hand in the bandiya to get the tin. At that moment, he feels something move and it is not the tin! To the astonishment of Aboo Bakuru and his guests a big brown rat runs over his arm and drops with a thud

\* Activity 1- Adapted for the Maldives from activity 'What a surprise' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

\* Activity 2-Adapted for the Maldives from activity 'Yoopy Scoopy' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

to the ground. The men fall silent as Aboo Bakuru tries to behave as if nothing has happened! The aspiring health worker turns to Aboo Bakuru and says, “What is wrong with you - do you not know how to store your water safely?”

- After reading the story, ask questions to help the children think critically about the story, for example:
  - Was there a difference in the work and responsibilities of Amina and Aboo Bakuru?
  - How would you have gone about the water storage and handling the situation if you were Aboo Bakuru?
- Ask the children to think about how their drinking water is stored at home.
- Draw two columns on the board labelled ‘safe’ and ‘unsafe’. In the one labelled ‘safe’ write the safe methods. In the ‘unsafe’ column, write down the unsafe methods (or ask the children to do this).
- Ask the children to copy the two lists in their books and take the lists back home to discuss.

### Activity 2: Water containers\*

- For the younger students, prepare drawings of different implements used locally to store and draw drinking water, e.g. a drum, a pot, a bucket, a bottle, a can, a filter, a ladle, a dipper, a jar, a tin, a cup, a glass, a bandiyaa, a dhani. Include the items used in school.
- Also prepare cards or slips of paper with the names of the implements.
- Lay out the drawings on the floor.
- Now ask the children to group the drawings into storage vessels and drawing vessels.
- Put the name cards under the drawings or ask the children to do so. Older children may write and place the cards themselves.
- For older children, or for younger children when they know the words, mix up the drawings and/or name cards and ask groups of children to regroup them.
- Ask the children to identify which types of water storage vessels/water drawing utensils are safer and less safe and give reasons for their choices. This can also be done as a sorting game, by ordering them into less safe and safer, or from worst to best.
- Ask the children to make a drawing of their water storage and drawing utensils at home and bring it to school.
- Facilitate a discussion on which utensils are safer and less safe.



*Water can be transported in many containers.*

### Activity 3: What’s in your water?\*

This activity involves a role-play for the students to act out. Older children can make their own dramas. The play has the following acting parts:

- Kadhdhaitha (or any other locally appropriate name)
- One elderly man
- A thirsty and tired football player
- A husband
- A baby child

The role-play is set in an island where the Mosque well is located one kilometer from Kaidhdhaatha’s house. Kaidhdhaatha travels with a Bandiyaa without a cover to collect water. When she reaches the well, she draws the water into her Bandiyaa with a dhani. She does not clean the Bandiyaa first. When Kadhdhaitha arrived near the well a crow was sitting on the dhani and it had defecated on the dhani. The dhani had not been cleaned and was lying on the floor near the well. Khadhdaitha shooed away the crow and filled the bandiyaa with water using the dhani. In the meantime one gentleman is performing the ablution and pauses to blow his nose into his fingers. He stares at the contents in his hands, makes a face and mumbling under his breath proceeds to throw away the contents and some lands inside the bandiyaa. He then walks into the mosque.

Kaidhdhaatha has filled her bandiyaa. She goes on her way home. On the way, she meets Ahmed who is returning from a football match and is very thirsty and asks her for some water. Kaidhdhaatha gives him some water from her bandiyaa. Ahmed walks on. After some time he is violently sick. Kaidhdhaatha continues home and serves the water to her husband and the little baby at home to drink. She also

\* Activity 3 - Adapted for the Maldives from activity ‘What’s in your water?’ in IRC (2005) ‘The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment’ IRC Water and Sanitation Center.

drinks herself. Some time later the baby, her husband and she herself are unwell.

After the role play ask questions to help children to reflect critically on the role plays presented. For example, ask the students to explain what some of the bad practices were. Ask the students to explain why the people in the role play became sick?

#### Activity 4: Observing collection practices

Ask the children to accompany their parents in the process of water collection from the nearest well or rainwater tank. Tell them to observe good and bad practices. Ask older children (10-14 years) to do a simple observational survey in groups at the island mosque well.

They can, for example, list answers for the first five users:

- the types of container;
  - the sex of the persons collecting;
  - the perceived age groups of the persons collecting (agree in advance how to divide age groups);
  - whether the collectors rinsed the container before filling;
  - whether they washed hands or not;
  - whether their hands touch the water during transport or not.
- In class, help the children enter their observations into an overall table (example below).
  - Use the assignment to facilitate a group analysis and draw conclusions on the characteristics of water collectors and safe and risky collection behaviors. Some sample questions:
    - What type of persons did you see most often collecting water?
    - What may that mean for the lives of these persons?



- Did most collectors use safe practices? What do you see in the table?
- What kind of person(s) used safe practices?
- What do you conclude about hygienic water collection in your island?
- Do the observations give the true picture or may it be different at other times?
- What could the users have done better?
- Ask the children to work out, individually or in small groups, the totals of safe and unsafe water practices for each group and write these down on Student Work sheet 1.

#### Conclusion:

Remind students that keeping water as clean as possible, is very important. When rain falls it is very clean and contains no bacteria and very little salt. But by using bad water collection or storage practices we can contaminate our water supplies. So it is important to collect and store drinking water safely. Otherwise we can become sick.

#### Filled in sample chart

No of persons	Male	Female	Child	Adolescent	Adult	Elderly	Rinse (v or x)	Leaves (v or x)	Touch (v or x)
1	X				x	X			x
2		X		X	x	X		x	x
3			X				X		
4	X	X		X	x		X		
5			X						

# Teacher Resource Sheet 1

## Safe household water collection and storage\*

Regardless of whether or not collected household water is initially of drinking water quality, it often becomes contaminated with pathogens during transport and storage due to unhygienic storage and handling practices.

### Collection

Since ancient times, water for household use is collected by a variety of physical methods ranging from manual (e.g., dipping), to passive (e.g., roof catchments and diversions) to mechanical (e.g., pumps), and it is stored in a variety of containers. In developing countries, many of the traditional types of water collection and storage methods employing vessels of various compositions and sizes are still widely used today. These include traditional pots or urns fashioned from natural materials (e.g., gourds or wood) or fabricated from clay, copper, brass and other impervious materials, and flexible bags or other vessels made of animal hides, other animal parts or fabrics treated to seal and prevent leakage. Today, other metals, including aluminum, steel and iron, as well as other materials, primarily plastics, have come into widespread use for water collection and storage in the form of buckets, jerry cans, picnic coolers and other vessel types and shapes. Cisterns and other basins are also still widely used for water collection and bulk storage near or adjacent to dwellings, as they have been since ancient times.

### Storage

Higher levels of microbial contamination and decreased microbial quality are associated with storage vessels having wide openings (e.g., buckets and pots), vulnerability to introduction of hands, cups and dippers that can carry fecal contamination, and lack of a narrow opening for dispensing water. Studies show that the use of containers with narrow openings for filling, and dispensing devices such as spouts or taps/spigots, protect the collected water during storage and household use. Improved containers protect stored household water from the introduction of microbial contaminants via contact with hands, dippers, other fecally contaminated vehicles or the intrusion of vectors.

The most desirable water storage vessels for many household treatment and storage options are: (1) between 10-25 liters capacity, rectangular or cylindrical with one or more handles and flat bottoms for portability and ease of storage, (2) made of lightweight, oxidation-resistant plastic, such as high-density polyethylene or polypropylene, for durability and shock resistance, (3) fitted with a 6-9 cm screw-cap opening to facilitate cleaning, but small enough to discourage or prevent the introduction of hands or dipping utensils, (4) fitted with a durable, protected and easily closed spigot or spout for dispensing water, and (5) provided with pictorial and/or written instructions for use affixed permanently to the container, as well as an affixed certificate of approval or authenticity. The cost of water storage vessels is also an important consideration, as they must be affordable or be subsidized. Locally available buckets, pots, urns, jerry cans, barrels, used beverage containers and flexible bags and flagons are usually low in cost and readily available. However, only some of these, in particular jerry cans, some plastic beverage containers, some urns and some flexible vessels, have properties and characteristics that are preferred or desirable as readily transported water storage vessels. Others, such as some buckets, cooking pots, some plastic beverage containers and other cylindrical vessels are less desirable for household water storage, but may be suitable for water collection and transport, especially if they are lightweight, have protective lids and are composed of easily cleaned materials (e.g., plastics).

Other factors contributing to greater risks of microbial contamination of stored water are higher temperatures, increased storage times, higher levels of airborne particulates (dust storms) and inadequate hand washing.

\* Teacher resource sheet information from [http://www.who.int/household\\_water/en/](http://www.who.int/household_water/en/)

# Student Work Sheet 1

## Safe and unsafe practices chart

After observing water collection practices record on the chart.

No of persons	Male	Female	Child	Adolescent	Adult	Elderly	Rinse (v or x)	Leaves (v or x)	Touch (v or x)
1									
2									
3									
4									
5									

## 5.7 Topic: Water treatment

### Learning Objectives:

- Students can explain how water can be purified.
- Students can indicate (and older children can explain) the relative effectiveness of the different methods.

### Grades: 5-7

### Time:

- Activity 1: 1 hour
- Activity 2: 1 hour

### Materials needed:

- A clean, white cloth, a clean plastic bottle, a knife, a small piece of wire mesh, coarse pebbles, coarse sand, fine sand, a transparent container, a jar with water which is muddy and contains parts of vegetation and possibly insects.
- Teacher Resource Sheets 1 and 2- read to familiarise yourself with the background to the topic.

### Introduction:

Water directly from an unsafe source is totally unsafe and can make you sick. Water can be treated to improve the water quality. There are a number of ways to treat water. Boiling, if done for at least ten minutes but possible twenty minutes, is safest. This is followed by slow sand filtration, chlorination and solar disinfection. Boiling, chlorine and strong sunlight all kill bacteria. Slow sand filters form killer bacteria which 'attack and eat' other bacteria that are harmful to health. Filtering through a cloth is least safe. The cloth filters the large bits of dirt, but does not attack and kill bacteria. Some are small enough to slip through the threads of the cloth.

### What to do:

#### Activity 1: Cleaning the flow\*

- Ask some students to take a clean white cloth and show it to the class.
- Ask them to place the cloth over an empty container and tie it firmly around the opening.
- Explain to the class where the water comes from (muddy water containing vegetation etc). Ask the students to pour it through the cloth. Ask them to describe what they see on the cloth.
- Ask them to loosen the cloth and hold it, and the container, up against the light for the class to see. Ask the other students to describe what they see and to discuss what may, and may not be retained by the cloth.



#### Activity 2: Filtration for purifying water

##### Sand filter

- Make a sand filter in advance for the younger children or help older children to make their own sand filter.
- Cut the bottom off a clean and clear plastic bottle. Cut out a circle of fine mesh to make a wire screen large enough to block off the neck of the bottle. Put the screen inside the bottle so that it is firmly lodged halfway down its neck.
- Put a layer of coarse pebbles on top of the screen, then a layer of coarse sand, and finally a layer of fine sand. Pour some dirty water into the bottle and let it soak through.
- Ask the children to observe the color of the water that drops into the bottle.
- Explain that the sand traps germs, but that over time it gets clogged by the particles of dirt. It needs to be taken out of the filter and cleaned or replaced every few weeks. Replace it when the water trickles more slowly or stops flowing altogether.



## Purification using ultraviolet rays

- Get a transparent bottle and fill it with water and close the container.
- Lay the bottle horizontally in strong sunlight on a flat surface. The process is even more effective if the bottom half of the bottle is painted black or placed on a black sheet of plastic that absorbs more heat thus helping to kill more microbes.

Ask the children to discuss which of the different ways of cleaning water they found easiest to use.

Ask them if they know other methods to purify water and how water is made 'safe and clean' in their homes.

Ask them to explain each method orally or in writing and to

identify which methods are safer and which are less safe or unsafe. Younger children can make three piles (safe, less safe and unsafe). Ask older children to do a full ranking. Ask them to explain why some methods are safe and others not.

## Conclusion:

Remind students that drinking water from an unsafe source may make them sick and that there are ways to treat water to improve the water quality. Boiling for 20 minutes is the safest method.

*Adapted for the Maldives from activity 'Filtering the flow' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.*

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## Teacher Resource Sheet 1

### Water treatment options

- Boiling, if done for at least ten minutes but if possible 20, is safest.
- This is followed by slow sand filtration, chlorination and solar disinfection. Boiling, chlorine and strong sunlight all kill bacteria. Slow sand filters form killer bacteria which 'attack and eat' other bacteria that are harmful to health.
- Filtering through a cloth is least safe. The cloth filters the large bits of dirt, but does not attack and kill bacteria. Some are small enough to slip through the threads of the cloth. To illustrate this, draw a diagram of a woven cloth.
- Alum and certain seeds clarify water but do not kill bacteria.
- Water directly from an unsafe source is totally unsafe.



## Teacher Resource Sheet 2

### Plastics Can Help Make Safe Drinking Water Available Worldwide\*

It seems like everyone carries a bottle of water around, but the luxury of readily available bottled water is something that not everyone in the world has access to. More than one billion people worldwide drink unsafe water and nearly 3.5 million people, mainly children, die every year from drinking microbe-contaminated water. But that empty plastic water bottle could help make drinkable water more widely available.

In an effort to make safe drinking water more accessible, the World Health Organization is promoting an inexpensive and simple method of water purification using sunlight and soft drink bottles. SODIS or Solar Water Disinfection, requires only sunlight, empty plastic soft drink bottles and a black surface. Invented by the Swiss in 1991, it was tested in Columbia, Bolivia, Togo, Burkina Faso, Indonesia, Thailand and China where it was found to be highly effective in eliminating water-borne pathogens such as cholera.

*\*Student resource sheet information adapted from [http://www.americanplasticscouncil.org/benefits/in\\_your\\_life/pop/power\\_plastics\\_june01](http://www.americanplasticscouncil.org/benefits/in_your_life/pop/power_plastics_june01)*

The bottles are filled with water and placed horizontally on a flat surface for about five hours in full sunlight where the ultraviolet radiation kills most microorganisms. The process is even more effective if the bottom half of the bottle is painted black or placed on a black sheet of plastic that absorbs more heat thus helping to kill more microbes.

SODIS does have its limitations. While it will reduce the amount of microbial contaminants in water, it will not purify chemically contaminated water. SODIS is not useful for treating large volumes of water, but is more suited to household use since an adequate supply of water can be generated with a few bottles. Lastly, SODIS requires about five hours of full sunlight to effectively kill microbes and if it is a cloudy day, the process could take as long as two days.

Improved water quality can help prevent disease and preventing disease can help alleviate poverty. The more than one billion people without access to adequate water resources are among the poorest in the world, so inexpensive and easy water purification systems like SODIS can be a significant improvement in overall health and well-being.

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## 5.8 Topic: Water use and reuse in the home

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### Learning Objectives:

- Students can demonstrate different water uses at home.
- Students understand the importance of conserving water.

### Grades: 5-7

### Time:

- Activity 1: 30 minutes per day for 3 days and then 1 hour
- Activity 2: 2 hours

### Materials needed:

- A map of the island and notebooks.
- Teacher Resource Sheet 1– read to familiarize yourself with the background to the topic.
- Student work sheets 1 and 2 (activity 1)

### Introduction:

Start by discussing with students about the multiple uses of water at home and school. We all use water in many ways that include drinking, bathing, washing and watering our

gardens, but water is a limited resource. That is why it is important that we all find ways to conserve water every day in every way. Children play an important role in making sure that every drop counts and there are things you can do to help your family save water. If everyone saves a little we can save a lot.

### What to do:

- Explore the nature of water consumption in your community.
- What do you use water for? Name the things you do with water.
- Do you know how much water you consume in a day? Make an educated guess of the quantity and then attempt to measure the amount used.

### Activity 1: My water usage

Using Student Work Sheets 1 and 2 ask the students monitor their drinking water use over a period of three days and calculate the average use. The work sheets can be adapted according to age level, and more complicated mathematical calculations can be undertaken, such as

the drinking water use over a week, month or year, for the family, the classroom and the whole island community. Ask the students whether they are surprised by the results?

## Activity 2: Water use on my island

Divide the students into groups and allocate the groups to different sections of the island. In groups, students walk around the community in different locations of the island and identify ways in which people use water. Then in groups, students visit 4 houses in different locations of the island.

Answer the following questions;

- Section of island (from the island map / or ward name)
- What water sources does the household use (well water/ rainwater)?
- How do they collect the water (e.g. pump, water containers)?
- How much water do they use each day?
- What household activities use the most water?

- Do they ever run out of water?

Return to the classroom and each group can present their findings to the class. Summaries of the data collected should be listed in columns on the board. From the data ask the students follow up questions:

The key questions to be discussed then are:

- What activities use the most amount of water?
- How could practices be improved so that water is not wasted?
- How do we make sure we have enough water now and in the future?

## Conclusion:

Everyone needs water. We know that without water - we are in trouble! Water is essential to life. Water is a primary/ essential substance on earth and is needed by everyone and everything to live. Water is essential - life is water - water is life. So we need to protect water and use it wisely!



# Teacher Resource Sheet 1

## Saving water

Water covers two thirds of the planet, but only 2.5% of that amount is fresh water. Most of that is locked into ice caps and glaciers, leaving only 0.08% of the earth's water available for human use. Water must be used wisely if there is to be enough to meet the needs of future generations. Awareness about the amount of water used in everyday tasks is the first step in developing a responsible approach to water use. Alternative ways of carrying out day to day tasks using less water can then be explored.

In the Maldives, the Maldives Water and Sanitation Company is responsible for the treatment and distribution of desalinated water to Male', Villingili and Hulhumale' for public consumption. In the islands, the island communities have their own sources of drinking water, such as wells and rainwater tanks. Unlike in Male' (MWSC) the island communities do not have experts regularly checking the water's quality. Wastewater is not treated nor used for any purpose.

## How we use water

We all use water in many ways that includes drinking, bathing, washing and watering our gardens, but water is a limited resource. That is why it is important that we all find ways to conserve water every day in every way. Children play an important role in making sure that every drop counts and there are things you can do to help your family save water. If everyone saves a little we can save a lot.

Some water facts:

- Cooking a meal uses around 10 litres of water.
- Washing dishes in a sink uses about 9 litres of water.
- Washing clothes by hand can use up to 60 litres, washing machines can use 155 litres per cycle.
- A 2 minute shower can use 30 litres of water.
- Flushing a toilet needs 11 litres of water.

## Saving water makes good sense

The average person uses 190 liters of water a day. If you obtain water from a public water supply, your water bill lets you know that each drop wasted costs you money. Those of us who get our water from private wells are concerned about wells going dry. These simple tips can help us all save money and preserve precious water supplies.

## What you can do at home to save water

### Bathroom

- Turn the tap off when you brush your teeth. If you brush your teeth twice a day, for two minutes each time, and leave the tap running, you could be wasting around 12 litres (or just over a bucket) of water a day. That's over 4,300 litres per person, per year.
- Reduce your showering time. Every minute you cut from your shower time could save up to nine litres of water if you have a water-efficient showerhead, and up to 20 litres if you have an older style, conventional showerhead.
- Use the half flush option when possible on dual flush toilets.
- Install a displacement device in the cistern (tank) of single flush toilets, as it can save you a litre of water every flush. You can do this by removing the lid of your cistern and carefully placing a one litre sealed plastic bottle filled with pebbles and water inside in a way that won't interfere with the flushing mechanism.
- Check for toilet leaks by placing a few drops of biodegradable food coloring into the cistern, and wait for 30 minutes. If you have a leaking toilet, you will see colored water in the toilet bowl and need to contact a plumber. A slow, barely visible leak into your toilet bowl can waste more than 4,000 liters of water a year. Visible, constant leaks (with a hissing sound) can waste 95,000 liters a year.

### Laundry

About 13 per cent of household water is used in the laundry. Conventional top loading washing machines use an average of 120 to 150 litres of water each load. Wash only full loads of dishes and laundry. Reduce the number of washing loads in a week and save water by combining smaller loads and only washing when you have a full load.

- Adjust the water level to suit the size of your load and use the economy cycle, if your machine has one.
- If you are buying a new washing machine, choose a water-efficient model with a water conservation rating of AAA (or greater). Front loading machines and some water efficient top loaders will save approximately 50 litres of water per load. They are also gentler on your clothes and require less detergent.

### Kitchen

- Rinse vegetables in a full sink or bucket of water.
- Rinse dishes in a full sink or pan of water.



### What you can do outdoors to save water

- Use mulch around shrubs and garden plants to save soil moisture and reduce evaporation.

*Apply organic mulches 4 inches deep to keep plants roots cool, prevent soil crusting, minimize evaporation, and reduce weed growth. Night-time watering minimizes evaporation.*

- If your community practices watering, water gardens on alternate evenings instead of every day. *Water your garden early in the morning or late in evening. Don't water on cool, rainy or windy days.*
- Plant drought-tolerant or low water-use plants and grasses.
- Use a bucket instead of a hose to wash your vehicle.

### Tips on safeguarding water

- All of us need clean water to drink. We can go for weeks without food, but only days without water. Contaminated water can be a threat to anyone's health, but especially to young children.
- Use Household Products Properly: BE CAREFUL...Many things around the home like paint or cleaners can harm you and cause water pollution if they are not handled and disposed of properly.

- Care for Your Garden: Everyone needs to use fertilizers carefully. If too much fertilizer is used, the fertilizer can wash into streams and cause water pollution.
- Plant Trees and Shrubs: Trees and shrubs help prevent water pollution by soaking up extra fertilizer (nutrients).
- Plants also prevent erosion by keeping the soil where it belongs – on the land and out of the water.
- Control Bugs Carefully: Not all bugs are bad. It's important to read labels and follow directions when using pesticides (bug sprays). Some pesticides can cause water pollution and even kill friendly insects like ladybugs. Staff at your local Health Centre or other relevant authority can teach your family safe, new ways to control pests.
- Control Rainwater: When lots of rain falls on hard surfaces like paved sidewalks and streets it can run off carrying leaves, waste and car oil into drains. The drains eventually seep into the water lens causing water pollution.

# Student Work Sheet 1

Uses of water at home: record how much water is used at home.

Activity (use in litres)	Number of times a day	Total water used in litres	Water quality	How can water consumption be reduced? Can the used water be reused? How?
Cooking main meal (10 l)				
Other meals				
Drinking (0.25 l per glass)				
Washing dishes in a sink (9 l)				
Washing clothes (how many?) by hand (60 l)				
Washing with washing machine each cycle (155 l)				
8 minute shower (120 l)				
Cleaning teeth with tap running (5 l)				
Cleaning teeth if tap is turned off (1 l)				
Flushing of toilet (11 l)				
Gardening				
Other, for example play or: _____				
TOTALS				

## Student Work Sheet 2

What do we use drinking water for and how much.  
Record how much drinking water is used and what for

	Date:		Date:		Date:	
	Number of times	litres used	Number of times	litres used	Number of times	litres used
Cooking						
Drinking (yourself)						
-----						
-----						
		Total:		Total:		Total:
Average liters of water used per day:						



# 6

## PARTICIPATORY ACTIVITIES AND TOOLS: ENVIRONMENTAL HYGIENE

### Introduction

The purpose of this chapter is to develop the students' understanding of the link between environmental hygiene at their school and on their island and their health.

### Learning objectives

The objectives of the chapter are to:

- Foster knowledge and awareness of issues about environmental hygiene on their island
- Link classroom activities to our student's community and environment

### Overview of topics

- Cleanliness of foot paths, play areas and roads
- Good waste management
- WASH snakes and ladders board game



## 6.1 Topic: Cleanliness of foot paths, play area and roads

### Learning Objectives:

- Students understand the effects of littering, on the environment and our health.
- Students understand the need to keep footpaths, play areas and roads clean.

### Grades: 3-7

### Time:

- Activity 1: 1 hour

### Materials needed:

- Teacher Resource Sheet 1 – read to familiarize yourself with the background to the topic.

### Introduction:

Start by explaining to students that litter is any type thrown where it does not belong. Whenever waste is not properly disposed of, it is considered litter. Litter is an important environmental issue that is very easy to see around us. Litter can be anything, from plastic bottles, drink cans, crisp packets, chewing gum or even old machines or furniture thrown in the ocean! The most common types of litter are sweet wrappers, drinks cans, plastic drink bottles and fast food wrappers. Litter does not look nice and also can affect our health:

- Litter attracts vermin and is a breeding ground for bacteria plus mosquitoes.
- Litter can pose a threat to public health e.g. broken glass and syringes or hazardous materials can be a health hazard in public places

### What to do:

#### Activity 1: Litter walk\*

Draw a map of your school and then take an environmental walk with the children.

1. List the kinds of litter you see
2. Record the numbers of each kind of rubbish. What is the most common?
3. Where does this waste come from? How did it get here?
4. What are the consequences of rubbish in the schoolyard?



6. Who should be responsible for keeping the school clean?
7. What actions can you and your school take to ensure the school is kept clean?
8. Go back into the class and look again at the map you drew. Each group should mark on the map the locations where most waste was found.

Explain that it is necessary to first understand what litter is being produced so that you can develop a suitable litter management plan. If you don't know what litter there is how will you know how to manage it?

- Back in the classroom, ask the students to think of the effects of litter on the environment, health and livelihoods. Write a list on the board.
- Ask the students to draw a poster showing the effects of litter that can be displayed in their classroom.

### Conclusion:

When we drop litter, it does not go away. Litter goes into our swamps, oceans and affects our wildlife and our health.

\* Adapted for the Maldives from activity 'Ouch and Bah' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

# Teacher Resource Sheet 1

## What is litter?

Litter is waste of any type thrown where it does not belong. Whenever waste is not properly disposed of, it is considered litter. Litter is an important environmental issue that is very easy to see around us.

Litter can be anything, from cigarette butts tossed on the ground, plastic bottles, drink cans, crisp packets, chewing gum or even old machines or furniture thrown in the ocean! The most common types of litter are cigarette butts, sweet wrappers, drinks cans, plastic drink bottles and fast food wrappers.

## Why is litter bad?

Litter can be dangerous to all living things and can cause a whole range of problems for everyone in the community. Litter can cause harm to wildlife and sometimes even death.

### Litter facts:

- Litter can travel through the drainage system to lagoons and oceans
- Litter attracts vermin and is a breeding ground for bacteria plus mosquitoes.
- Litter can pose a threat to public health e.g. broken glass and syringes or hazardous materials can be a health hazard in public places
- Litter can be a fire hazard when e.g. carelessly discarded cigarette butts turn accumulated litter into potential fire hazards
- Litter harms wildlife and plants e.g. animals might eat litter mistaking it for food, while plastic sheets and oil can cover and suffocate plants and animals living on the seabed. Plastic litter can choke or suffocate birds and marine life. Carelessly discarded containers can trap small mammals. Old fishing line, rope, nets or wire can trap land or marine life.
- Litter creates a negative image of places, especially tourist locations e.g. a littered environment sends out a message that people do not care for the environment and that it is acceptable to litter.

## Why do people litter?

All the litter you see in your environment comes from people. Sometimes people litter thinking someone else will clear up after them, or because areas are already heavily littered and they think a bit more won't make any difference. People may also litter if rubbish bins are full and there is nowhere convenient to dispose of their rubbish.



*Plastic bags can wash into the ocean and become a threat to wildlife.*



Research points to several factors that may affect littering behaviour:

- Lack of knowledge of the environmental effects of littering.
- Litter has already accumulated. The more litter present the more people are inclined to litter.
- Lack of social pressure to do the right thing.
- Absence of penalties or consistent enforcement.
- Number, placement and appearance of disposal containers at or near the site.
- People who litter often feel no sense of pride in the areas they are littering.
- They do not view the item as litter. That is often the case with cigarette butts.

## What can be done?

The only way to reduce litter is for individuals to change their behaviour. Bringing about behavioural change and litter control needs a community focus, but individuals must be behind any action to prevent and control litter.

## 6.2 Topic: Good waste management

### Learning Objectives:

- Children learn to identify various types of solid waste and where they occur.
- They can identify negative effects of careless disposal.
- They develop positive attitudes to a clean environment.

### Grades: 3-7

### Time:

- Activity 1: 30 minutes then after 1 week
- Activity 2: 1 hour

### Materials needed:

- 4 plastic containers, (can use water drinking bottles cut in half) 4 different waste materials -plastic, paper, fruit waste, peel, skins, vegetables, leaves, etc. (Activity 1)
- Paper, drawing materials, locally available waste materials (Activity 2).
- Teacher Resource Sheet 1 and 2 – read to familiarize yourself with the background to the topic.

### Introduction:

As our lifestyles have changed, so too have our waste streams. Wastes are no longer just composed of organic materials; they also are made from metals, plastics and hazardous wastes. Also, we are producing a lot more waste. This means that dumping mixed waste around our islands at different places on the beach or forest, or burning it, is no longer effective in removing waste from our islands. These new wastes do not breakdown quickly, so the wastes remain on our islands for longer, potentially affecting our health, environment and livelihoods.

### What to do:

#### Activity 1: Waste Decomposition

Take a few different waste materials and place one in each container. Leave them in the containers and check them each week. Are some things changing? Which are changing and which are not?

Different materials break down at different rates – some organics (matter derived from living things) can break down very quickly while things like plastic may not break down. With organic materials some have high nitrogen and break down quickly while others have higher carbon and break down slowly. When organic materials break down they will make a smell and attract flies and rats.



Discuss with students:

- A. What is the difference between organic and in-organic waste?
- B. What happens if we throw in-organic waste in waterways and on the ground?
- C. What breaks down the quickest, an apple core, a plastic bag, or some paper?
- D. Can waste affect human health?

#### Activity 2: Waste not, want not\*

- Ask the children to go out and bring different types of waste materials from the school environment. Alternatively, you can ask the children to bring materials to school the following day.
- Ask the children to exhibit all the materials that they have brought. Ask them to put the same materials together (cans with cans, paper with paper, etc.).
- Facilitate a discussion with the children on which materials are biodegradable and which are non-biodegradable.
- Facilitate a discussion about the various risks and nuisances: e.g. bad smell, insects breeding, rats, and implications for health (e.g. vector-borne diseases, insect-breeding and insect-borne diseases (e.g. when mosquitoes breed in water in empty cans, drums, etc. and spread dengue), accidents (cuts, falls), general contamination and degradation of the environment.
- Facilitate a discussion about reduce, reuse and recycling practices in the homes of the children and in the community.

### Conclusion:

Remind students that poor waste management practices can impact our health and our environment. So we all need to manage our wastes in ways to minimize impacts on our community health.

\*Adapted for the Maldives from activity 'Wonderful waste' in IRC (2005) 'The Joy of Learning: Participatory lesson plans on hygiene, sanitation, water, health and the environment' IRC Water and Sanitation Center.

## Teacher Resource Sheet 1

As our lifestyles have changed, so too have our waste streams. Wastes are no longer just composed of organic materials; they also are made from metals, plastics and hazardous wastes. Also, we are producing a lot more waste. This means that dumping mixed waste around our islands at different places on the beach or forest, or burning it, is no longer effective in removing waste from our islands. These new wastes do not breakdown quickly, so the wastes remain on our islands for longer, potentially affecting our health, environment and livelihoods.

Poor waste management practices can impact our **health**: (i) mosquitoes can breed in water collected in tins, cans and plastics and contribute to the spread of mosquito borne diseases such as dengue fever and chikungunya, (ii) rotting organic matters attracts vectors such as rats and crows, (iii) burning of plastics and wet organics can cause local air pollution that can be inhaled by the island inhabitants, and (iv) long term buried waste can contaminate ground water potentially affecting the quality of water in wells.

Poor waste management practices can also affect our **economy**: (i) waste floating in the seas, on the reefs or swept onto beaches is not attractive and impacts on the image of the Maldives environment as a pristine environment, especially for the tourism industry, and (ii) waste floating in the seas can also damage boats (e.g. stuck in propellers).

Poor waste management practices can also affect our land and marine **environments**: (i) waste dumped on the beach can pollute the water and spread it to other islands; (ii) non biodegradable plastics can be ingested by animals such as turtles, birds, dolphins, whales etc, and (iii) burying wastes such as batteries and nappies can also pollute the groundwater.

### Reduce, reuse and recycle

**Reduce** – Using less of things, for example, don't throw away paper unless you have used both sides. Reduce the use of plastics by using a longer life bag or a woven basket. For example when we buy something from a shop which is already packaged in a box or wrapped in paper or plastic, we do not need to put it into another plastic bag. It is even better to bring your own cloth bag and avoid plastic altogether.

Maldives has a population of about 300,000 people, if everyone used 4 disposable plastic bags each day, it would calculate to 1200,000 plastic bags being thrown away everyday of the year. This is a lot of plastic!



*Waste floating in the sea can affect our livelihoods.*



**Reuse** – there are many things that we can use again instead of throwing away, for example, use a plastic bottle again for storing pickles or containers for water storage in the fridge.

**Recycle** - this is the process where recyclable materials (e.g. paper, plastic, glass, metal, aluminum, steel etc.) are converted into new products. Never throw waste into the sea or anywhere else in the environment.

Table: Waste decomposition timelines.

Item	Duration
Glass bottles	1 million years
Cigarette filter	5 years
Disposable nappies	500 years
Cigarette lighter	200 years
Nylon slippers	50 – 80 years
Plastic bags	10 – 20 years
Plastic bottles	More than 1 million years
Alkaline batteries	100 years
News papers	3 – 6 months
Fish catching net	600 years
Regiform cups	50 years
Aluminum cans	50 – 100 years

Source: Based on the information poster by Environment Research Center and Ministry of Environment Energy and Water.

## 6.3 Topic: Good Water, Sanitation and Hygiene Practices

### Learning Objectives:

- Students learn to identify positive and negative water, sanitation and hygiene practices.
- Facts about water, sanitation and hygiene learnt in the other topics are reinforced in a fun and interesting way.

### Grades: 1-7

### Time:

- Activity 1: 1 hour

### Materials needed:

- WASH snakes and ladders board game on water, sanitation and hygiene practices.

### Introduction:

By following this manual students have learnt many topics relating to water, sanitation and hygiene. This final topic reinforces messages taught in all other topics of this manual. Research shows that students learn best when the lesson is taught in a fun and memorable way. The WASH snakes and ladders game has been designed so that students can play the game in groups and receive important messages in a fun and positive environment.

### What to do:

#### Activity 1: WASH snakes and ladders game

In groups of four let students play the board game on Water, Sanitation and Hygiene practices. When everyone finishes playing, have a class discussion about the game. The teacher could ask questions like:

- What are some of the good practices highlighted in the game?
- What are some of the bad practices highlighted in the game?
- Can you think of some other good and bad practices?
- Describe 1 new fact that you have learned in this game?
- How will you use the messages from the board game at your home or at your school?

### Conclusion:

Remind the students that now we know the differences between good and bad practices, we all are responsible for using good water, sanitation and hygiene practices at home and at school. Each day we can all take up good practices and avoid bad practices, to safeguard our health and protect our environment.



Students playing the WASH game.

# 7

## ONGOING MONITORING

This manual has been designed with twin objectives, to:

- *Raise knowledge and awareness of good water, sanitation and hygiene practices with teachers and school health assistants; and*
- *Provide participatory tools, techniques and materials for teachers and school health assistants to promote improved water, sanitation and hygiene practices amongst students.*

Once teachers and school health assistants start to use this manual, it is very important to check to see if the manual is achieving these objectives. This is called monitoring. When we monitor we are looking to see if the manual contains the most useful activities and tools. We also want to check to see the impact of the manual on students; Are they more aware? Have their practices changed?

### **Monitoring and evaluation by teachers**

Teachers and school health assistants play an important role in monitoring and evaluating the implementation of the manual. To check the quality and effectiveness of the WASH lesson plans, the teacher should be encouraged to fill out an evaluation form at the end of each lesson (see below). This will help teachers to reflect on whether students achieve learning outcomes and also help to improve the delivery of the topics over time (i.e. continuous improvement).

## Monitoring and evaluation by school management and School Health Unit

Monitoring can also be carried out at a higher level, for example by the school management and/or School Health Unit. Some questions that can be asked at this level include\*:

### Teacher training:

- Do teachers/school health assistants understand the new topics and are they committed to implementing them?
- Are they, at the end of the training, willing to set good WASH examples in the school?

### At the school:

- Is WASH education part of the school programme?
- Can WASH education be practiced in the school; are facilities available and can they be used?
- Do the teachers set good WASH examples in the school?
- After the lessons, are students more aware of WASH practices?

- Have their WASH practices changed? How? Are these changes likely to be sustainable?
- What has been the most significant change in WASH awareness or behavior at the school?
- What barriers need to be overcome to improve WASH practices in the school?

### For the extension into school, home and community:

- Do methods and learning materials link learning in the classroom with life skills at home and in the community?
- Does the programme effectively aim to complement classroom teaching with regular activity around the school?
- Is learning in the school transferred through joint school/community activities or less formally through child-to-child activities?



\* Adapted from Postma, Leonie; Getkate, Renate and van Wijk, Christine (2004). *Life Skills-Based Hygiene Education: A guidance document on concepts, development and experiences with life skills-based hygiene education in school sanitation and hygiene education programmes*. Delft, The Netherlands, IRC International Water and Sanitation Centre. (Technical Paper Series; no. 42). 144 p.

## Teacher evaluation

Name of activity	
What were the learning outcomes for this topic?	
Was the time allocated appropriate for the activity?	
Was the content effectively followed and thought out?	
Is the content relevant to the needs of the students?	
Are students involved in active learning and thinking?	
Are all students involved and not just some of them?	
Did the students enjoy the activity?	
Were the methods and resources appropriate for the teacher/ students?	
Did the teacher feel that the students have learned something? (i.e. were the learning outcomes achieved)	
As a teacher do you think that this activity could be improved, and how?	
Any other comments	



# References

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- UNICEF and IRC (1998) *A Manual on School Sanitation and Hygiene* Water, Environment and Sanitation Technical Guidelines Series - No. 5.
- UNICEF (1999) *'A manual on hygiene promotion.'* Water, Environment and Sanitation Technical Guidelines Series No. 6

# Website Resources

## Child Health

[www.cyh.com/](http://www.cyh.com/)  
[www.hygieneexpert.co.uk/  
ImportanceOfGoodHygieneInChildren](http://www.hygieneexpert.co.uk/ImportanceOfGoodHygieneInChildren)  
[www.mayoclinic.com/health/hand-washing/HQ00407](http://www.mayoclinic.com/health/hand-washing/HQ00407)

## Environmental Education

[www.livelearn.org](http://www.livelearn.org)  
[www.schoolsanitation.org](http://www.schoolsanitation.org)

## General Health

[www.canadian-health-network.ca/](http://www.canadian-health-network.ca/)

## International year of Sanitation

<http://esa.un.org/iys/>

## IRC- International Water and Sanitation Center

<http://www.irc.nl/>

## Maldives Water and Sanitation Authority

[www.mwsa.gov.mv/](http://www.mwsa.gov.mv/)

## Ministry of Environment, Energy and Water

[www.meew.gov.mv/water/index.php](http://www.meew.gov.mv/water/index.php)

## Ministry of Health

<http://www.health.gov.mv/>

## Maldives Department of Public Health

[http://www.dph.gov.mv/school\\_health.htm](http://www.dph.gov.mv/school_health.htm)

## Ministry of Education School Health Program

<http://www.edc.edu.mv/pages/36>

## Sewage

[extoxnet.orst.edu/faqs/safedrink/sewage](http://extoxnet.orst.edu/faqs/safedrink/sewage) and [www.  
extension.umn.edu/distribution/naturalresources/  
components/DD6946b](http://www.extension.umn.edu/distribution/naturalresources/components/DD6946b)

## UNICEF

<http://www.unicef.org/wes/>

## WHO

[http://www.who.int/water\\_sanitation\\_health/monitoring/en/](http://www.who.int/water_sanitation_health/monitoring/en/)

## Water treatment

[www.americanplasticscouncil.org/benefits/in\\_your\\_life/pop/  
power\\_plastics\\_june01.html](http://www.americanplasticscouncil.org/benefits/in_your_life/pop/power_plastics_june01.html)

# Glossary

**Bacteria:**

A bacterium (plural: bacteria) is a unicellular microorganism. Typically a few micrometres in length, individual bacteria have a wide-range of shapes, ranging from spheres to rods to spirals.

**Biodegradable:**

Easily broken down.

**Contaminants:**

to make something impure, unclean, or polluted, especially by mixing harmful impurities into it or by putting it into contact with something harmful

**Decay:**

To rot or become rotten; decompose.

**Desalination:**

The removal of salt (especially from sea water).

**Ecosystem:**

A community of plants, animals and micro-organisms that are linked and that interact with each other and with the physical environment.

**Environment:**

Everything that surrounds a living thing and affects its growth and health.

**Freshwater lens:**

About a third of the rainfall will soak into the ground and infiltrate into the coral sand. This water collects in the sand and forms a body of fresh water.

**Germ:**

a general term for different types of tiny organisms, or living things, commonly known as germs.

**Hygiene:**

the practice of keeping oneself and one's surroundings clean, especially in order to prevent illnesses or the spread of diseases.

**Non Bio Degradable:**

Cannot be easily broken down.

**Pathogen:**

An agent of disease. A disease producer. The term pathogen most commonly is used to refer to infectious organisms (e.g. bacteria, viruses).

**Percolation:**

To cause (liquid, for example) to pass through a porous substance or small holes; filter (e.g. rainwater passing through sand).

**Potable water:**

Water suitable for drinking.

**Rain gauge:**

An instrument for measuring the quantity of rain at any given place.

**Rain Water harvesting:**

collecting rain water.

**Sanitation:**

the hygienic means of preventing human contact from the hazards of wastes to promote health.

Saturated: Soaked with moisture; unable to contain any more water.

**Sewage:**

Fluid containing water borne, domestic and human waste.

**Sustainable:**

Capable of being sustained or maintained.

**Virus:**

A virus is a sub-microscopic infectious agent that is unable to grow or reproduce outside a host cell.



