

BLUE SCHOOLS.

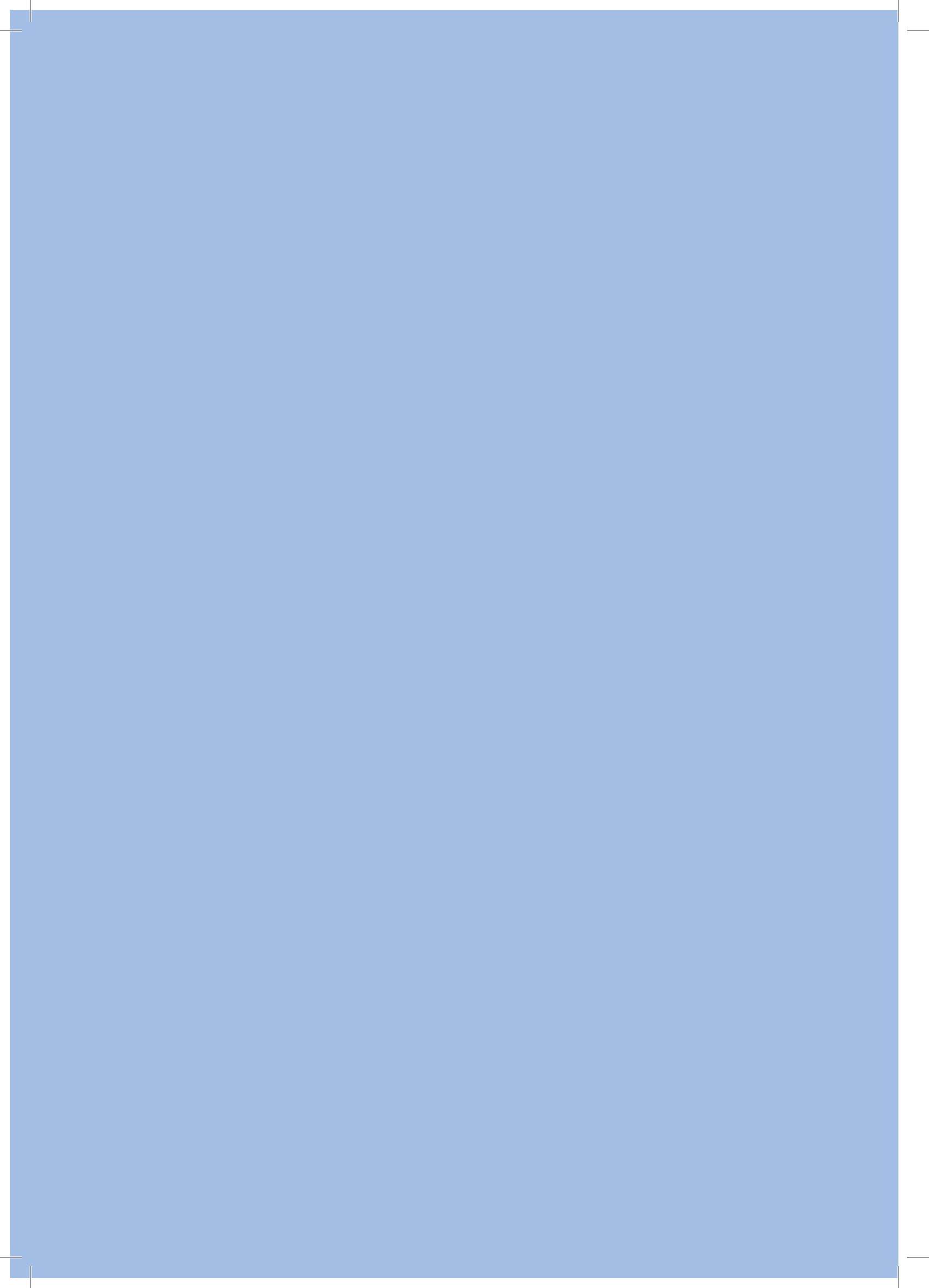
LINKING WASH IN SCHOOLS
WITH ENVIRONMENTAL
EDUCATION AND PRACTICE

**CATALOGUE
OF PRACTICAL
EXERCISES**

**1ST EDITION
CAMBODIAN CONTEXT**

CARITAS Caritas Cambodia
Caritas International
Caritas Switzerland

Swiss Water & Sanitation Consortium



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BLUE LINKING WASH IN SCHOOLS
WITH ENVIRONMENTAL
EDUCATION AND PRACTICE

SCHOOLS.

ADAPTATION OF BLUE SCHOOLS KIT FOR THE CAMBODIAN CONTEXT

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INTRODUCTION.

A Blue School is a school where children learn hands-on about hygiene and environmental conservation. It offers a healthy learning environment and exposes students to environmentally-friendly technologies and practices that can be replicated in their communities.

The Catalogue of Practical Exercises aims to inspire teachers with hands-on and low cost exercises to complement lessons from the national curriculum. The examples provided facilitate students' learning by doing and can be replicated in the students' homes and communities. It provides examples of practical exercises for each topic of the Blue Schools Kit. For each topic, technical background sections are provided to facilitate understanding of basic key concepts. Each topic includes a selection of teaching, participatory or creative activities, discussions, demonstrations, games, and experiments, all requiring simple materials at little to no cost. The practical exercises aim to help reach the key learning objectives defined in each topic's first page. The level of difficulty for each exercise is indicated; depending on the class and age group, teachers can select the most appropriate activities and students can deepen their knowledge on these topics from year to year.

This catalogue is a compilation of references from the WASH in School (WINS) community of practice, as well as other sectors related to the Blue Schools' topics. Users of this document are also encouraged to refer to the other materials of the Blue Schools Kit i.e. the Concept Brief, the Facilitator's Guide and the Catalogue of Technologies. These can be downloaded from the Swiss Water and Sanitation website <http://waterconsortium.ch/blueschool/>.

ADAPTATION TO THE CAMBODIAN CONTEXT

This Catalogue of Practical Exercises has been adapted from the original Blue Schools Kit for the Cambodian context as follows:

- Revision of technical backgrounds,
- Addition, deletion and improvement of some exercises for relevancy and based on Blue Schools implementation experience since the original Kit was launched,
- Shifting some exercises from one topic to another for coherence,
- The topic order has been changed, in line with the usual Blue Schools project cycle "pathway" in Cambodia, starting with WASH topics.
- All practical exercises relating to the topic of environment have been put under one topic (My Surrounding Environment), with a focus on understanding the changes in our surrounding environment, the importance of trees and forests, soil fertility and rivers.



TOPIC 1

MY DRINKING WATER

- 1.1 Clear water isn't clean water
- 1.2 Rainwater harvesting
- 1.3 Safe storage and transportation
- 1.4 Water filter in a bottle
- 1.5 Water quality testing
- 1.6 Treating water with moringa seeds
- 1.7 Treating water with chlorine
- 1.8 Engaging students in O&M of ceramic water filter

P. 1 – 20

EXPERIMENT
 CREATIVE ACTIVITY
 DISCUSSION
 EXPERIMENT
 EXPERIMENT
 EXPERIMENT
 EXPERIMENT
 EXPERIMENT



TOPIC 2

SANITATION AND HYGIENE

- 2.1 Glitter hands
- 2.2 Germ transfer
- 2.3 Group hand washing
- 2.4 Pile sorting of hygiene practice
- 2.5 Supervision of WASH facilities
- 2.6 O&M of hand washing facilities
- 2.7 Organizing events/drama play
- 2.8 Treating water with chlorine
- 2.9 Engaging students in O&M of ceramic water filter
- 2.10 O&M of toilets
- 2.11 Demonstration of proper tooth brushing

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GAME
 GAME
 GAME
 GAME
 PARTICIPATORY ACTIVITY
 DEMONSTRATION
 PARTICIPATORY ACTIVITY
 CREATIVE ACTIVITY
 DEMONSTRATION
 DEMONSTRATION
 PARTICIPATORY ACTIVITY



TOPIC 3

GROWTH AND CHANGE

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- 3.2 Music equality game
- 3.3 Role reversal game
- 3.4 Knock down the myth
- 3.5 As we grow up
- 3.6 My menstrual cycle
- 3.7 my menstrual cycle calendar
- 3.8 Managing menstruation hygienically and with dignity
- 3.9 Menstrual hygiene products demonstration
- 3.10 Reusable pad-making workshop
- 3.11 How to use pads
- 3.12 Disposal

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GAME
 GAME
 GAME
 GAME
 DISCUSSION
 DISCUSSION
 DISCUSSION
 DISCUSSION
 DISCUSSION
 PARTICIPATORY ACTIVITY
 DEMONSTRATION
 DEMONSTRATION

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- 4.5 Waste assessment
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- 4.7 Ecobricks - Building with plastic
- 4.8 Reduce waste - Make a bag
- 4.9 Turning organic waste into biogas

OUTDOOR ACTIVITY
DISCUSSION
OUTDOOR ACTIVITY
DISCUSSION
PARTICIPATORY ACTIVITY
OUTDOOR ACTIVITY
CREATIVE ACTIVITY
CREATIVE ACTIVITY
EXPERIMENT



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OUTDOOR ACTIVITY
OUTDOOR ACTIVITY
CREATIVE ACTIVITY
OUTDOOR ACTIVITY
EXPERIMENT
OUTDOOR ACTIVITY
OUTDOOR ACTIVITY



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OUTDOOR ACTIVITY
PARTICIPATORY ACTIVITY
PARTICIPATORY ACTIVITY
DISCUSSION
SUPPLEMENT
GAME
EXPERIMENT
EXPERIMENT
EXPERIMENT
EXPERIMENT
EXPERIMENT
GAME
EXPERIMENT
DISCUSSION
EXPERIMENT
EXPERIMENT



TOPIC 1

MY DRINKING WATER.

THE PRACTICAL EXERCISES
IN THIS TOPIC ARE MEANT
TO HELP STUDENTS:

- Understand that clear water is not always safe to drink.
- Understand that the surrounding environment can contaminate water (water chain).
- Learn and practice how to make water safe for drinking.



*“When the well is dry we will
know the worth of water.”*

BENJAMIN FRANKLIN



CREATIVE
ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR
ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL
ACTIVITY



TOPIC 1

MY DRINKING WATER.



SAFE WATER

Water is essential to life. More than 90% of deaths from diarrheal diseases in developing countries occur in students under five-years-old (WHO/UNICEF). Malnutrition also reduces students' resistance to infectious diseases. Access to safe drinking water is therefore a top priority to reduce child mortality today.



This section aims to make students realise the importance of drinking safe water for their health and equip them with practical tools on how to ensure the water they drink is safe.

It focuses on:

- Introducing the concept of water quality, and that clear water is not necessarily clean water;

- The difference in water quality depending on the source of water;
- The importance of transportation and storage;
- How to treat water at school and home.

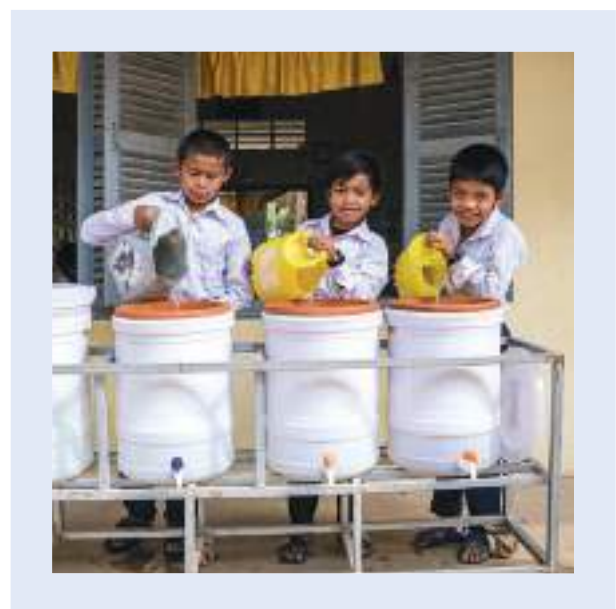
IMPROVED WATER SOURCES

Improved drinking water sources are those that have the potential to deliver safe water by nature of their design and construction, and include: piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water. Unimproved sources include unprotected wells or springs, and populations drinking surface water collected directly from a river, dam, lake, stream or irrigation canal. (WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene JMP)

WATER PURIFICATION

There are five steps to basic water purification:

aeration, coagulation, sedimentation, filtration and disinfection. Aeration adds air to the water. It allows gases trapped in the water to escape and adds oxygen. Coagulation is the process that allows dirt and other suspended solid particles to chemically 'stick together' into flocks (clumps of alum and sediment). During this step, the water is also clarified, or made clear and colourless. Sedimentation is the process that occurs when gravity pulls the particles of flocks to the bottom of the container. So, as the water sits undisturbed most of the flocks settle, preparing the water for the next step. Filtration is the process where remaining solid particles and flocks are separated and removed from the water. Disinfection is the final step, in which water



is treated with solar energy or chemicals (chlorine) to remove bacteria and other micro-organisms. These unseen bacteria can cause severe sickness and even death in humans. Toxic chemicals and heavy metals may require further steps to make the water safe to drink.
(Home Science Tools)



Image source:
Caritas Switzerland



1.1

CLEAR WATER ISN'T CLEAN WATER

-
- To demonstrate to students that clear water is not always safe to drink.
 - For students to understand what can be in water that makes us ill.
 - For students to understand how water can become contaminated.
-

MATERIALS

3 PLASTIC WATER BOTTLES

WATER

SALT

CINNAMON (OR OTHER VISIBLE SPICE)

EXERCISE

Prepare three bottles with safe drinking water:

- In one, put a spoon of salt.
- In another one, put a spoon of a spice to discolour the water (such as cinnamon).
- In another, do not put anything.

Ask 3 volunteers to come forward and pick one bottle. Ask them whether the water is safe to drink. If they say yes, ask them to take a sip. Most likely, the two volunteers that picked the bottles with transparent water will be willing to do so. Make sure they face the group so that all can see their reaction to the taste. The one that picked the water with salt will be very surprised!

Ask the group what lessons they can draw from this exercise:
clear water is not always safe to drink!

DISCUSSION:

Ask the group to reflect on what can be in the water that we cannot see:

Clear water may contain many things invisible to the eye that can make us ill; such as bacteria, virus, Helminths, chemicals, etc.

Ask the group how water gets contaminated (human excreta, agriculture, industry). You can also clarify what are safe sources of water versus unsafe sources of water.

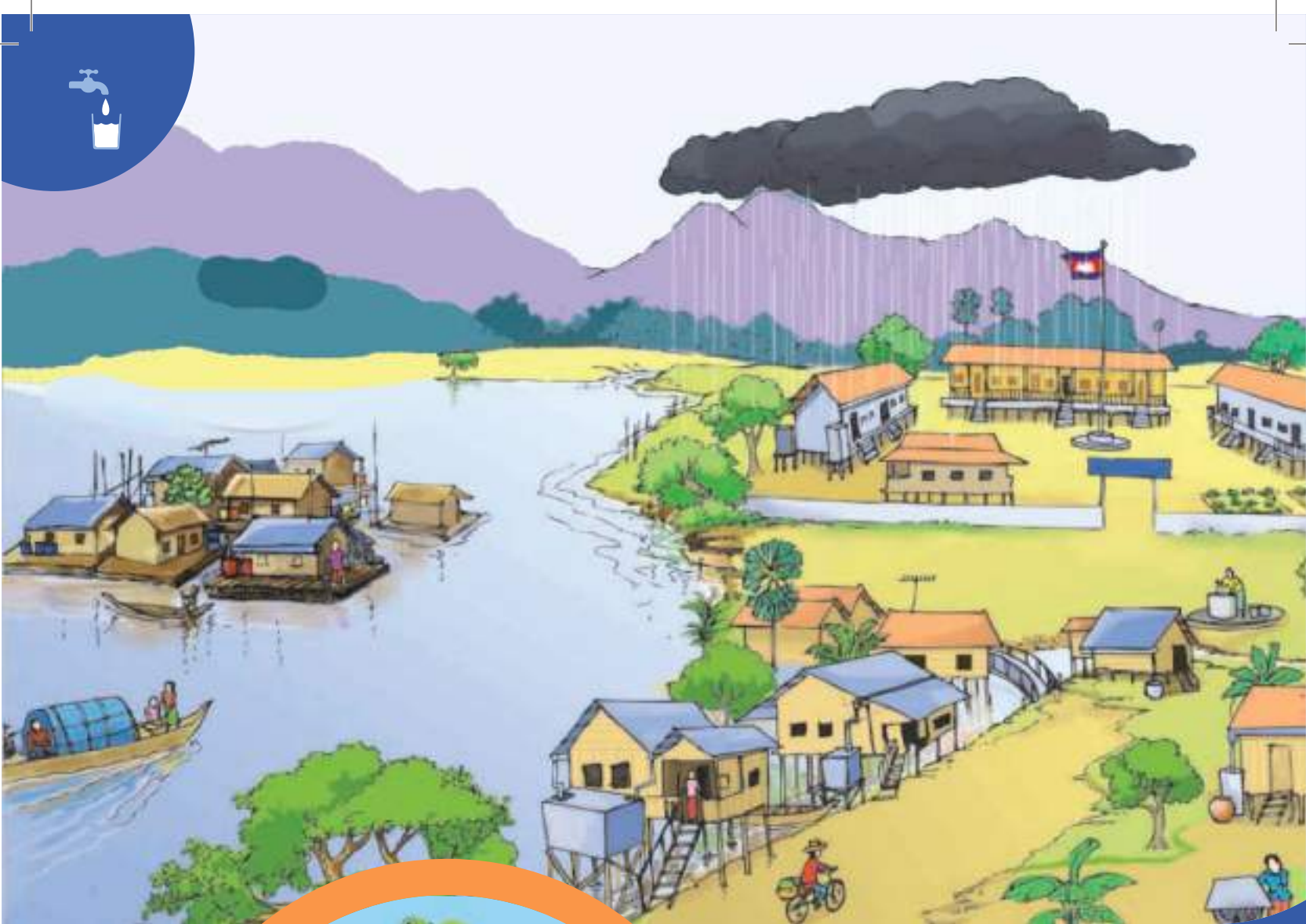


Image source:
Practical Tools for Schools,
Tonle Sap Sustainable
Livelihoods - School Flipchart

1.2 RAINWATER HARVESTING

For students to understand the potential of rainwater as a source of safe drinking water and learn how to design a simple rainwater harvesting system.

MATERIALS

PAPER

PENS OR COLOURED MARKER

PICTURE ON THE LEFT

EXERCISE

- Show students the picture of the community that is harvesting rainwater.
- Organise the students into small groups and ask them to design a rainwater collection system in a simple way. You can help students by showing the drawing on the left.
- When each group has finished, ask them to present their design to the rest of the class. Encourage other students to make comments about the design.
- Ask students these questions:
 - What is happening in the picture?
 - What time of the year can people collection rainwater?
 - How is rainwater protected from contamination?
 - Clarify how to ensure rainwater is safe to drink.



1.3

SAFE STORAGE AND TRANSPORTATION

-
- For students to understand that our water storage tanks, water dispensers and cups are often dirty and contaminate our water, and that it is important to keep them clean.
 - For students to realize why it is important to keep all transport, storage and drinking containers clean, and how to clean them.
-

MATERIALS

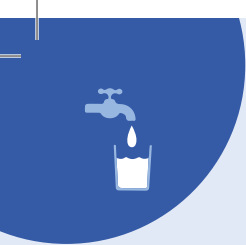
WATER STORAGE TANK AND/ OR OTHER CONTAINERS OR CUPS USED FOR TRANSPORT STORAGE AND DRINKING.

ACCORDING TO LOCAL PRACTICES:
EITHER DETERGENTS, SOAP BARS, ASHES, CHARCOAL, SAND, OR MAIZE COB

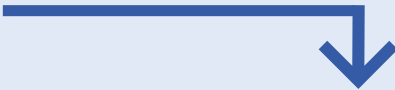
BRUSHES AND WATER.

EXERCISE

- Engage students in a discussion on how they collect and store water at home, and what they use to drink water.
- Go outside with the students: you can either go to a household close to the school and ask to have a look at the containers used for transporting and storing water, or bring a jerrycan to the school for this exercise.
- Ask the students to look inside these containers and describe what they see. Most likely, they will notice that it is dirty.
- **Discussion:** Ask students what happens to their water when it goes inside this jerrycan.
- Using locally appropriate materials, demonstrate how to clean the containers, and invite volunteers to practice it.



TOP HALF OF 2 L
PLASTIC BOTTLE



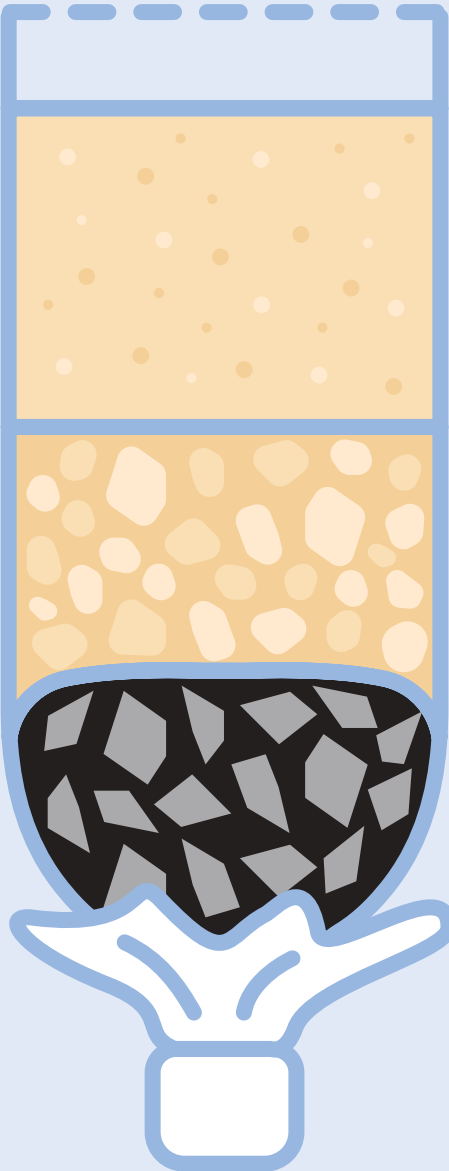
FINE SAND



COARSE SAND



GRAVEL OR
SMALL PEBBLES



COFFEE FILTER
& RUBBER BAND



TREATED
WATER





1.4 WATER FILTER IN A BOTTLE

For students to understand how water filtration works.

MATERIALS

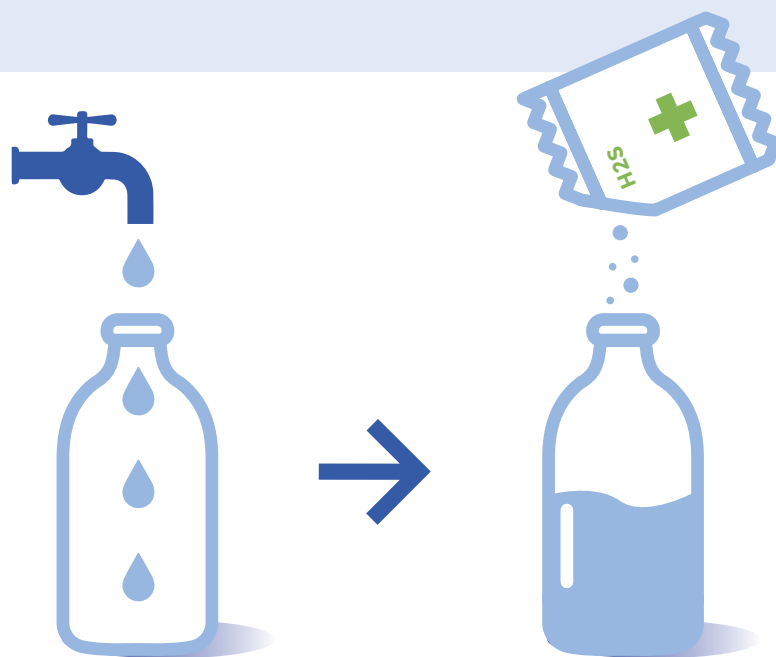
1 PLASTIC BOTTLE WITH LID
2 CUPS OF FINE SAND
1 CUP OF COARSE SAND
1 CUP OF SMALL PEBBLES
1 FILTER PAPER /
OR COFFEE FILTER
1 RUBBER BAND
1 SPOON
HALF A LITER OF DIRTY WATER.

EXERCISE

- Remove the bottom of a plastic bottle.
- Cover the cap end of a plastic bottle with a coffee filter and secure with a rubber band.
- Add gravel (or small pebbles).
Next, add the coarse sand and then add the fine sand.
- Turn the bottle upside down on top of a glass jar.
- Pour in the dirty water and watch what happens.
- Activated charcoal can be added to the filter between the gravel layer and the coarse sand layer, if available.



1.



2.



3.



1.5

WATER QUALITY TESTING

For students to understand how water can be tested and that clear water is not necessarily safe to drink.

MATERIALS

THE **H₂S TEST KITS** CAN BE PURCHASED FROM A CHEMIST (DEPENDING ON THE CONTEXT).

ADDITIONAL RESOURCES

SSWM

[India Water Portal](#)

EXERCISE

To know if water is safe, it should be tested.

The best way is to find what simple test are locally available and carry it out with the students.

A simple test that can be done is the H₂S method. The H₂S method comes with little glass bottles containing a reddish powder.

To test the water, pour the water sample in the bottle, gently shake it and keep the bottle at an ambient temperature for 24-48 hours.

If the water stays reddish, it is safe to drink. If it turns black, it is contaminated with faecal bacteria and unsafe to drink. To make the exercise more fun, take two samples to compare. For example a sample of treated drinking water and a sample of untreated water from the river.



CRUSHED MORINGA SEEDS

Crushed moringa seeds can be used as a coagulant in water because they have positively charged, water-soluble proteins that bind with negatively charged particles (silt, clay, bacteria, toxins, etc). The resulting sedimentation drops to the bottom. To make sure that water is safe for drinking, the process should be complemented with filtration and disinfection.

1.6

TREATING WATER WITH MORINGA SEEDS

To demonstrate to students how to use moringa seeds to reduce the turbidity of water and improve water quality.

MATERIALS

MORINGA SEEDS
GRINDER OR MORTAR
1 BOWL AND A BOTTLE
SMALL MESH

EXERCISE

- Collect mature moringa oleifera seed pods and remove seeds from pods. Remove seed coat to obtain clean seed kernels: in general 1 seed kernel will treat 1 litre of water.
- Crush the seed kernels to obtain a fine powder and sift the powder through a screen or small mesh.
- Mix the powder with a small amount of water to form a paste.
- Mix the paste and 1 cup of clean water (250ml) into a bottle and shake for 1 minute to activate the coagulant properties.
- Add to the turbid water to be treated: Stir water rapidly for at least 1 minute then slowly for 5–10 minutes and let the water sit without disturbing for at least 1–2 hours. When the particles have settled to the bottom, the water is ready.



Wash your hands
with water and
soap or ash.



Is your water
clear?



Put 1 tablet in the
container.
Close container.



Wait 30 minutes.



Water is now ready.



Is your water dirty
looking?



Filter the water
through cloth.



Add 2 tablets
to the container.
Close container.



Wait 30 minutes.



Water is now ready.

Image source:
www.ifrc.org

1.7

TREATING WATER WITH CHLORINE

To demonstrate to students how to apply chlorination tablets or solution.

MATERIALS

CHLORINATION TABLETS
OR DROPS

ADDITIONAL RESOURCES

SSWM

[India Water Portal](#)

EXERCISE

- Initiate a discussion on what can be in water that makes us sick, and why it is important to treat water.
- Explain to the students that one tablet typically treats one litre of water. These tablets generally need between 30 minutes to four hours to work.
- With the students, fill a jar with water and add enough tablets to treat the water.

CHLORINATION

Chlorination is one of many methods that can be used to disinfect water. This method was first trialed more than a century ago and is still used today. It is a chemical disinfection method that uses various types of chlorine or chlorine-containing substances for the oxidation and disinfection of what will be the potable water source.

The main purpose of chlorination is to disinfect water, but it also has many other benefits. Unlike some of the other disinfection methods like ozonation and ultraviolet radiation, chlorination is able to provide a residual to reduce the chance of pathogen regrowth in water storage tanks or within the water distribution system. In addition to destroying harmful micro-organisms, chlorination also reduces the amount of iron, manganese and hydrogen sulphide in water. Chemical disinfection using chlorine has the benefits of being relatively quick, simple and cheap, and provides some protection against recontamination.



1.8

ENGAGING STUDENTS IN MAINTENANCE OF CERAMIC WATER FILTERS

For students to practice how to clean the ceramic water filter (for other filters, this protocol needs to be adapted).

MATERIALS

CONTAINER

SPONGE

CLEAN WATER AND SOAP

ADDITIONAL RESOURCES

Environmental Sanitation
Cambodia (ESC)

EXERCISE

Demonstrate to the students how to ensure maintenance of water filters, and in groups, give them the opportunity to practice, following the below guidelines:

1. **Wash hands with soap** before cleaning the filter.
2. **Clean the inside and outside** surface of the lid with soapy and clean water, rinse it and let it dry.
3. **Carefully lift the ceramic pot** out of the receptacle and set it on the clean lid. Touch only the rim when lifting the ceramic pot.
4. **Pour the clean water** (already filtered) from the receptacle to the cleaning container.
5. **Clean the inside of the receptable** as well as taps with soap and rinse with clean water in the cleaning container.
6. **In a similar way**, proceed with cleaning the ceramic pot.



TOPIC 2

SANITATION AND HYGIENE.

THE PRACTICAL EXERCISES
IN THIS TOPIC ARE MEANT
TO HELP STUDENTS:

- Understand how diseases are transmitted, and what good and bad hygiene and sanitation practices are.
- Apply good hygiene and sanitation practices at school and home.



*“Hygiene is two thirds
of health.”*

LEBANESE PROVERB



CREATIVE
ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR
ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL
ACTIVITY



TOPIC 2

SANITATION AND HYGIENE.



HYGIENE AND SANITATION

Definitions and differences between hygiene and sanitation

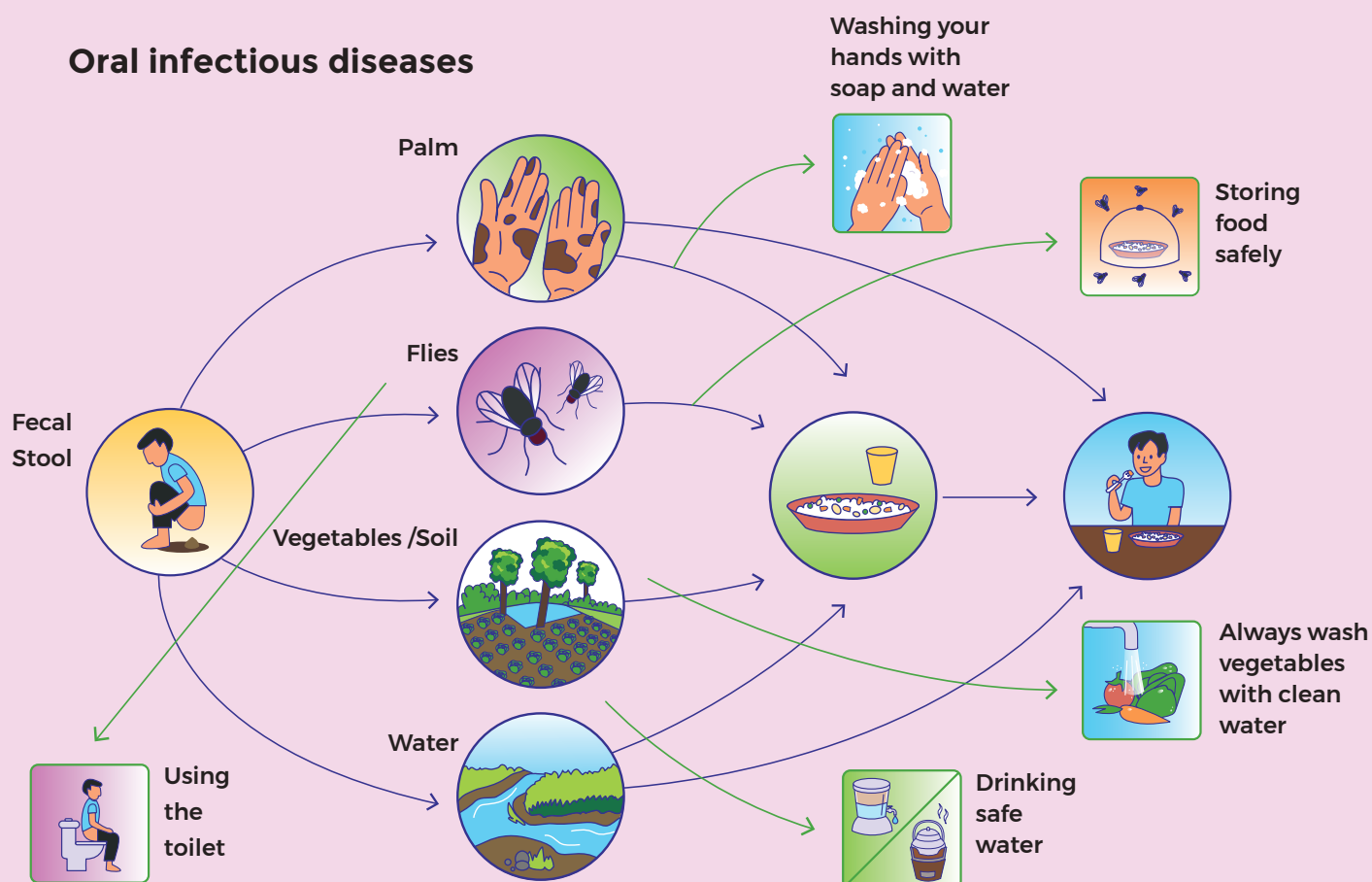
Hygiene generally refers to the cleanliness of the human body and respective practices, such as washing hands, nail trimming and showering. Beyond that, hygiene also refers to practices that guarantee hygienic conditions of a surrounding environment, such as cleaning and waste management. Sanitation is synonymous with the infrastructures that allow human beings to satisfy personal and public hygiene. Properly constructed and maintained “improved” toilets hygienically separate human excreta from human contact in the environment. This prevents human contact with waste and bacteria in the environment that can cause diseases. Importantly, “safely-managed sanitation” includes the onsite

treatment and disposal or reuse of human excreta, or conveyance to an offsite facility for treatment and disposal/reuse. Open defecation is a harmful risk for students and the whole community. Therefore, schools need to have latrines for students to use.

Why are water, hygiene and sanitation so important?

As seen in the ‘F’ diagram, water, sanitation and hygiene interventions act as barriers to stop the transmission of disease; these can be primary (preventing the initial contact with faeces) or secondary (preventing it being ingested by a new person). This section of the Blue Schools Kit focuses on the promotion of knowledge about how diseases spread and how to limit this through sound hygiene practices and sanitation infrastructure.

Oral infectious diseases



This topic introduces, through a variety of exercises including practical demonstration, the effects of good hygiene practices for personal health and how to integrate them into daily routines. It aims to cover most aspects of hygiene and sanitation, including:

- The correct use and maintenance of toilet facilities at school and home, including how to safely confine faeces and to avoid faecal-oral contamination from flies, food, fluids, floods, fingers and domestic animals;
- How to correctly wash hands with soap or ash at critical moments, and important elements and adequate performance of personal hygiene (tooth brushing, face washing, wearing shoes, nail trimming etc.);
- Covering food to protect it from contamination from flies or other sources;
- The importance of keeping the surrounding environment clean, collecting (and separating) waste - further covered in Topic 4 From Waste to Resources.





Image source:
Philip Cohen

GRADE



2.1

GLITTER HANDS

For students to understand that cleaning hands requires effort, the use of soap and vigorous rubbing.

MATERIALS

GLITTER

WATER

SOAP

EXERCISE

- Sprinkle glitter on students' hands and challenge them to wash it off with soap and water. Because glitter is naturally sticky, it may take up to 30 seconds to scrub it away.
- Then indicate they should scrub off germs like the glitter each time hand washing occurs.
- From there, you can engage students in a discussion on the importance of hand washing with soap, the key steps, and the critical times for hand washing with soap. Simply getting our hands wet and wiping them on our clothes will not remove the glitter (or germs).



Image source:
Caritas Switzerland



2.2

GERM TRANSFER

For students to understand how easily germs spread.

MATERIALS

WATER

ASH

CONTAINER

ADDITIONAL RESOURCES

[Live and Learn, Practical Tools for Schools, Tonle Sap Sustainable Livelihoods - School Flipchart](#)

EXERCISE

- Pretend to sneeze and cover your hands in ash.
- Then continue as if nothing happened, touching students and objects around the room. The students will see the transfer of ash.
- Explain to the students that just because they cannot see the germs on their hands, it does not mean they are not there. After sneezing, you have germs on your hands and the ash symbolises them.
- Invite students to find all the surfaces where germs now live and then ask them to clean the marks off the surfaces.
- Initiate a discussion on what can be done to avoid the spread of germs that makes us sick.



របៀបលាង សម្អាតដៃ

- ✓ មុនពេលចាប់កាន់
ចំណីអាហារ
- ✓ ក្រោយពេលបន្ទោបង្ហូរ



១ ដាក់សាប៊ូឱ្យចេញចុះហើយផុស
ឱ្យសព្វដៃរយៈពេល ២០វិនាទី



២ ផុសដៃស្តាំលើដៃឆ្វេង
ហើយផុសដៃឆ្វេងលើដៃស្តាំវិញ



៣ ផុសបាតដៃទាំងសងខាងជាមួយគ្នា
ដោយដាក់ប្រាមដៃឆ្លាស់គ្នា



៤ ផុសថ្ពលខាងក្រោយប្រការដៃ
ទៅនឹងបាតដៃឆ្វេងឆ្វេង



៥ ផុសរង្វង់ទាំងសងខាង
បង្វិលចុះឡើង



៦ ផុសបាតដៃខាងឆ្វេងនិងខាងស្តាំរួចហើយ
ផុសបាតដៃខាងស្តាំនិងខាងឆ្វេងវិញ



៧ លាងជម្រះសាប៊ូនិងទឹកច្រើន



រលាស់ដៃឱ្យស្អាតដោយ
មិនបាច់ប្រើកង្ហែងជូត

Image source:
USAID



2.3

GROUP HANDWASHING

-
- For students to understand how and when it is important to wash their hands with soap or other cleaning agents.
 - For students to practice proper handwashing.
-

MATERIALS

SOAP AND CLEAN WATER

GROUP HANDWASHING STATION

ADDITIONAL RESOURCES

Minimum Requirement on WASH in School (WinS), Cambodia

EXERCISE

- With other teachers, develop the group handwashing schedule. For that, make sure to clarify:
 - The group size.
 - Which teacher is assigned for group handwashing.
 - Timing for different grades.
- Demonstrate the 7 steps of handwashing to students who are members from student council.
- Once ready, ask the student council members to demonstrate the 7 steps of handwashing to other groups of students.
- Initiate a discussion on handwashing (why/how/when do we wash hands?)



Image source:
Lucie Leclert

2.4

PILE SORTING OF HYGIENE PRACTICES

For students to analyse different practices of daily life, discuss whether it is a good or bad practice and understand why, using pre-drawn cards or drawings

MATERIALS

POSTERS FROM ACTIVITY 2.1.

ADDITIONAL RESOURCES

CHAST, Caritas Switzerland

EXERCISE

- Place the two smiley posters next to each other on the floor or pin them on the blackboard and place the posters displaying good and bad hygiene and sanitation practices on the floor for all to see.
- Ask the students to place the good practices under the happy smiley and all bad practices under the sad smiley.
- Leave enough time for discussion and provide clarification if necessary.





Image source:
Caritas Switzerland

2.5

SUPERVISION OF WASH FACILITIES

To make students responsible and play a more active role in the maintenance and supervision of the status of WASH facilities.

MATERIALS

NOTEBOOK

PEN

ADDITIONAL RESOURCES

CHAST, Caritas Switzerland

School Health Club Poster,
Caritas Switzerland, 2017

EXERCISE

- The facilitating teacher needs to be aware of the criteria for functioning and well-equipped WASH infrastructure!
- A checklist can be developed beforehand by all students.
- Ask some volunteers to lead other students to visit all WASH facilities within the school compound and assess their functionality status and cleanliness.
- Once ready, ask students to report what they have seen and discuss how to further improve WASH conditions in their school.



Image source:
Caritas Switzerland

2.6

O&M OF HANDWASHING FACILITIES

For students to practice O&M of handwashing facilities.

MATERIALS

SOAP AND CLEANING MATERIALS

ADDITIONAL RESOURCES

Minimum Requirement
on WASH in School (WinS)

Environmental Sanitation
Cambodia (ESC)

EXERCISE

- With other teachers, develop the O&M of a hand washing schedule. This includes:
 - Who are the responsible students from different grades.
 - Defining rotating duties/days/times.
- Display the schedule at the hand washing facilities
- Demonstrate to students how to ensure O&M of handwashing facilities. In groups, give them the opportunity to practice following the below guidelines:
 - Make sure soap and water (from an improved water source) are available at the handwashing facility.
 - Clean the water storage tank at least once a week.
 - Clean the water drainage and taps regularly and tell teachers when taps are broken.



IMPORTANT GLOBAL WASH DAYS:

22 March	World Water Day
28 May	Menstrual Hygiene Day
15 October	Global Handwashing day
19 November	World Toilet Day

2.7 ORGANISING EVENTS/DRAMA PLAY

To engage students in raising their parents' awareness by demonstrating good hygiene and sanitation practices during school events.

MATERIALS

Depends on the activities that will be carried out during the event.

EXERCISE

Selected students, volunteers or members of the school health club or equivalent, if it exists, to develop songs, drama, poems or a quiz on handwashing and present it to other students, before, during or after classes to sensitise them on good hygiene practices. These can also be performed during:

- Celebrations of global WASH days*.
- Parents' days.
- Interclass or interschool competitions.
- Visits to adjacent villages.



Image source:
Blue School Event in 2022,
Cambodia



Image source:
Practical Tools for
Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart



2.8

HYGIENE POSTER

For students to actively pass hygiene messages to other students and the broader community, and develop creative skills.

MATERIALS

PAPER

COLOURED PENCILS
OR MARKERS

ADDITIONAL RESOURCES

Live and Learn,
Practical Tools for Schools, Tonle Sap Sustainable Livelihoods - School Flipchart

EXERCISE

- Organise the students into groups and ask them to think of hygiene messages they want to promote to other students or their community and ask them to think of a slogan.
- When ready, ask them to share these with the rest of the class and write them on the blackboard. Then ask the students to vote for the slogan they like the most.
- Next, in groups, ask students to design posters that will be displayed in the school or community in strategic locations. They can also present the posters to audiences.
- You can consider organising a competition. For example, prizes for the best posters or a drawing competition. This can also be organised as an open call for posters/messages among several schools and across social media.



1 Pour water into the toilet bowl before use



2 Defecate in the toilet bowl.



3 Wash your anus after cleansing



4 Pour water after defecation and clean if necessary.



5 Wash hands with soap.

Image source:
O&M presentation,
Environmental Sanitation
Cambodia (ESC)



2.9

HOW TO USE TOILET

For students to learn how to use the toilet.

MATERIALS

TOILET WITH BUCKET
AND WATER FOR FLUSHING

CLEAN WATER AND
HANDWASHING FACILITY
WITH SOAP.

ADDITIONAL RESOURCES

*Environmental Sanitation
Cambodia (ESC)*

EXERCISE

- Same as for group handwashing, go to the toilets as a group.
- Once ready, ask a volunteer to demonstrate how to use the toilet (keep clothes on!).
- One at a time, ask each student to come forward and repeat the practice. Ask student to clarify/correct if necessary.
- Discuss why this practice is important.



Clean school grounds and handwashing facilities regularly



Collect rubbish in the toilet bin and take it out daily



Clean the water tank every 1-3 months



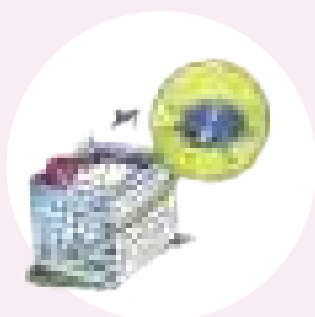
Clean the bathroom ceiling weekly.



Clean the bathroom regularly and clean the tank in the toilet every 1-3 months.



Always clean the toilet in the bathroom.



Always clean floors and drain.



Use an old toothbrush to always clean tools inside of the bathroom.



Clean the outside of the bathroom every time you clean the toilet.

Image source:
**O&M presentation,
Environmental Sanitation
Cambodia (ESC)**



2.10

MAINTENANCE OF TOILETS

For students to practice how to clean toilets. This exercise is part of the overall WASH facilities O&M schedule

MATERIALS

BRUSH

BROOM

SOAP AND DISINFECTING
PRODUCTS, SUCH AS BLEACH

ADDITIONAL RESOURCES

*Environmental Sanitation
Cambodia (ESC)*

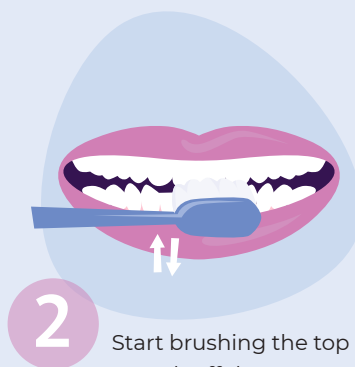
EXERCISE

- With other teachers, develop the maintenance of toilets schedule. This includes:
 - Who are the responsible students from different grades.
 - Defining rotating duties/days/times.
- Display the schedule at the toilets.
- Demonstrate to students how to clean the toilets and in groups give them the opportunity to practice, following the guidelines on the left.



1

Squeeze toothpaste onto a brush



2

Start brushing the top teeth off the gums



3

Continue to brush the same distant teeth



4

Now brush the back of the teeth



5

Now brush the chewing surface of the teeth in a circular motion



6

Now brush your tongue starting from the root



7

After brushing your teeth, rinse your mouth with mouthwash



8

Done! Enjoy a radiant smile

2.11

DEMONSTRATION OF PROPER TOOTH BRUSHING

For students to practice O&M of handwashing facilities.

MATERIALS

TOOTHBRUSH

TOOTHPASTE

WATER

ADDITIONAL RESOURCES

Minimum Requirement on WASH
in School (WinS):

How to brush teeth properly

EXERCISE

- Same as for the handwashing demonstration, go to the place at school where students are expected to practice tooth brushing.
- Once ready, ask a volunteer to demonstrate following the steps outlined on the left. Clarify and demonstrate if necessary.
- One at a time, ask each student to come forward and repeat the practice. Again, clarify if necessary.
- Discuss why this practice is important and when it should be done.



TOPIC 03

GROWTH AND CHANGE.

THE PRACTICAL EXERCISES
IN THIS TOPIC ARE MEANT
TO HELP STUDENTS:

- Understand the importance of avoiding gender stereotyping.
- Understand the changes for both boys and girls in puberty: it is part of growing up and is a normal process.
- For girls: to learn how to manage menstruation: body hygiene, types of pads available and their disposal.



“To call women the weaker sex is libel”

MAHATMA GANDHI



CREATIVE
ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR
ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL
ACTIVITY



TECHNICAL BACKGROUND

GROWTH AND CHANGE.

MAIN SOURCE:

Esther Lowe-de Vreede, Caritas Switzerland
Minimum Requirement on WASH in School (WinS)
Growth and Change
To become a young man



MENSTRUAL HYGIENE MANAGEMENT

Respecting gender-based specificities and needs

As students grow, changes in their bodies occur, accompanied by an evolution of their minds, feelings and understanding of psycho-social differences between males and females. Their needs will also evolve in many ways. This section of the Blue Schools Kit addresses as a priority young women's needs when they reach puberty, namely menstrual hygiene management (MHM). These needs may appear mostly physical, but they also have strong emotional repercussions. Respect for those needs are very important to ensure young women can fully and harmoniously take their place in their families and communities.

Menstruation

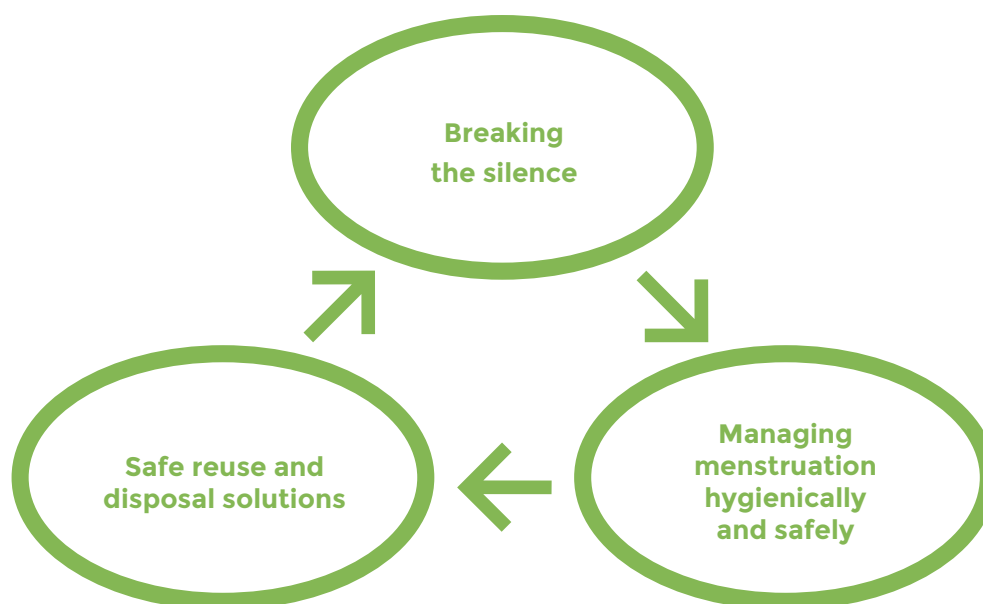
Menstruation is a natural process. However, in most parts of the world, it remains a taboo and is rarely discussed, even with family members. Many cultures have beliefs, myths and taboos relating to menstruation. Almost always, there are social norms or unwritten rules and practices about managing menstruation and interacting with menstruating women. Some of these are helpful but others have potentially harmful implications (SWSS).

MHM in schools

Many schools do not support adolescent girls or female teachers in managing menstrual hygiene with dignity. Inadequate water and sanitation facilities make managing menstruation very difficult, and poor sanitary protection materials can result in blood-stained clothes causing stress and embarrassment. Teachers (and male members of staff in particular) can be unaware of girls' needs, in

some cases refusing to let them visit the latrine. As a result, girls have been reported to miss school during their menstrual periods or even drop out completely.

Nonetheless, schools make a good entry point to talk about menstrual hygiene, to be included or to strengthen the existing curriculum. Students trust their teachers and listen to their advice. Teachers also have more factual and scientific knowledge to break taboos and bring about the fact that menstruation is a normal process in life.



- 1. Breaking the silence** – fostering the understanding that menstruation is a fact of life and a distinct biological female attribute that women should be proud of, not ashamed by.
- 2. Managing menstruation hygienically and safely** – ensuring adequate water, cleaning and washing materials and private spaces for managing menstrual flows hygienically and privately, and with dignity, in the home and public spaces.
- 3. Safe reuse and disposal solutions** – ensuring mechanisms for safe reuse, collection and disposal of menstrual waste in an environmentally safe manner. Disposal can involve a number of steps in the waste disposal chain, particularly when a girl is in a school where sanitary materials are collected for disposal.

In schools (and other public places), the waste chain includes:

- A discrete, washable container with a lid, where sanitary materials can be temporarily stored.
- Collection, transfer and emptying of the containers.
- Final destruction of the sanitary materials through burying, incineration or another method.



"Girls and
boys should
both be
educated"

"Girls are
smarter
than boys"

GRADE

1

2

3

4

5

6

GAME

3.1 EQUALITY QUIZ

For students to be able to differentiate between fact and opinion around issues of gender.

MATERIALS

CARDSTOCK OR PAPER

PENCILS OR PENS

EXERCISE

- **Prepare cards** that display statements such as “Girls are smarter than boys,” “Girls and boys should both be educated”, “Girls should fetch water,” or “All boys are good at sports”.
- **After reading each card**, ask the students to raise their hands if they think it is a fact or an opinion. You can also split students into two competing teams for this game.

“Girls
should
fetch
water”

“All boys
are good
at sports”



PLAY SOME MUSIC !



Image source:
Clover foundation

3.2

MUSIC EQUALITY GAME

For students to realise they have more similarities
with the other gender than what they might think.

MATERIALS

**MUSICAL INSTRUMENT
(OR SINGING)**

**CHAIRS (OR SITTING
ON THE GROUND)**

EXERCISE

Students can quickly focus on the differences between themselves and others. However, a game of musical diversity can get them thinking more about their similarities.

Play some music and allow the students to wander or dance around freely. When the music stops, they have 30-60 seconds to grab a partner and find one thing they have in common.

This can also be done by specifically asking a boy and girl to pair when the music stops.



3.3

ROLE REVERSAL GAME

For students to become more aware of the different roles often associated with one gender and be more understanding towards each other, regardless of gender.

EXERCISE

- Ask students to suggest a few activities that are normally associated with men and activities that are associated with women.
- Ask some boys to volunteer to act activities that are typically assigned to girls. This can be carrying water on their heads, cooking or carrying babies.
- Ask girls to do the same for activities normally assigned to men, such as running to get wood or repairing something.
- Finally, have students share their experiences of the exercise during a class discussion.



Image source:
Caritas Switzerland
in Cambodia

3.4

KNOCK DOWN THE MYTH

For students to discuss the myths around menstruation and distinguish between facts and myths.

MATERIALS

PAPER

PENCILS

PLASTIC BOTTLES

BALL (CAN BE MADE OF PAPER)

ADDITIONAL RESOURCES

Unicef

EXERCISE

- Ask all students to write on a slip of paper an idea, information or story they have heard about “menstruation”.
- Once ready, ask them to fold the papers and collect them in a container.
- When all papers have been collected, ask one student at a time to pick out a slip of paper and read the statement. Ask if she/he thinks the statement is true or false and why. Encourage other students to give their views.
- Move on to the next statement until all statements have been read.
- Shatter the myths: all false statements can be placed inside plastic bottles and put in a circle. Using a ball, students on the count of three can throw their ball and knock down the plastic bottles.



ការប្រែប្រួលរាងកាយ

- ឈាមរបស់អ្នកនឹងផ្លាស់ប្តូរជាតិខ្លាញ់ច្រើនជាងមុន ដូច្នេះអ្នកនឹងអាចមានកើតមុន។
- ចុងដោះរបស់អ្នកនឹងមានពណ៌ក្រហមជាងមុន។
- ដោះរបស់អ្នកនឹងលូតលាស់ធំជាងមុន ហើយអ្នកទទួលបានការព្រួយបារម្ភច្រើនជាងពីមុន។
- រោមនឹងមានដុះក្រោមភ្លើង និងជុំវិញប្រដាប់ភេទរបស់អ្នក។
- ក្រពេញភ្លើងដែលនៅក្រោមភ្លើងរបស់អ្នកនឹងសកម្មជាងមុន។ ដូច្នេះអ្នកនឹងចាប់មានក្លិនខ្លួនដូចជាមនុស្សធំ។
- គ្រាករបស់អ្នកនឹងចាប់ផ្តើមរីកសាយ។
- អ្នកនឹងចាប់ផ្តើមលូតកម្ពស់។



Body Changes

- Your skin makes more oils, so you may get pimples.
- Your nipples will get darker in color.
- Your breasts will grow larger and be more sensitive.
- Hair will grow under your arms and in your private area.
- Sweat glands under your arms will be more active so you will smell more like an adult.
- Your hips will become wider.
- You will grow taller quicker than you grew before.

ចំណុចសំខាន់ៗនៃការប្រែប្រួលរាងកាយ

- អ្នកចាប់ផ្តើមលូតកម្ពស់ និងឆ្លើងម្នាក់ៗ។
- ឈាមរបស់អ្នកនឹងផ្លាស់ប្តូរជាតិខ្លាញ់ច្រើនជាងមុន ដូច្នេះអ្នកនឹងអាចមានកើតមុន។
- សាច់ដុំរបស់អ្នកនឹងចាប់ផ្តើមលូតលាស់ធំ និងរឹងមាំជាងមុន។
- ក្រពេញភ្លើងដែលនៅក្រោមភ្លើងរបស់អ្នកនឹងសកម្មជាងមុន។ ដូច្នេះអ្នកនឹងចាប់មានក្លិនខ្លួនដូចជាមនុស្សធំ។
- ចុងដោះរបស់អ្នកនឹងផ្លាស់ប្តូរពណ៌ក្រហមជាងមុន។
- រោមនឹងមានដុះនៅលើមុខ ក្រោមភ្លើង រាងកាយ និងដងខ្លួន។
- សរីរាង្គបន្តពូជរបស់អ្នកនឹងចាប់ផ្តើមរីកសាយ និងលូតលាស់ធំជាងមុន (លើកលែងតែស្រីដែលមានផ្ទៃពោះ)។



MAIN BODY CHANGES SLIDE

- Your height and weight increase
- Your skin makes more oils so you may get pimples
- Your muscles get bigger and stronger
- Sweat glands under arms become active so you may smell like an adult
- Your nipples get larger and darker in color
- Hair grows on your face, under your arms, chest, and pubic area
- Your sex organs grow and develop (penis, testicles, scrotum)

Image source:
Unicef

3.5

AS WE GROW UP

To discuss the body changes that occur in boys and girls during adolescence and understand these are normal.

MATERIALS

CHALK

BLACKBOARD

ADDITIONAL RESOURCES

Minimum Requirement on WASH in School (WinS)

CHAST Facilitator's Guide, 2019. Caritas Switzerland.

EXERCISE

- To start this activity, ask students to line up from the youngest to the oldest.
- Initiate a discussion about body changes in both boys and girls that occur as we grow up. You can decide to ask students to form smaller groups.
- Using posters such as the ones on the left, summarise the answers. It is important to not only focus on the reproductive organs but also other changes linked to puberty.
- Highlight that all these changes are normal.

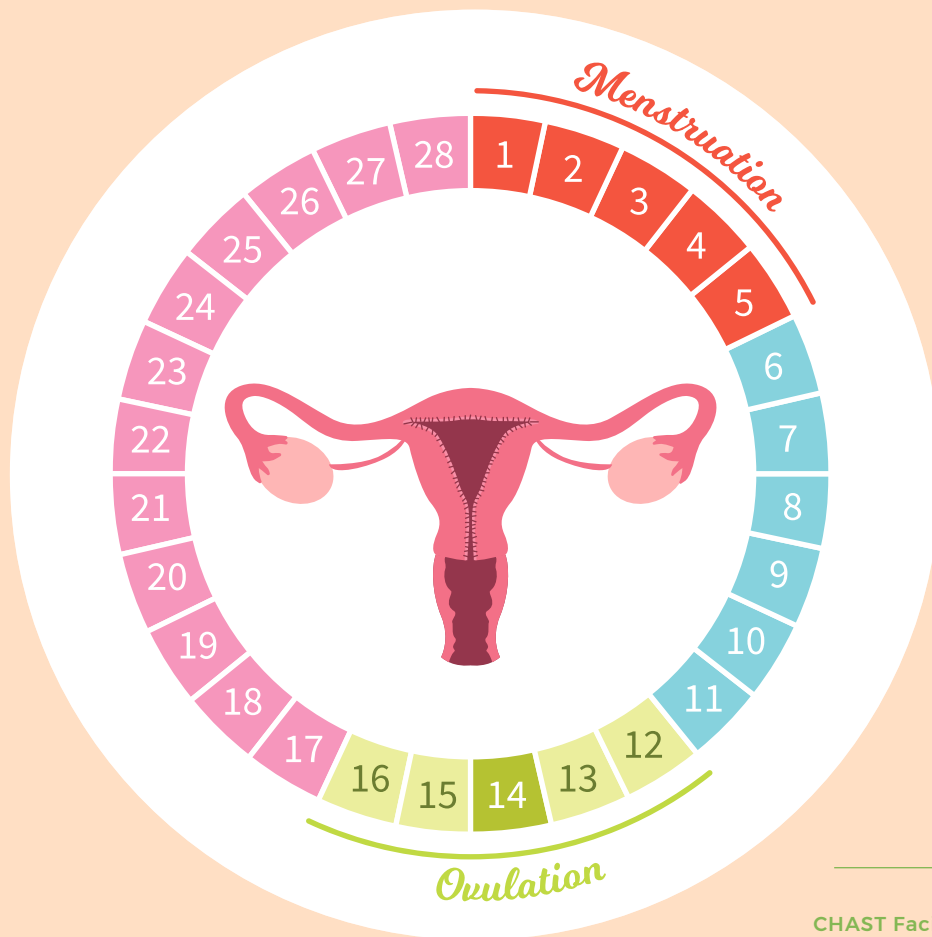


Image source:
CHAST Facilitator's Guide,
2019. Caritas Switzerland.

THE DIFFERENT STAGES OF THE MENSTRUAL CYCLE:

The first day of menstrual bleeding is considered Day 1 of the cycle.

Once the bleeding stops, the lining of the uterus becomes thicker, preparing for the possibility of a pregnancy (day 6 – 14).

Somewhere around day 14, an egg is released from one of the ovaries and begins its journey down the fallopian tubes to the uterus. If sperm are present in the fallopian tube at this time, the woman can get pregnant. In this case the fertilised egg will travel to the uterus and the uterus provides a home to the growing baby.

Day 25 – 28: If the egg was not fertilised, the lining of the uterus comes out through the vagina along with blood and mucus: The cycle begins again on Day 1 menstrual bleeding.

3.6

MY MENSTRUAL CYCLE

For students to better understand what menstruation is, the different stages of the menstrual cycle and why it is a normal process not to be ashamed of.

MATERIALS

CHALK

BLACKBOARD

MENSTRUAL WHEEL
([DOWNLOAD](#))

EXERCISE

- Explain the key facts about how the menstrual cycle works. Make sure to leave enough time for questions.

ADDITIONAL RESOURCES

Minimum Requirement on WASH
in School (WinS)

CHAST Facilitator's Guide, 2019.
Caritas Switzerland.



Image source:
CHAST Facilitator's
Guide, 2019. Caritas
Switzerland.

KEY INFORMATION ABOUT MENSTRUATION:

- Menstruation means a girl's body is growing up. It is preparing for the future when she might get pregnant and have a baby.
- Most girls have their first period between the ages of 11 to 14, although some girls start as early as 8 and some at 17 or older.
- Bleeding usually lasts for 4-7 days and usually happens every month.
- For many years after a girl starts having her period, she may not get her period every month; it can skip months. This is normal.
- In case of any dramatic changes in the cycle patterns, it is important to see a doctor (not getting a period for multiple cycles or very heavy bleeding, very painful cramps etc.)

3.7

MY MENSTRUAL CYCLE CALENDAR

For girls to understand that each girl's cycle is unique and to know how to plan when they will get their period.

MATERIALS

CALENDARS

PENS

ADDITIONAL RESOURCES

Minimum Requirement
on WASH in School (WinS)

CHAST Facilitator's Guide, 2019.
Caritas Switzerland

EXERCISE

- Using a drawing similar to the one on the left, explain how a usual menstrual cycle works (duration, number of bleeding days, etc.).
- Explain to girls how to keep track of their period.
- Explain why keeping track and better understanding of our own menstrual cycle can help plan for the need for menstrual materials and also anticipate pain moments, fertility windows and notice anomalies.



“HOW TO” QUESTIONS



GOOD PRACTICE GUIDANCE FOR GIRLS TO MANAGE THEIR MENSTRUATION



1. How to manage your first period?

- Talk to other girls and women in your community. They will give you good advice.
- Don't be afraid. It is very normal and natural.
- If you are at school, tell the matron, a female teacher or a fellow student.
- Feel proud! Your body is developing into that of a young woman.

2. How to capture the blood?

- Place a cloth, pad, cotton or tissue on your underwear.
- Never insert the materials inside your vagina.
- Change every two to six hours or more frequently if needed.

3. How to dispose of the cloth, pad, cotton, or tissue?

- If you are re-using a cloth, put it into a plastic bag until you can wash it with hot water and soap and then dry it in the sunshine or iron it.
- If you are using a pad, tissue or cotton, or want to dispose of it, wrap it in paper to make a clean package and put it in the bin so it can be burned later.
- If there is no other option, drop it straight in the latrine pit.

4. How to keep yourself clean during your period?

- Every day (morning and evening) wash your genitals with soap and water.
- Keep unused cloths and pads clean wrapped in tissue of plastic bag.
- Pat the area dry with a cloth and put a fresh cloth, pad, cotton, or tissue on your underwear.
- Always wipe from front to back after defecation.
- Never douche (washing out the vagina with water).

5. How to manage the belly pain (cramps) from your period?

- You can put a bottle with hot water on your stomach.
- Try keep your body active.
- Take a cup of tea or warm water.
- Take painkiller medicines every four to six hours on the most painful days.

Image source:
**CHAST Facilitator's
Guide, 2019. Caritas
Switzerland.**

3.8

MANAGING MENSTRUATION HYGIENICALLY AND WITH DIGNITY

For girls to understand that each girl's cycle is unique and to know how to plan when they will get their period.

MATERIALS

CALENDARS AND PENS

ADDITIONAL RESOURCES

Minimum Requirement on WASH in School (WinS)

CHAST Facilitator's Guide, 2019. Caritas Switzerland.

EXERCISE

- With girls only, discuss the following points:
 - How to manage your first period?
 - How to capture the blood?
 - How to dispose of the cloth, pad, cotton or tissue?
 - How to keep yourself clean during your period.
 - How to manage belly pain (cramps) from your period?
- Answers to these questions might be context specific, but the table on the left provides some guidance.



Image source:
WEDC, 2014.



3.9

MENSTRUAL HYGIENE PRODUCTS DEMONSTRATION

For girls to be aware of the range of products
available to use during their menstruation.

MATERIALS

Different types of menstrual
products available locally,
such as

**COMMERCIAL DISPOSABLE
PADS**

REUSABLE PADS

HOMEMADE PADS

COTTON WOOL PADS ETC.

EXERCISE

- Show samples of the range of products available and discuss the advantages and disadvantages of each, how to use them, how to dispose of them, how to clean them etc.
- Where possible, also demonstrate how to place them (using underpants/ needle etc).

ADDITIONAL RESOURCES

CHAST Facilitator's Guide, 2019.
Caritas Switzerland.



Image source:
Green Lady Cambodia

3.10

REUSABLE PAD-MAKING WORKSHOP

For girls to be aware of the range of products available to use during their menstruation.

MATERIALS

FABRIC

SCISSORS

THREADS

SEWING MACHINES (IDEAL
BUT NOT MANDATORY)

ADDITIONAL RESOURCES

Green Lady Cambodia

DIY Washable Pads (hand
sewing)

EXERCISE

- Organise a workshop for making reusable pads. Make sure to adapt it to local practices. You can also invite a community health worker to lead this exercise.
- Make sure to put enough focus on how to wash the pads and how to dry them in the sun or iron them so they remain clean.
- Depending on the materials available, pads can be made by hand or using a sewing machine.

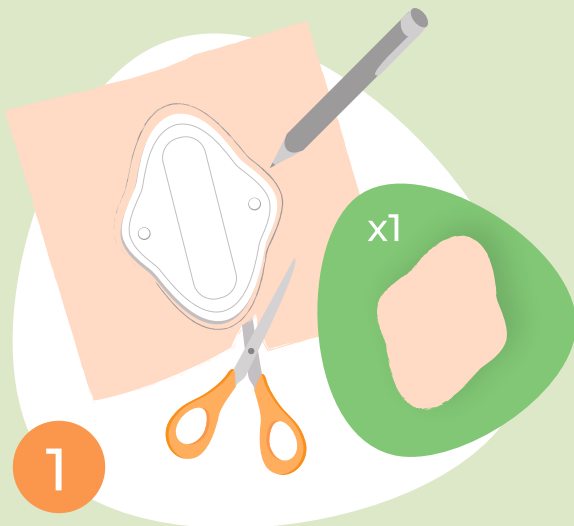
DIY Washable Pads

The material consists of an outer part with two wings:

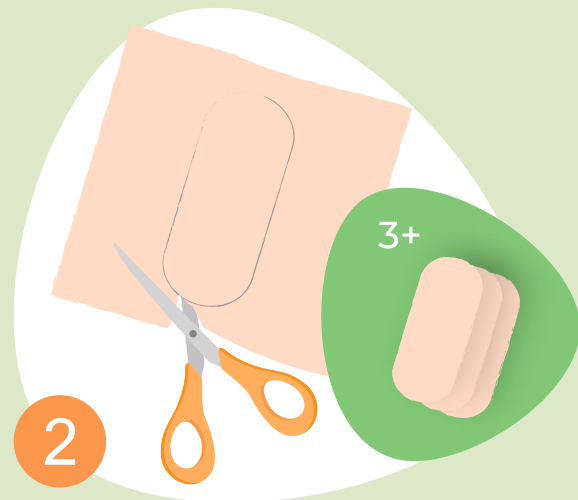
1 piece of clean cloth or cotton that will be used on our skin and as an inner core

1 piece of waterproof pad or umbrella cloth or thin rubber cloth (thick cloth is hotter when using it)

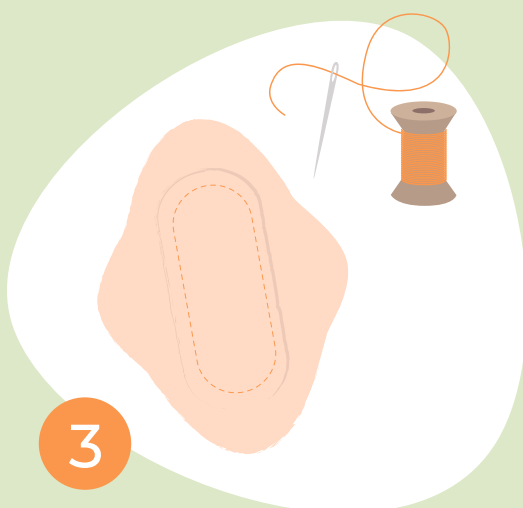
(Yarn / needles / buttons / pens / scissors / cardboard to use as a stencil / fabric)



Use a pen to draw a pattern in the shape of the pad on a piece of cloth or paper, and cut out the shape.



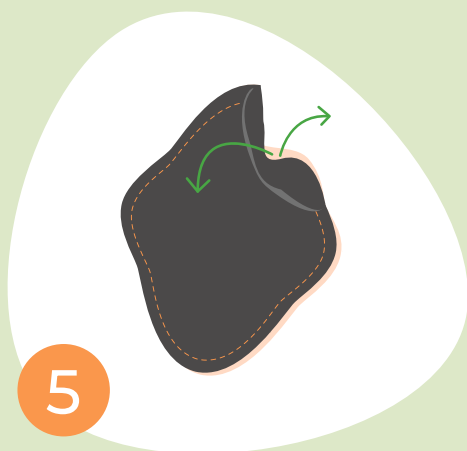
Cut three or more core shapes from the same cloth or cotton. You can cut more depending on how thick you want the pads to be.



Take the piece of cloth that forms the base of the pad and place the cores previously cut out on top. Sew them together in the center of the winged cloth.

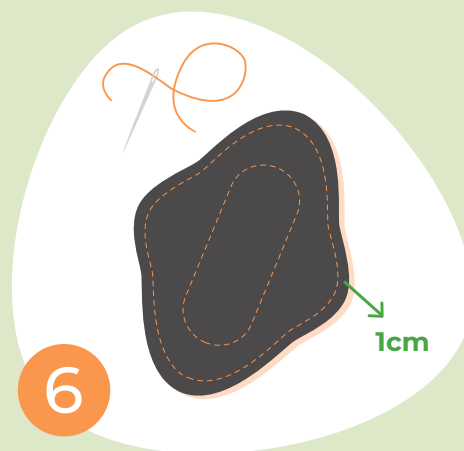


Take the waterproof cloth and cut it in the same shape as the winged cloth. Next, place the back of each material together. (This must be removed later) Sew the seam according to the shape, but keep a small space at the top of the pad.



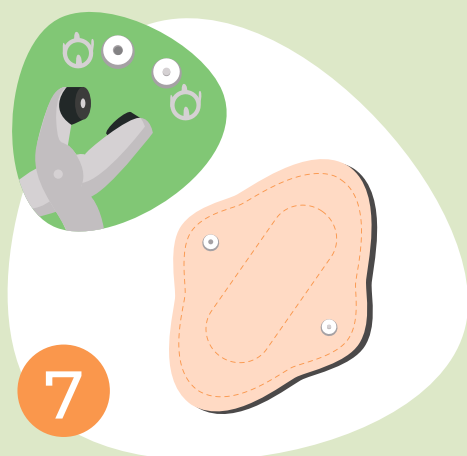
5

Pull out the cloth from the space left at the top of the pad.



6

Next, sew around the cloth 1cm from the edge and around the core materials.



7

Finally, we can make a simple button, use a button clamp, or find another creative way to secure the pad.

Note: There are many styles/shapes of cotton pad to choose from. You can choose the cloth and thickness depending on your requirements.



8

You can make a bag to store the pad in. Cut the cloth in a square shape to the size you want. It is also possible to sew it together with waterproof cloth inside.



9

Connect the materials and attach strings or buttons as desired.



Image source:
Caritas Switzerland



3.11

HOW TO USE PADS

For girls to learn and practice how to use reusable pads.

MATERIALS

UNDERWEAR

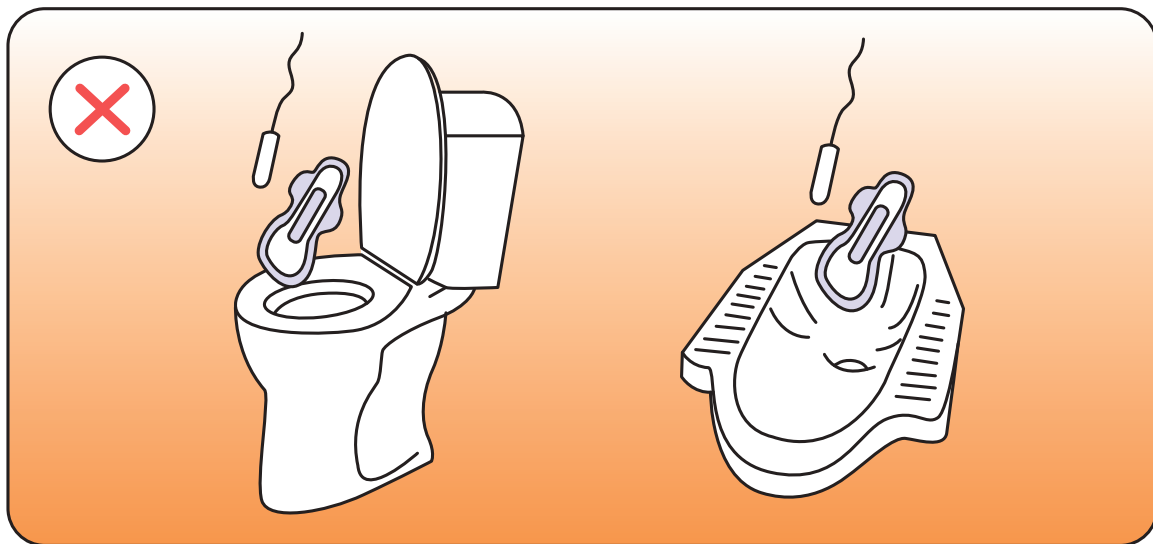
SANITARY PADS

ADDITIONAL RESOURCES

Minimum Requirement on
WASH in School (WinS)

EXERCISE

- With girl students, discuss, demonstrate and practice how to stick the sanitary pad to underwear properly. This can be done in the classroom toilets.
- Make sure to start by washing hands with soap.



Disposing sanitary pad or a tampon

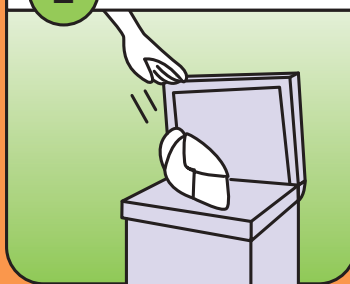
1

Wrap in paper



2

Put in dustbin



3

Close the lid

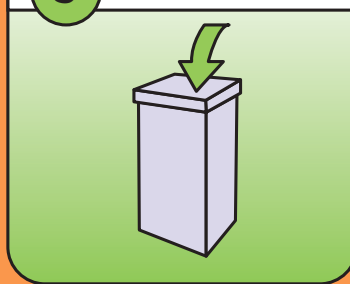


Image source:
Menstrupedia

HOW TO REGULARLY EMPTY BINS:

The usable sanitation pad can be collected and burnt in a standard incinerator or burnt at a nearby healthcare facility incinerator



3.12 DISPOSAL

To discuss with students how to safely and hygienically dispose of menstrual waste (often only girls).

ADDITIONAL RESOURCES

Minimum Requirements on
WASH in School (WinS)

Menstrupedia

EXERCISE

- Ask the girls to draw a map of the school and locate where they have seen or think soiled menstrual materials are being disposed of.
- Initiate a discussion on the importance of disposing safely and hygienically e.g. to keep the environment clean.
- Go to the toilets and demonstrate how to use the available disposal facilities, e.g. bins, and explain what happens after.



CHAPTER 04

FROM WASTE TO RESOURCES.

**THE EXERCISES IN THIS TOPIC
ARE MEANT TO HELP STUDENTS:**

- Understand the importance of waste management and how waste pollutes our environment when not properly handled.
- Learn and experience sustainable waste management practices by **REDUCING, REUSING AND RECYCLING** solid waste.



*“Let’s be part of the Solution,
not the Pollution.”*



CREATIVE ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL ACTIVITY



TECHNICAL BACKGROUND

FROM WASTE TO RESOURCES.



WASTE, ENVIRONMENTAL IMPACT, REMEDYING STRATEGIES.

Waste definition

Waste is a generic term that refers to something that is no longer used and is discarded. It is estimated the world population now generates 1.9 billion tons of garbage each year, of which 30% remains uncollected and is mostly openly burned or dumped somewhere. For the collected fraction, 70% is disposed in landfills and dumpsites.

Environmental impact

Burning and dumping mixed waste are common practices that have a huge impact on human health and the environment.

Burning threat: Even if sometimes not visible, the smoke from burning waste can enter

the lungs through the nose and mouth. The tiny particles can poison the blood, cause respiratory diseases and cancer. Burning waste is even more dangerous when it contains plastic, as this releases harmful pollutants.

Dumping threat: Dumping waste leads to visible plastic accumulation in nature, environmental pollution of soil and water, and is also responsible for the spread of diseases as it encourages breeding of mosquitoes among other disease vectors.

The 3R principles

Waste is produced whenever we stop using a product and discard of it. The best way to minimise the environmental threat of inadequate waste management is to minimise the amount of waste produced by following the 3R principle of

“Reduce, Reuse and Recycle”

Reduce means avoiding waste production by buying and consuming products that create less waste.

Reuse involves the repeated use of a product before you finally discard of it.

Recycle means to make use of the discarded object and transform it into a new product or to recover energy from it.

If we take the example of a plastic bag used to carry things, Reduce means to use only one plastic bag for all the things we buy instead of one plastic bag for each item. Reuse means to utilise the same plastic bag the next time we go shopping. Recycle means to use it for another purpose, for example to produce an eco-brick (see exercise 8.6).



HOW TO IMPROVE WASTE MANAGEMENT IN SCHOOL

The severe threats to human health and environmental pollution from open burning and inappropriate waste management highlights the necessity to safely manage waste at schools and increase knowledge and awareness of students regarding risks, but also to show pathways for improvement.



Waste heterogeneity

Even if we commonly see waste as a single entity, waste is made of different materials, such as plastic, paper, glass and organic waste. Different waste management strategies can be applied for these different materials to enhance their reuse, recovery and recycling. Being aware of the waste composition is a key step to change our view that it is a potential resource instead of something we want to get rid of.

Tasks for good waste management at school:

- Understand the issues of inappropriate waste management
- Identify waste streams and quantities
- Separate waste materials at source into different bins: organic waste, plastic, paper, metal
- Check the Practical Exercises and Catalogue of Technologies for Topic 8 to see what you can do with each fraction.



4.1 WASTE COLLECTION DAY

For students to understand the impacts of dumping and throwing waste away.

MATERIALS

PLASTIC BAG FOR WASTE
COLLECTION

GLOVES

NOTEBOOK

PENCILS

SCALE (MANDATORY)

EXERCISE

- Organise a waste collection day at a water body (river, stream, lake), green area, or any place where students play in their free time.
- At the end of the day, report the amount of waste collected (number of plastic bags filled or the total weight) in a notebook.
- Discuss the results with the students.
You can ask the following questions:
 - What are the most predominant waste types collected (plastic/ metal/ glass/ paper/ organic)?
 - Where does the waste comes from?
 - What can be done to avoid that waste being dumped into the environment?





POLLUTION OF...

- Farmland
- The air we breath
- Drinking water
- Lakes, rivers, & canals
- Wildlife areas & tourist attractions

HEALTH RISKS...

- Students' growth stunted
- Cholera & Diarrhoea
- Eye & skin infections
- Respiratory & Reproductive health problems
- Polluted air, water & food

ECONOMICS OF...

- Social ill-health & unrest
- Cleaning polluted areas
- Flooding due to blocked drains
- Climate change emissions
- Damage to livestock & wildlife
- Loss of business & tourism

Image source:
Wasteaid

4.2

IMPACTS OF UNMANAGED WASTE

The objective of this activity is to familiarise students with the issues of not managing waste properly when openly burning or dumping it.

MATERIALS

NONE /
(PENCILS AND PAPER)

ADDITIONAL RESOURCES

Wasteaid toolkitt

EXERCISE

- Discuss the issues of burning mixed waste with plastic and dumping waste with students.
- The discussion can start by asking students if they have burned or seen somebody burning mixed waste (with plastic) and if they think it is a good practice or not, and why. The same questions can be asked for the issue of dumping waste.
- Once they have shared their own experiences, provide them with the information given on environmental and health threats. Discuss this with them and define what can be done to avoid these problems.



WHAT SHOULD BE
DONE TO IMPROVE
THE SITUATION?

Image source:
UNDP in Cambodia

4.3

VISIT A LANDFILL/DUMPSITE

To familiarise students with the issues of not managing waste properly when openly burning or dumping it.

MATERIALS

APPROPRIATE SHOES

LOCAL AUTHORISATION
TO VISIT THE SITES

(TRANSPORT)

EXERCISE

- Organise a visit to the closest dumpsite or landfill. Before reaching the site, ask students where they think their waste ends up and to describe what a landfill/dumpsite looks like. At the site, give students information provided in the Technical Background regarding annual amounts of waste generated and dumped.
- At the end of the day, collect impressions on what they think about the visit, what was the most impactful thing they saw and what they would suggest should be done to improve the situation.





Image source:
Caritas Switzerland in
Cambodia

KEY INFORMATION

Biodegradation is a biochemical process in which materials are dissolved by bacteria and micro-organisms. In nature, different materials degrade at different speeds depending on their structure and composition. The main materials and corresponding degradation times are shown in the table.

4.4 WASTE DEGRADATION RATE

To familiarise students with the long-term impact of throwing waste away.

MATERIALS

PENCILS

PAPER

SCISSORS

EXERCISE

- Make cards for each material and each degradation time separately and put them in two piles. Shuffle each pile and lay them out on a desk.
- Ask students to pair the material cards with the correct corresponding degradation time card. Students should explain their choices.
- Once all material cards have been assigned to a degradation time, share the correct answers and ask students to make a drawing representing what they have learned.



Calculate the
waste generation
per person.



Image source:
Practical Tools for
Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart

4.5 WASTE ASSESSMENT

To enable students to evaluate their waste production.

MATERIALS

**BIG PLASTIC BAGS FOR
WASTE COLLECTION**

BASKET

GLOVES

PLASTIC SHEET (2X2M)

NOTEBOOK

PENCILS

SCALES

ADDITIONAL RESOURCES

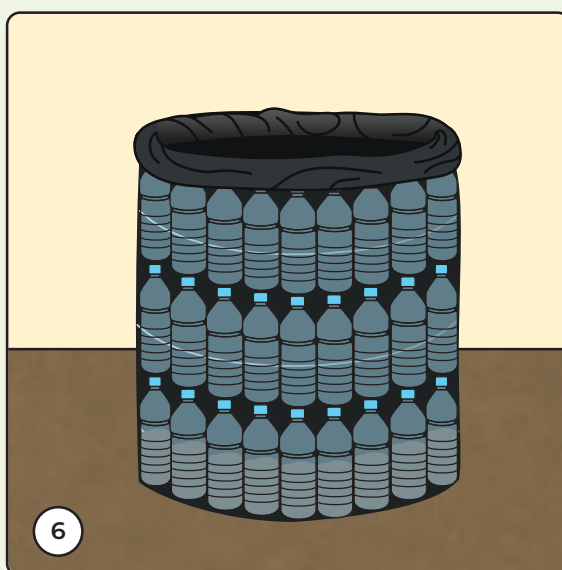
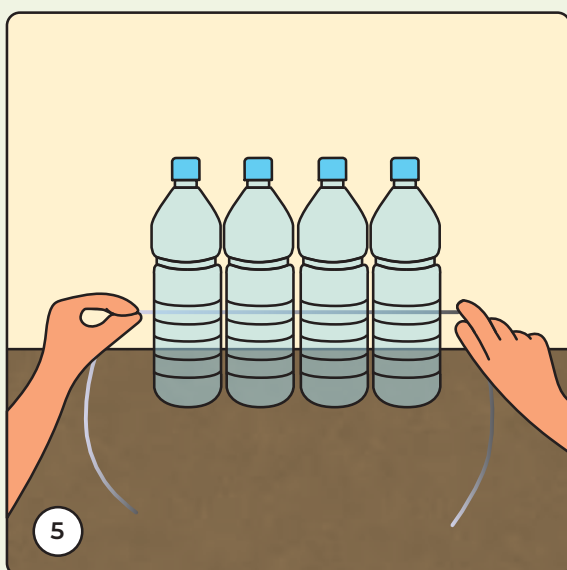
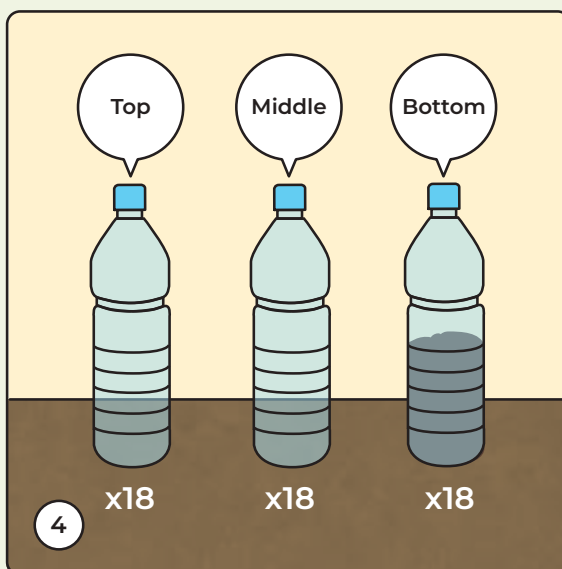
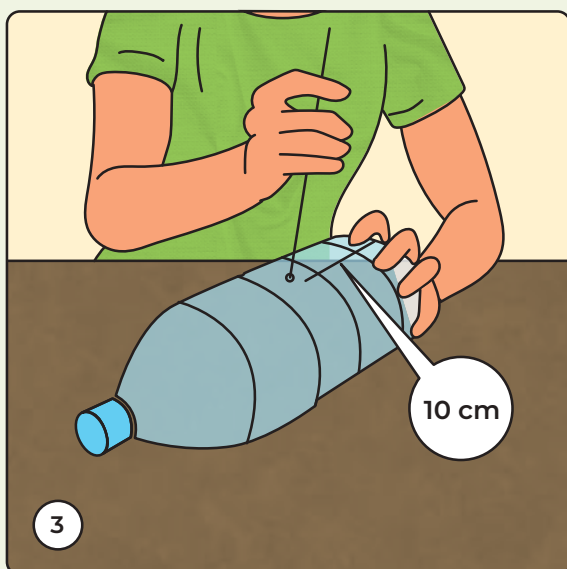
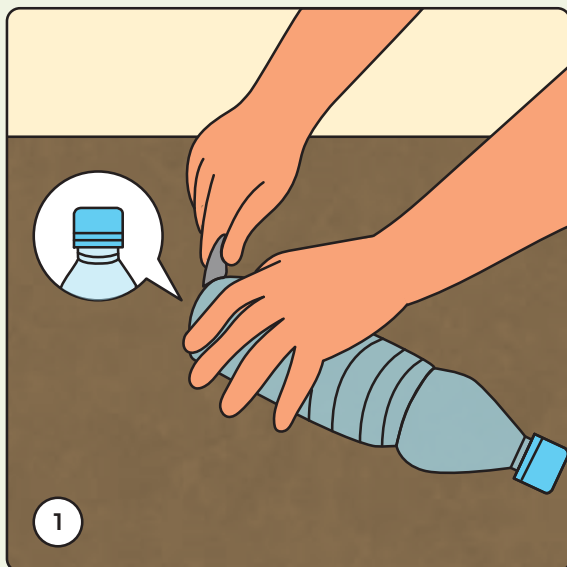
Minimum Requirement on
WASH in School (WinS)

Wastewise Toolkit

**Live and Learn, Practical
Tools for Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart**

EXERCISE

- Note the number of students and teachers for each classroom.
- With students, collect the waste produced in one week from the waste bins.
- Ask students to wear gloves and separate the waste into five piles of different materials: organic waste, paper, plastic, metal and glass.
- Weigh each fraction by putting it into a basket and measuring it on a scale. Subtract the empty basket weight to calculate the net amount of waste generated for each fraction. Ask students to report the measurements in their notebook and calculate the percentage of each fraction over the total waste analysed. Rank the fractions according to their percentage.
- With the assessed number of students and teachers per classroom, calculate the waste generation per person.
- At the end of the activity, discuss with the students the most predominant generated waste fractions (plastic/ metal/ paper/ organic) and what can be done to reduce these amounts.





4.6

WASTE BINS FROM PLASTIC BOTTLES

To familiarise students with waste recycling and waste separation.

MATERIALS

36 CLEAN PLASTIC BOTTLES
OF SAME SIZE

KNIFE

PLIERS/WIRE CUTTER

CANDLE

TRASH OR SAND/SOIL

WIRE

BIG PLASTIC/JUTE BAG

CARDBOARD

PENS

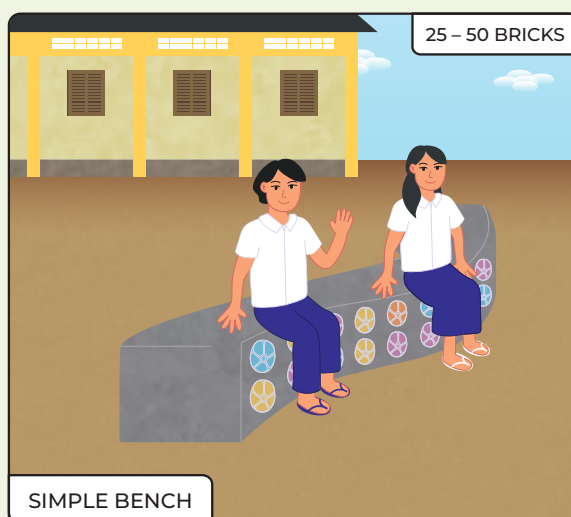
ADDITIONAL RESOURCES

[Wikihow Guidelines](#)

EXERCISE

Waste bins can be made out of plastic bottles in the following steps:

- Cut a hole at the bottom of 36 bottles the same size as the bottle cap, so another bottle can snap right in and not fall out. This can be done with a sharp knife or by heating a knife in a candle for a few seconds.
- Fill another 18 bottles halfway with trash, soil/sand. These bottles will be used to make the bottom row of the bin to provide some weight.
- Measure 10cm from the bottom of each bottle and put a mark on both sides. Use a candle to heat a piece of wire and poke two holes through the markings.
- Make three rows of 18 bottles each. The row of bottles with trash or sand/soil is at the bottom. Snap an empty bottle (with a hole at its bottom) onto each bottle top of the row of bottles with trash or sand/soil and then make another row on top.
- Line up all three rows. Start inserting a wire through the side holes of the bottom row. Repeat again for the middle row of bottles and then the top row. To make it easier, keep the bottles in a line as you insert the wire.
- After inserting the wire through the whole row, bring the two ends of wires together and fix them together with wire cutters. Adjust the bottles so they are standing as straight as possible. Put a big plastic or jute bag inside and make a sign of what type of waste should be thrown into this bin.



4.7

ECOBICKS BUILDING WITH PLASTIC

To demonstrate to students how to recycle plastic waste by producing a building material.

MATERIALS

PET BOTTLES

SOFT PLASTIC

STICK

ADDITIONAL RESOURCES

[Ecobrick Construction Guide](#),
[Wasteaid toolkit](#)



Image source:
Eawag

EXERCISE

To create an Ecobrick, the following steps need to be undertaken:

- Clean, dry and collect soft plastic waste.
- Compress the waste into a plastic bottle with a stick.
- Pack tightly many bags into the bottle until the bottle cannot be squeezed by hand at its sides.
- Squeeze with one hand to measure if it is full enough (for reference, a 1.5 litre PET bottle should weight around 400g). Then close with a bottle top.
- Once enough Ecobricks are produced construction can begin. See the additional resources for more information. If you don't have enough Ecobricks or space for construction, you can also use them as an efficient way to store plastic waste.



**REDUCE
WASTE,
MAKE A BAG!**



Image source:
Practical Tools for
Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart



4.8

REDUCE WASTE-MAKE A BAG!

For students to understand how to reduce waste using plastic bags and how to recycle the waste.

MATERIALS

SCISSORS

CLOTH

SEWING NEEDLES
AND THREAD

MARKERS OR PAINT
TO WRITE ON THE BAG.

ADDITIONAL RESOURCES

*Live and Learn, Practical
Tools for Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart*

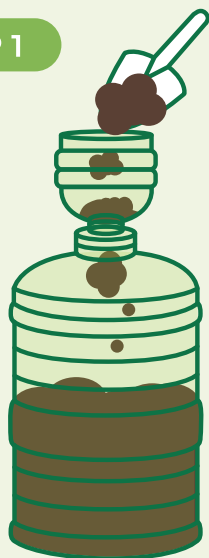
EXERCISE

**To create a bag, the following steps
need to be undertaken:**

- Break the class up into groups and give them some fabric, scissors, needles, threads and coloured markers.
- Demonstrate how to make a bag using the materials and give them time to replicate the same.
- Once ready, engage students in a discussion on the importance of reducing plastic waste, and to reuse and recycle it as much as possible.



STEP 1



STEP 2



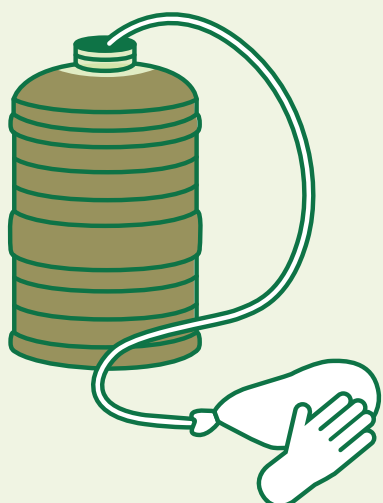
STEP 3



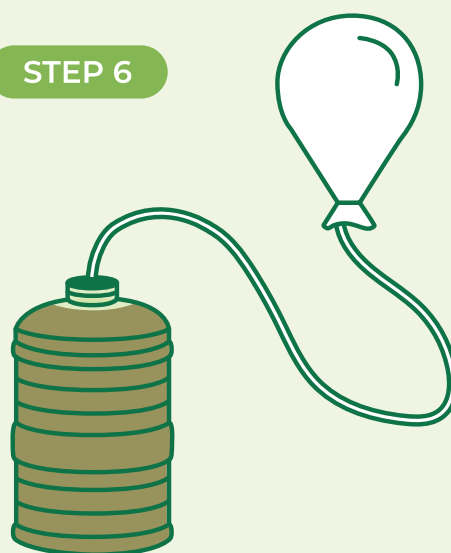
STEP 4



STEP 5



STEP 6





4.9

TURNING ORGANIC WASTE INTO BIOGAS

For students to understand how to turn organic waste into biogas.

MATERIALS

BIOGAS DIGESTER,

1-2M PIPE

LARGE BALLOON

TAPE

WATER

ANIMAL MANURE SUCH AS
PIG, COW, CHICKEN...

PLANT LEAVES

GRASS

FOOD WASTE

ADDITIONAL RESOURCES

*Live and Learn, Practical
Tools for Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart*

EXERCISE

Put animal manure, plant leaves, food waste and water into a biogas digester by following the process below:

Cut the bottom off a 4 litre plastic milk/water bottle to make a wide-mouthed funnel.

1. Place the funnel into the neck of the plastic bottle and scoop in small amount of manure.
2. Use a stick or piece of dowelling to push the manure through the neck of the bottle if it gets plugged.
3. Add enough water to bring the level close to the top of the water bottle.
4. Make a hole in the cap of the water bottle, insert a pipe through it and seal the cap on the bottle in an airtight manner. Attach the deflated large balloon at the other end of the pipe and seal with tape.
5. Store the biogas digester somewhere safe where no one can tamper with it. After two weeks, gas will begin to accumulate in the balloon. You can check to see if this gas is methane and will burn by attempting to light the Bunsen burner.
6. Ask some students to conduct this test. One student can open the clamp or valve so that biogas can flow from the balloon to the Bunsen burner. Another student can squeeze the Mylar balloon gently while you (the teacher) attempt to light the Bunsen burner with a match or spark igniters.

If your Bunsen burner ignites, your biogas is a success!



CHAPTER 05

FROM SOIL TO FOOD.

THE EXERCISES IN THIS TOPIC
ARE MEANT TO HELP STUDENTS:

- To understand the crucial role of biodiversity and sustainable agriculture techniques in our food growing systems.
- To observe soil composition and its connection with plants and water.



*“A society grows great
when old men plant trees
whose shade they know
they shall never sit in.”*

GREEK PROVERB



CREATIVE ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL ACTIVITY





TECHNICAL BACKGROUND

FROM SOIL TO FOOD.



SOIL

For millennia, life on earth has been sustained by a thin layer of fertile soil on the earth's crust. This top 36-39 inches of soil is a highly sophisticated living ecosystem and among humanity's most precious non-renewable geo-resources. Soil supports agriculture, which accounts for 95% of our food. It houses the rich biodiversity of the plant kingdom which does the work of converting carbon dioxide into life-sustaining oxygen. It absorbs, filters and regulates the flows of freshwater bodies. And it plays a vital role in climate change mitigation and adaptation by storing carbon (carbon sequestration) and decreasing greenhouse gas emissions into the atmosphere.

But healthy soil is disappearing fast. Agriculture, deforestation and other factors have degraded and eroded topsoil at alarming rates. Globally, 52% of agricultural land is already degraded. The equivalent of one soccer pitch of soil is eroded every two seconds. This erosion far outstrips the natural regeneration

rate of about 1 inch every 1000 years. Much of what remains is stripped of organic matter, resulting in dramatic declines in agricultural productivity of the soil.

Conscious Planet

LOW EXTERNAL INPUT SUSTAINABLE AGRICULTURE (LEISA) AND ORGANIC AGRICULTURE

Adopting sustainable practices for food production is possible and has proven effective and productive in many different countries and settings all over the world.

LEISA and organic agriculture are both examples of those new paradigms for agriculture, food production and farming

FURTHER RESOURCES

Farming Matters, magazine on agro-ecology and LEISA:

REIJNTJES, c., et al, Farming for the future: an introduction to LEISA, 1992

HOLMGREN, D., Permaculture: principles and pathways beyond sustainability", 2002

MOLLISON, B., Permaculture: a designer's manual, 1988

systems. They represent not only a viable alternative to industrial agriculture, but maybe also a real hope, if not the only hope, for a positive and abundant future for humanity on this planet. Today, one important approach for implementing organic agriculture principles is permaculture design.

LEISA and permaculture, although not entirely the same, share common key strategies:

- The maximum use or sharing of local resources available on the homestead and the community (tangible assets, vegetation, animals, manual labour, knowledge, etc.);
- The aim is to reduce as much as possible dependence toward external resources (such as energy, water, seeds and agro-chemicals) for health, ecological and economical reasons;
- The will to reduce waste;
- The importance of observing, assessing the needs, planning ahead and designing the food



production systems to maximize their efficiency and minimize their environmental impacts;

- The importance of interacting with and accepting feed-back from the system, as a guidance to operate necessary changes;
- The utmost respect for the surrounding natural ecosystems (forests, watersheds, etc.) which support all life on Earth, including ours as humans.



Image source:
Caritas Switzerland
in Cambodia

GRADE



OUTDOOR
ACTIVITY

5.1

SOIL PREPARATION FOR VEGETABLE PLANTING

To demonstrate to students how to recycle plastic waste by producing a building material.

MATERIALS

TANKS

MIXING MATERIALS

EXERCISE

With the students, get them involved in soil mixture for vegetable planting activities by following these steps:

- Mix seven parts of soil with three parts of dry animal manure and three parts of rice husk charcoal.
- Stir the mixture well and store it in the plastic bag for 15 days.
- After mixing, ask students to prepare the garden and start planting.



5.2

NURSERY BEDS IN SCHOOLS

To demonstrate to students how to recycle plastic waste by producing a building material.

MATERIALS

CONTAINER
FOR MIXING SOIL

PLASTIC BAGS

DRY MANURE

RICE CHARCOAL

SOIL

WATER.

EXERCISE

There are many methods to sow seeds or plant cuttings. It depends on the specific plants you want to grow. Equally, for soil preparation, there are different mixing 'recipes'. Below is what has been practiced in some schools in Cambodia.

Soil preparation: engage students in mixing:

- 3 parts dry manure fertiliser
- 7 parts rice charcoal
- 7 parts normal soil

- Place the mixture into small containers (can be plastic bags).
- Let it rest for two weeks, ensuring it is watered every two to three days.
- For cuttings: put the plants deep in the soil mixture bag, cover it from direct sunshine and water daily.
- For seeds: plant the seeds in the soil and water daily.



Image source: Caritas
Switzerland in Cambodia



Image source:
**Practical Tools for
Schools, Tonle Sap
Sustainable Livelihoods
- School Flipchart**

5.3

GROWING PLANTS IN PLASTIC BOTTLES

For students to experiment how to reuse plastic bottles by growing plants in them.

MATERIALS

PLASTIC CONTAINER

SOIL AND SEEDS

ADDITIONAL RESOURCES

Live and Learn, Practical
Tools for Schools, Tonle Sap
Sustainable Livelihoods -
School Flipchart

EXERCISE

To grow plants in plastic bottles, the following steps need to be undertaken:

- Encourage students to keep and collect plastic containers, such as water bottles.
- Cut the top of the plastic containers and put small holes in the bottom for drainage.
- Place a piece of paper in the bottom of the container and fill it with soil to plant the seeds or small plant.
- Involve students in taking care of the small plant and observe how it grows.



“THERE ARE MANY WAYS TO MAKE COMPOST.”

BELOW IS A SIMPLE METHOD:

Dig a pit 20-30 cm deep and approximately 1X1m in size.

Build the compost layers alternating dry plant material, wood ash, animal droppings, top soil and green plant materials. As a rule of thumb, the ratio of 50% green and 50% brown material usually works well. Mostly, avoid putting more green than brown material.

Water well as you go to keep the dry layers moist and activate the composting process.

If you can find compost worms, add them to the bottom layers of the heap as they tend to work their way up. In this case, do not add wood ash!

After three weeks, turn the compost around and leave it for approximately another three weeks.

When the compost is ready (dark brown crumble, smells nice), apply it to crops or sieve it and use for potting.

Image source:
KONRAD ADENAUER
STIFTUNG (KAS
Cambodia)

5.4

MAKING A COMPOST PIT

For students to experiment how to reuse plastic bottles by growing plants in them.

MATERIALS

APPROPRIATE TOOLS TO DIG
(SPADES OR OTHER)

BROWN (DRY) VEGETAL
MATERIAL

GREEN (WET) VEGETAL
MATERIAL

ANIMAL DROPPINGS

MANURE

WOOD ASH

ADDITIONAL RESOURCES

fourthway.co.uk

Other method:
The 18 days compost recipe

KONRAD ADENAUER
STIFTUNG (KAS Cambodia)

EXERCISE

To create a compost pit, the following steps need to be undertaken:

- Engage students in collecting and disposing in a compost pit organic waste from:
- Snack sellers (students' leftover lunch).
- The school garden.
- The school compound (such as leaves).
- With students, regularly monitor the compost moisture and temperature.
- Based on this, regularly turn the mixture around and add water if needed.
- The process takes from three to six months. If you want the composting process to be quicker, you can cut the waste in smaller and same sized pieces.
- See Technology 8.1 for more details on how to make a compost pit.

REMARKS

Make sure the compost heap is placed in an area that is not prone to flooding and in the shade, for example under a tree to protect it from direct sunlight and rain as much as possible.

Another tip is: if the compost smells bad, there is something wrong. The compost is probably saturated with nitrogen. In this case, add more dry vegetal material. You can use a temperature stick to make sure the heat rises in the compost heap, which indicates the composting process is occurring. If it doesn't, add a little water and green material to the heap.



**“THE IDEAL
MOISTURE CONTENT
OF A COMPOST HEAP
IS AROUND
50-60%”**



5.5

COMPOSTING MOISTURE TEST

For students to understand how to check
for the right moisture content of a compost heap.

MATERIALS

GLOVES

ADDITIONAL RESOURCES

CCAC Handbook

EXERCISE

- Put on a glove and take a handful of material from the centre of the compost heap.
- Squeeze the material in your hand and observe what happens:
 - If you can squeeze water out of it: the compost is too wet.
 - If it does not release water or just a few drops: it is just right.
 - If it does not release water but crumbles apart when released: it is too dry.
- Based on your observation, if it is too wet you can either add dry materials or turn the heap during a warm and sunny day to allow moisture evaporation. If it is too dry you can sprinkle the heap with some water.



Image source:
Terre des Hommes
(Bangladesh)

5.6

KEYHOLE GARDEN

For students to practice vegetable production in an efficient and productive way, even when only a small space is available.

MATERIALS

A 3X3M SPACE

BRICKS, OR STONES, OR ETC.

TOP SOIL

COMPOST

WELL ROTTED MANURE

WOOD ASH

STRAW

PEGS (STURDY AND BENDY)

NATURAL STRING

ADDITIONAL RESOURCES

Send a Cow UK - The Bangladeshi version can be seen [here](#)

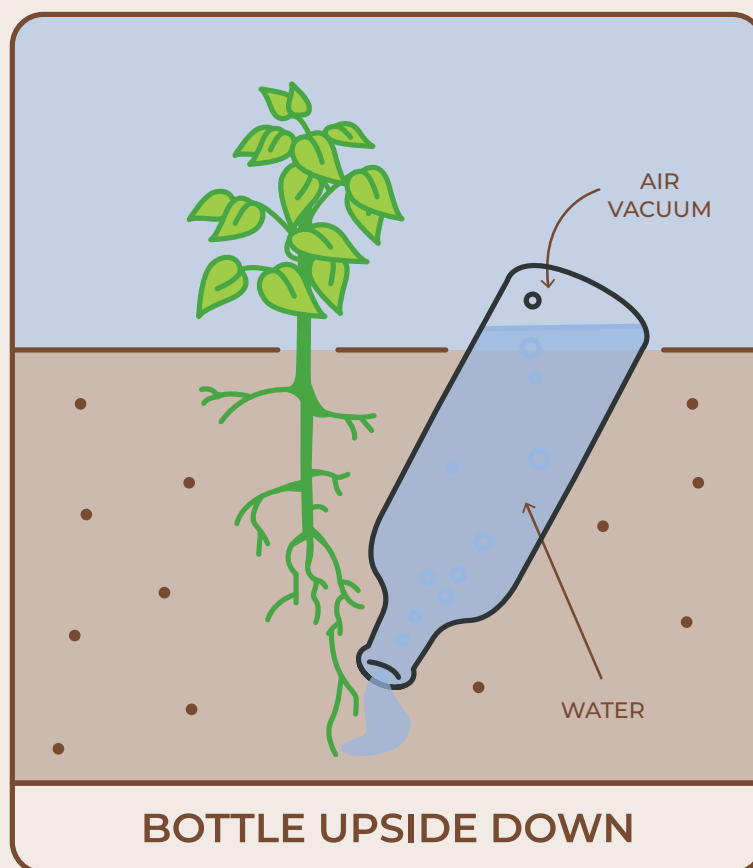
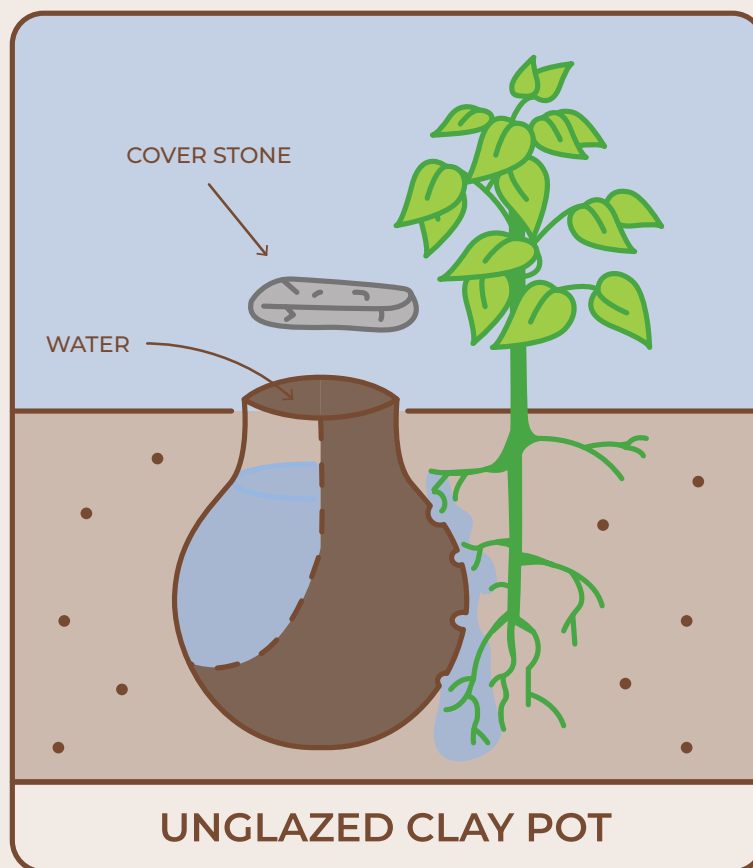
REMARKS

It is important to build these gardens following the main basic principles, such as the size of the garden (3m across is maximum), make the central compost basket the right size, and use locally available materials.

EXERCISE

Engage students in the construction and maintenance of the keyhole garden. To build a keyhole garden, you need to follow these steps:

- Measure and mark a circle for the central compost basket (roughly 50cm radius).
- Measure and mark the circle for the garden (150cm), with V-shaped access to the compost basket.
- Build the compost basket and start filling it with dry materials, green materials, wood ash and manure. Sprinkle water on the dry layers.
- Build the garden's border with stones or bricks (or anything else available, such as logs or banana stems).
- Mix and add the soils as you build the garden walls (with top soil, well rotted compost and manure, and straw or dry vegetal matter). Heap the soil towards the compost basket, creating a little mound (this facilitates the plants access to nutrients in the basket and increases the surface available for cultivation).
- Cover the compost basket to protect it from sunlight or excess water during rainy season.
- Leave the garden to rest and settle for a week before planting seeds or seedlings.



5.7

BURIED POT FOR PLANTING CROPS

Help students understand effective methods for making water available to crops while minimising evaporative loss.

MATERIALS

UNGLAZED POTS

ADDITIONAL RESOURCES

SSWM_Manual Irrigation

EXERCISE

- Arrange the unglazed pots with small holes to enable water to slowly seep out and reach the roots of the plants
- Bury the pots in a cluster near to the plant's roots
- Put water in the pots and make sure it is regularly topped up



CHAPTER 06

MY SUR- ROUNDING ENVIRON- MENT

**THE EXERCISES IN THIS TOPIC
ARE MEANT TO HELP STUDENTS:**

- Understand the opportunities and resources that our surrounding environment offers, as well as its fragility.
- Understand the importance of vegetation cover, particularly trees, for the environment.



*“The environment is
everything that isn’t me.”*

ALBERT EINSTEIN



CREATIVE ACTIVITY



DEMONSTRATION



EXPERIMENT



GAME



OUTDOOR ACTIVITY



PARTICIPATORY
ACTIVITY



DISCUSSION



FIELD VISIT



PRACTICAL ACTIVITY



TECHNICAL BACKGROUND

MY SUR- ROUNDING ENVIRON- MENT.



DEFORESTRATION

Deforestation happens when people change the land into farms, pasture land and cities. A lot of deforestation is caused by the removal of all the trees from a forest for wood or fuel. The loss of trees, which anchor the soil with their roots, causes widespread erosion, especially severely throughout the tropics. Only a minority of areas have good soils, which after clearing are quickly washed away by heavy rains. When forests are cleared or burnt, stored carbon is released into the atmosphere, mainly as carbon dioxide. Cambodia has one of the worst deforestation rates in the world. Since 1970, Cambodia's primary virgin rainforest cover went from over 70 percent in 1970 to 3.1 percent today. Deforestation accounts for around 18% of all global greenhouse gas emissions due to human activities. It is a major contributor to global warming. Forests are vital for life, home to millions of species, they protect soil from erosion, produce oxygen, store carbon dioxide, and help control climate. Deforestation by humans is causing all of these necessary functions to be lessened, and hence damaging the atmosphere even further. (FAO)

SOIL EROSION

Soil is formed in the breakdown of organic and inorganic materials, sediments of sand, and smaller particles, sometimes containing the remains of organisms. Soil erosion is a natural process that occurs on all land. The agents of soil erosion are water and wind, each contributing a significant amount of soil loss each year. Soil erosion and degradation are now so severe worldwide that our ability to grow food is being threatened. Soil erosion may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing serious loss of topsoil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality, and damaged drainage networks. The rate and magnitude of soil erosion by water is controlled by these factors: rainfall intensity and runoff, soil erodibility, slope gradient and length, and vegetation.

(Benchmarks for Science Literacy)



MY RIVER BASIN

A river basin is very similar to a watershed. It is the portion of land drained by a river and its tributaries. This river system builds the alluvial plain, the fertile land suitable for paddy rice and other crops. It enables irrigated agriculture, supplies wetlands with fresh water and provides drainage after floods. In addition, the river is the habitat of a variety of fish and other aquatic species with rich nutrients for their proper living conditions. It also supports domestic water and irrigation water supply and provides a major means for transportation of people and goods.

A river basin is characterized by its topography, shape, size, soil type, and land use. Problems (such as flooding, soil erosion or water table decrease) arise, if water and/or land is not managed appropriately.

Activities such as deforestation, intensive agricultural practices, overuse or pollution of water bodies or inappropriate spatial planning can result in severe threats to human health which can affect down-stream populations, in terms of quality and quantity of water available. This highlights the necessity to safely manage

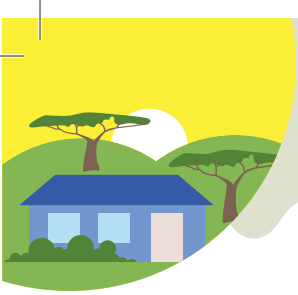
water and land, and thus create increased knowledge and awareness of students regarding risks but also show pathways for improvement to the river basin around the school.

Theonle Sap is the largest fresh water body in Southeast Asia, situated in central Cambodia. It is linked to the Mekong River and provides a home and livelihood to one third of Cambodia's population through its freshwater/ fish resources and flood plains. The Tonle Sap lake operates on a flood-pulse system, like a beating heart, emptied and filled through the arterial Tonle Sap River, a major tributary of the Mekong.

During the dry season, the eponymous river is pushed toward the Mekong.

In the rainy season, the Mekong River overflows, expanding the size of the lake by up to five times. The water level in numerous other streams around the lake also rises leading to the creation of a complex delta system, which provides habitats for a variety of species with different characteristics such as floodplains and freshwater swamps, and seasonally flooded rice fields and grasslands.

(UNESCO, 2015 and 2019 Census).



As the human population has expanded, more and more land has been cleared for agriculture and other pursuits that degrade the soil and make erosion more likely to occur. This in turn has a detrimental effect on biodiversity—the ability of plants, animals, insects and humans to work together for healthy soil.



AGRICULTURE

When agricultural fields replace natural vegetation, topsoil is exposed and can dry out. The diversity and quantity of microorganisms that help keep the soil fertile can decrease, and nutrients may wash out. Soil can be blown away by the winds or washed away by rains.

DEFORESTATION

Without plant cover, erosion can occur and sweep the land into rivers. The agricultural plants that often replace the trees cannot hold onto the soil and many of these plants, such as coffee, cotton, palm oil, soybean and wheat, can actually worsen soil erosion. As land loses its fertile soil, agricultural producers move on, clear more forest and continue the cycle of soil loss.



OVERGRAZING

The conversion of natural ecosystems to pasture land doesn't damage the land initially as much as crop production, but this change in usage can lead to high rates of erosion and loss of topsoil and nutrients. Overgrazing can reduce ground cover, enabling erosion and compaction of the land by wind and rain. This reduces the ability for plants to grow and water to penetrate, which harms soil microbes and results in serious erosion of the land.



USE OF AGROCHEMICALS

Pesticides and other chemicals used on crop plants have helped farmers to increase yields. Scientists have found that overuse of some of these chemicals changes soil composition and disrupts the balance of microorganisms in the soil. This stimulates the growth of harmful bacteria at the expense of beneficial kinds.

The loss of fertile soil makes land less productive for agriculture, creates new deserts, pollutes waterways and can alter how water flows through the landscape, potentially making flooding more common.

DESERTIFICATION

Desertification can be characterized by the droughts and arid conditions the landscape endures as a result of human exploitation of fragile ecosystems. Effects include land degradation, soil erosion and sterility, and a loss of biodiversity, with huge economic costs for nations where deserts are growing.



LOSS OF ARABLE LAND

Arable land is any land that can be used to grow crops. Many of the practices used in growing those crops can lead to the loss of topsoil and destruction of soil characteristics that make agriculture possible.



LOGGED AND POLLUTED WATERWAYS

Soil eroded from the land, along with pesticides and fertilisers applied to fields, washes into streams and waterways. This sedimentation and pollution can damage freshwater and marine habitats and the local communities that depend on them.

INCREASED FLOODING

Land is often transformed from a forest or other natural landscape, such as floodplains and wetlands, into a crop field or pasture. The converted land is less able to soak up water, making flooding more common. There are methods to improve soil water holding capacity as well as restoration and maintenance of wetlands. (worldwildlife.org).



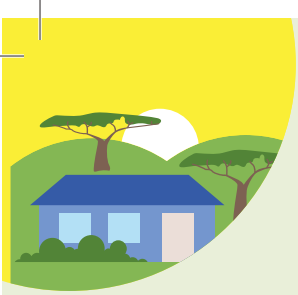


Image source:
Caritas Switzerland,
Cambodia



GRADE



FIELD VISIT

6.1 TRANSECT WALK

Help students understand effective methods for making water available to crops while minimising evaporative loss.

MATERIALS

NOTEBOOKS OR PAPER

PENCILS

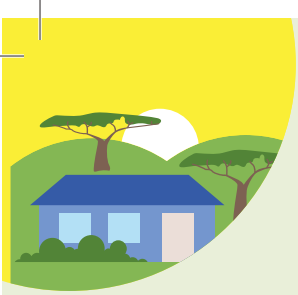
CAMERA (IF AVAILABLE)

ADDITIONAL RESOURCES

CLTS (focusing on sanitation)
SSWM Geoparticipation World
Bank Group

EXERCISE

- Take students on a walk outside the school and ask them to make notes about their environment's characteristics, resources and vulnerabilities.
- Take some breaks and discuss with them what they have observed.
- Observations can be noted and shared in group discussion and as part of a mapping exercise.



6.2

WHAT THE ELDERS SAY

For students to become aware of how quickly their surrounding environment is changing and the impact these changes have on people. This can be in the positive and negative sense.

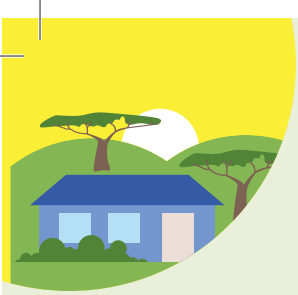
MATERIALS

NOTEBOOKS OR PAPER

PENCILS

EXERCISE

- For homework, ask students to speak to a village elder or parent about the changes they have observed in their environment since their childhood and how it has impacted their lives. This can be as broad as infrastructure improvements and more houses, to less trees and pastures, etc. Impact can be positive or negative.
- At school, ask students to report what they have heard and use these examples to put the changes into perspective and clarify the cause/effect relations.



WHY ARE TREES IMPORTANT?

- They provide shelter, living environment (habitat) and shade to many other creatures and plants (biodiversity)
- They maintain soil moisture for a long time without rain and help in this way to prevent soil from drying out and being blown away by wind or washed away by water (erosion)
- They provide food to humans, animals and other plants
- They can be used for fuel (cooking, heating), fodder for livestock and as timber to build houses, furniture tools and many other things
- They breathe and absorb carbon dioxide (the main greenhouse gas causing global warming) from the air and store it for as long as they are not burnt or decayed.

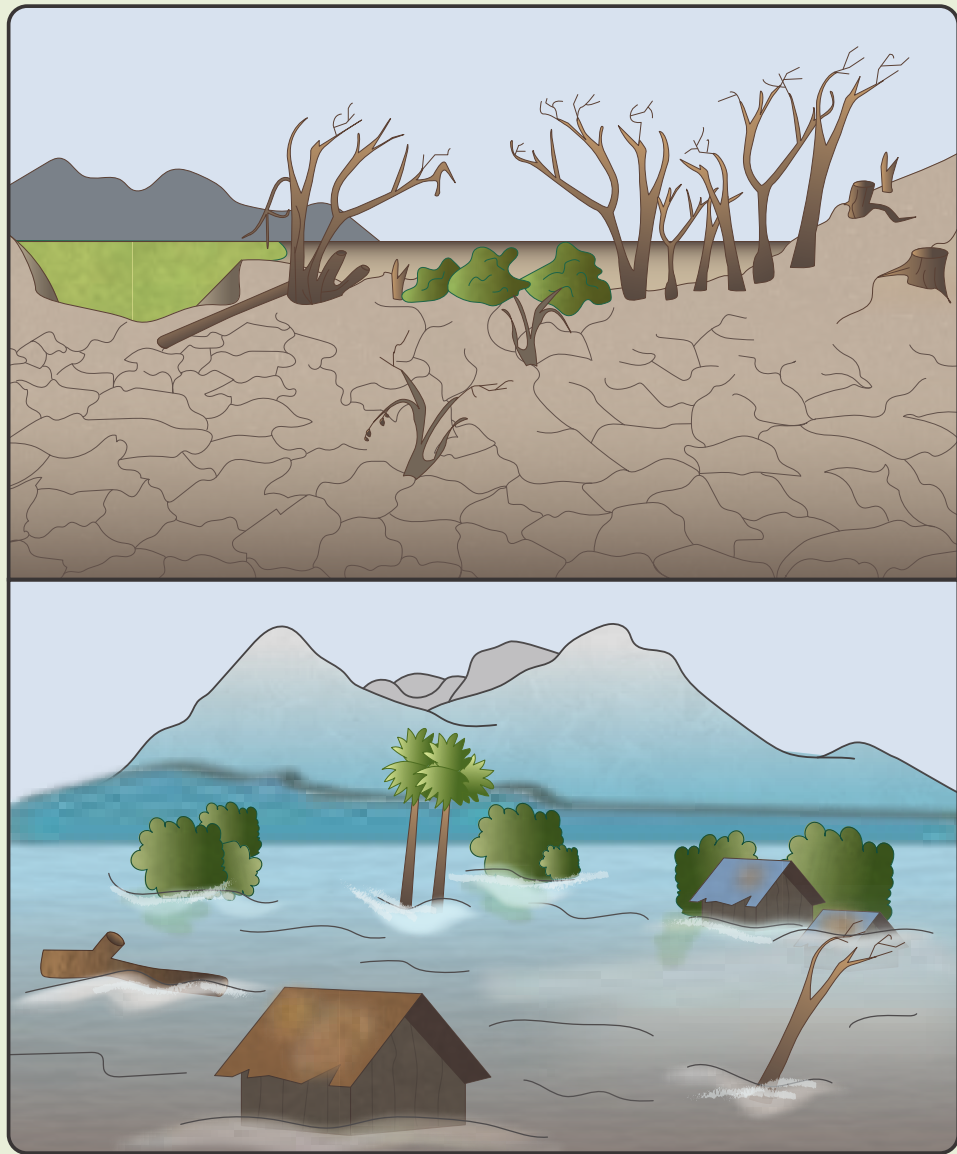
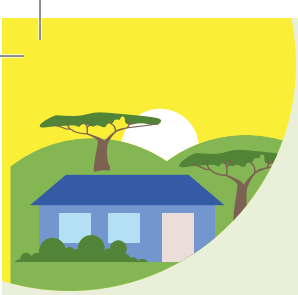
6.3

WHY ARE TREES IMPORTANT?

For students to understand why trees are important.

EXERCISE

- Ask students why they think trees are important.
- Encourage students to imagine solutions that limit tree cutting and deforestation, i.e. appropriate tree species to plant, agroforestry or simple traditional techniques, such as tree trimming (both pollarding or coppicing).



6.4

IMPACT OF DEFORESTATION

The purpose of this discussion is to convey to students the fact that deforestation – the unsustainable cutting down of trees – makes soil dry out, erode in the rain and eventually causes a decrease in rainfall.

EXERCISE

- Conduct a discussion with the students based on the following fact: Deforestation is when forests are destroyed by cutting trees and not replanting them.
- Explain to students about the cause and impact of deforestation.
- Encourage students to imagine solutions that limit tree cutting and deforestation.

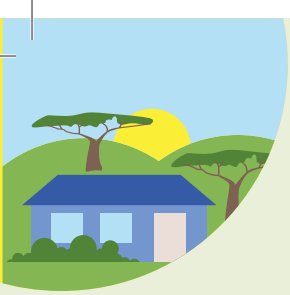


Image source:
Caritas Switzerland

6.5

VISIT TO A FOREST

For students to understand the importance of trees and to experience it through a forest visit.

MATERIALS

POSTER

NOTEBOOK

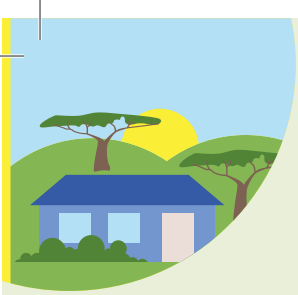
PEN

EXERCISE

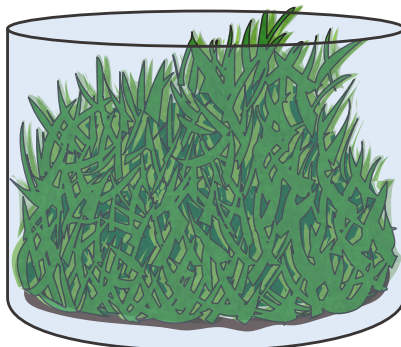
- Organise a forest tour or camping trip in the forest.
- Ask the students to take notes/ record what they have observed from their field trip in terms of temperature, fresh air, soil moisture, fruits, animals, habitats and timber/non-timber forest products (see key information).
- When ready, ask them to share to their group what they have observed.
- Discuss with the students the impact of deforestation on their environment and clarify that, in most countries, it is an illegal activity.
- Discuss with the students how to best conserve their forest.

**WHY ARE
TREES
IMPORTANT?**

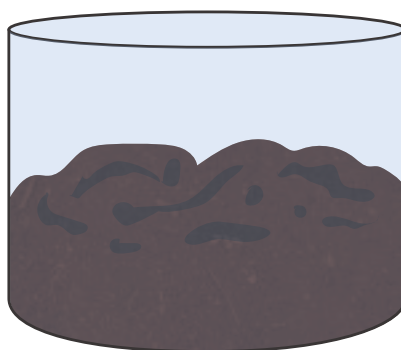
GO BACK TO THE
CHAPTER 6.3



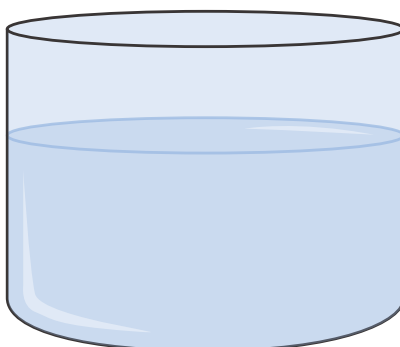
A



B



C



6.6

EVAPORATIVE LOSS

For students to understand the principle of evaporative loss and how plants in the soil help to retain water.

MATERIALS

THREE GLASS CONTAINERS

WATER

SOIL

GRASS

A SCALE

EXERCISE

- Select three open-top glass containers.
- Prepare them as follows:
 - Fill container A with soil, grass, weeds, or plants, and fill with water to the top of the soil without drowning plants.
 - Fill container B with soil and add the same amount of water as the first one.
 - Fill container C with an equal amount of water.
- Weigh each container and record the weight.
- Place the containers in a sunny spot. Weigh each container once a day and record the weight. Monitor the water level of the third container using tape or a marker to compare day to day changes.
- After a week, ask the students:
 - Which container is losing more weight and why?
 - Where do they think the water went in container C?
- Clarify that the weight loss and change of water level is mainly due to evaporation. Vegetation cover helps to retain water in the soil.

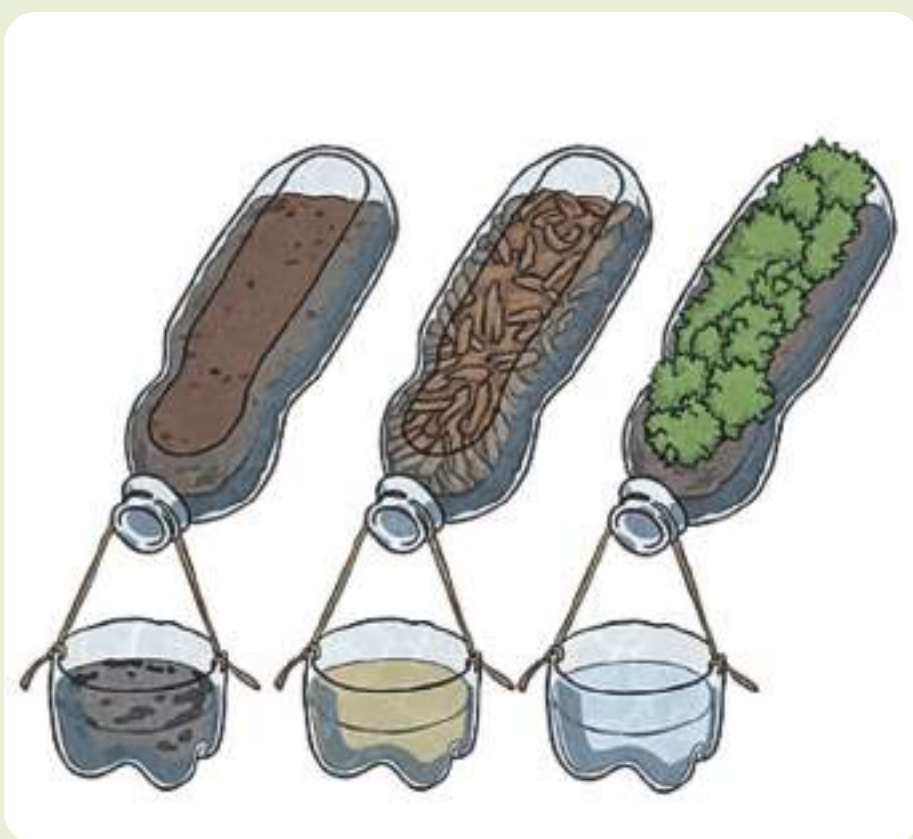
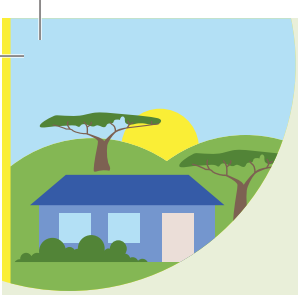


Image source:
twinkl

6.7

OBSERVING SOIL EROSION

To make the process of soil erosion visible to students and demonstrate that the less ground cover there is and the more exposed the soil, the worse the soil erosion and nutrient loss is.

MATERIALS

THREE DIFFERENT LARGE PLASTIC CONTAINERS WITH LIDS

A BOARD OR OTHER FLAT SURFACE LARGE ENOUGH TO HOLD ALL THREE CONTAINERS

SOIL

GRASS SEED OR OTHER SIMILAR PLANTS

LEAVES, TWIGS AND OTHER GROUND COVER

THREE CLEAR RECIPIENTS THAT CAN HOLD WATER

A MEASURING CUP

ADDITIONAL RESOURCES

Fun science demos

EXERCISE

- Cut the top off the milk jug or other container, making sure to leave the spout part of the bottle attached.
- Fill all three with soil to just below the level of the spout.
- Place them on a slightly elevated surface and place a clear recipient under each of the spouts so that you can see the water that will flow out.
- Fill the container as follow:
 - In the first one, plant grass seeds or similar.
 - In the second one, cover it with ground cover.
 - Leave the third one with bare soil.
- Pour the same quantity of water over each container and observe what happens in the clear recipient.
- Discuss with students the difference in the “run off” from each container. Clarify that for the container with bare soil, the “run off” water has carried a lot of soil. The loss of soil (and thus erosion) is more when there is less vegetation cover.
- After this experiment, you can take a walk in the area surrounding your school and spot signs of erosion.



Image source:
**IM Toolbox for small
irrigation system,
Caritas Switzerland in
Cambodia**

GRADE



FIELD VISIT

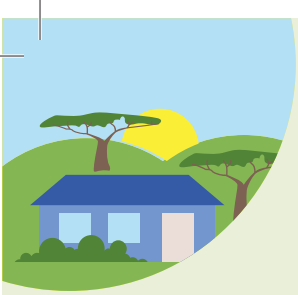
6.8

WHAT CAUSES EROSION

For students to understand the different factors affecting soil and accelerating erosion.

EXERCISE

- Organise a field visit to a soil erosion field, such as floodplain area, irrigation canal or water embankment.
- With students, discuss the causes of soil erosion and distinguish between natural factors and human-induced factors.



FOR BARE-ROOT TREES,

the hole should be a few inches deeper than the length of the root and wider than the spread of the root.

FOR A BALL AND BURLAP TREE,

you need to measure the height of the root ball and the depth of the hole before planting it.



6.9 PLANT A TREE

For students to understand the importance of trees and experience a tree growing from seedling to maturity.

MATERIALS

ONE TREE (INDIGENOUS
TO YOUR REGION)

SHOVEL

BUCKET OF WATER

MEASURING TAPE

EXERCISE

- Discuss the most appropriate tree varieties to plant based on local conditions and availabilities.
- Organise a tree planting day at your school. This can be with one class or with the full school. Consider inviting parents and the local government.
- Make sure you protect the trees when planted, engage the students and take care of it. One option is that each student is responsible for her/his own tree.
- Organise regular sessions around the tree to discuss the changes and why trees are important.



REMARKS

Planting an indigenous tree is the safest choice. However, in some areas alien species can be highly beneficial (for example, leguminous trees with nitrogen fixing capacities can play a long-term role in fostering soil fertility). Be aware, however, that some alien species (such as eucalyptus trees) can reduce soil fertility, which is detrimental to other flora.

Image source:
Caritas Switzerland,
Cambodia

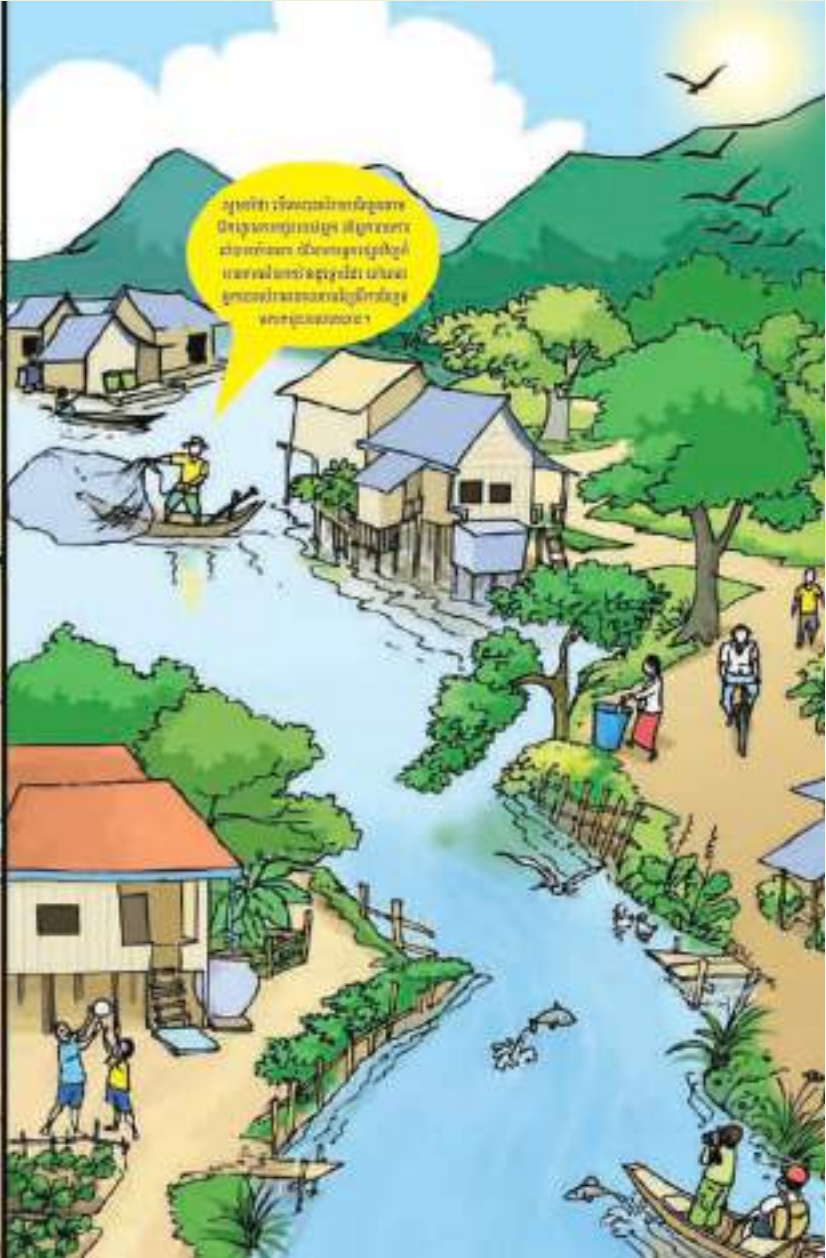
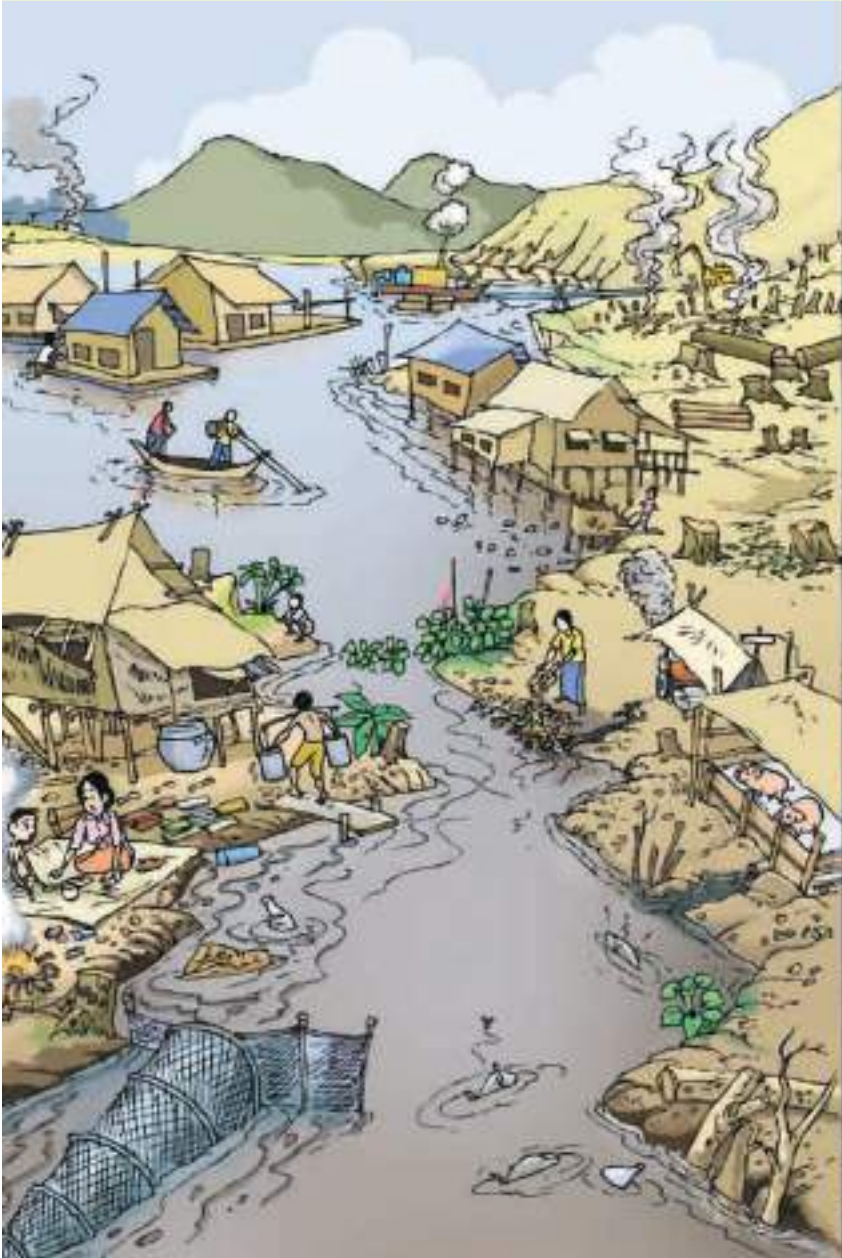
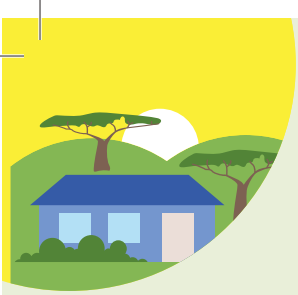


Image source:
 Practical tool for schools
 by Live and Learn

6.10 HEALTHY AND UNHEALTHY RIVERS

For students to understand the causes and sources of water pollution, and how to protect water resources from pollution at school and in their community.

MATERIALS

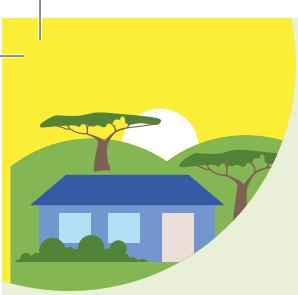
POSTERS OF THE TWO RIVERS

ADDITIONAL RESOURCES

Practical Tools for Schools,
Tonle Sap Sustainable
Livelihoods - School Flipchart

EXERCISE

- Show students the picture of the two rivers, where one is badly polluted and the other is healthy. This picture is on the opposite side of the flipchart.
- Ask students the following questions and encourage them to share their opinions:
 - Are the pictures the same?
 - What are the causes of pollution that you see in the unhealthy river?
 - What activities can you see that would reduce or prevent water pollution from happening?



ENERGY from the sun heats the surface of the earth. **WATER** evaporates from oceans, rivers, lakes, etc. Warm, **MOIST** air rises because it is less dense.

CONDENSATION occurs when this water vapour comes into contact with a surface (in this case dust particles in the air) and is turned back into water droplets as it cools down and clouds are formed.

PRECIPITATION occurs as these water droplets get bigger and heavier, and they begin to fall as rain, snow and sleet, etc. When the precipitation reaches the earth's surface, some falls directly into the sea but other water falls on land.

Some of the water that falls on land is **INTERCEPTED** by vegetation. Some water will reach bare ground.

Some will **EVAPORATE** from the surface of leaves or be absorbed by plant roots, and some of this water will eventually return to the air as vapour through the process of **TRANSPIRATION**.

This slows down or prevents some water flowing back to the river. Some water flows across the surface of the ground - surface **RUN-OFF**.

This happens when the surface doesn't allow water to penetrate. Surface run-off is more likely to occur if the ground is **SATURATED** with water or when the rock is hard and **IMPERMEABLE**. This water moves quickly to the river.

Some water **INFILTRATES** into the soil. This **THROUGH FLOW** moves more slowly back to the river than surface run-off.

Some water **PERCOLATES** deeper into the ground and is slowly transferred back to the river or sea.

STORES AND TRANSFERS: The movement of water between major water stores; the ocean, ice caps, land and the atmosphere are called transfers.

(bbc.co.uk).

6.11 WHAT IS THE WATER CYCLE?

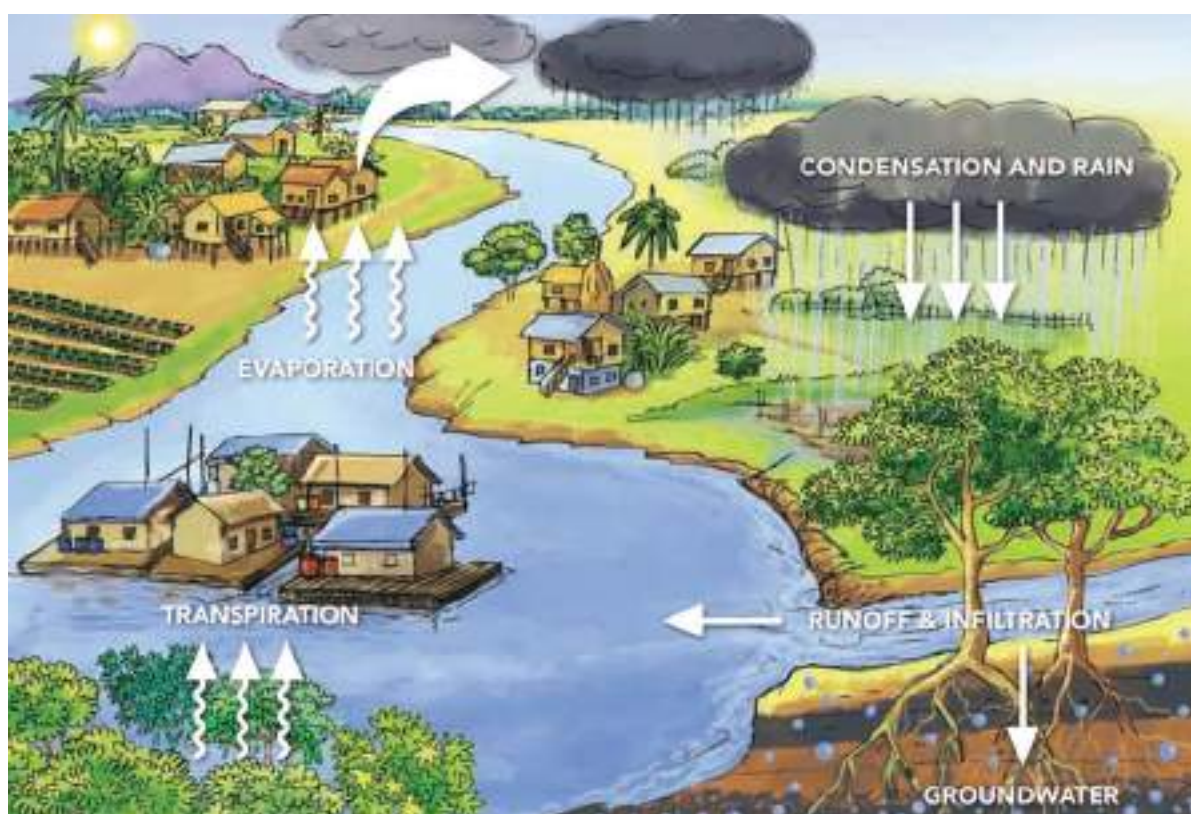
For students to understand the different elements of the water cycle and the different states of water (solid, liquid, ice).

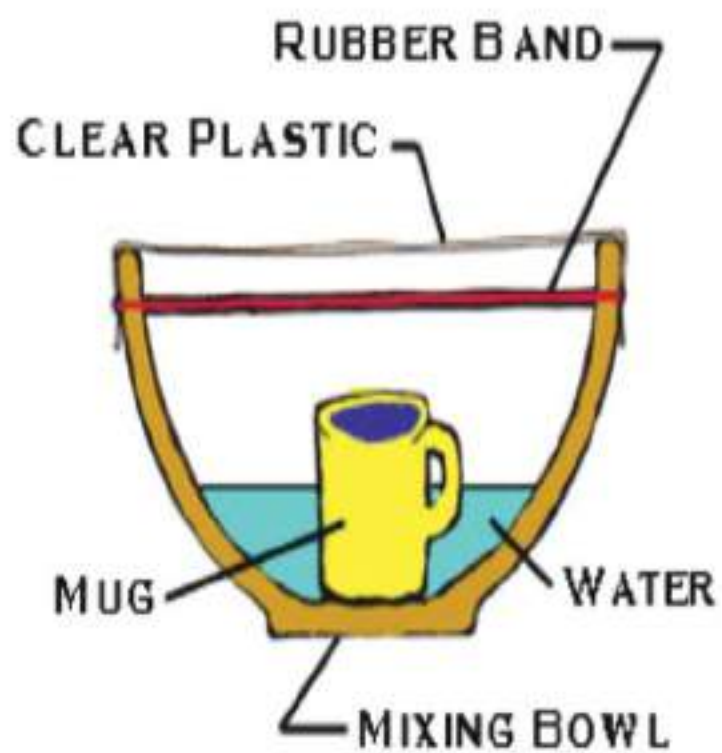
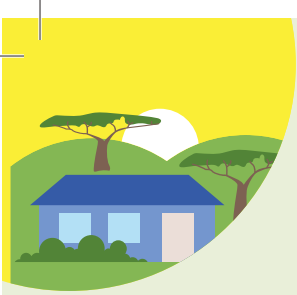
ADDITIONAL RESOURCES

SSWM USGS,
Downloadable Poster

EXERCISE

- Draw a similar graphic on the blackboard and discuss with students how the water flows.







6.12 MAKE A WATER CYCLE

For students to visualise the key processes that take place in the water cycle and understand water is constantly changing its state from liquid to vapour and back again.

MATERIALS

A LARGE METAL
OR PLASTIC BOWL

A PITCHER OR BUCKET

A SHEET OF CLEAR PLASTIC
WRAP

A DRY CERAMIC MUG

A LONG PIECE OF STRING
OR LARGE RUBBER BAND

WATER

EXERCISE

- Put the bowl in a sunny place outside. Using the pitcher or bucket, pour water into the bowl until it is about $\frac{1}{4}$ full.
- Place the mug in the centre of the bowl. Make sure not to splash any water into it.
- Cover the top of the bowl tightly with the plastic wrap and a string.
- Ask students to observe and discuss what happens: The “mist” that forms on the plastic wrap will transform into larger drops of water that will begin to drip. When this happens, continue watching for a few minutes then carefully peel back the plastic.
- Show the students there is now water in the bowl. Ask them what they think happened.
- **Clarify:**
This small, simple experiment demonstrates what happens on a much larger scale when the sun’s heat causes water to evaporate from streams, lakes, rivers and oceans. Water vapour rises and eventually reaches cooler air and condenses into clouds. When the clouds are full of water, or saturated, they release some of the water as rain. Water from the “ocean” of water in the bowl evaporated. It condensed to form misty “clouds” on the plastic wrap. When the clouds became saturated it “rained” into the mug (The Water Project).

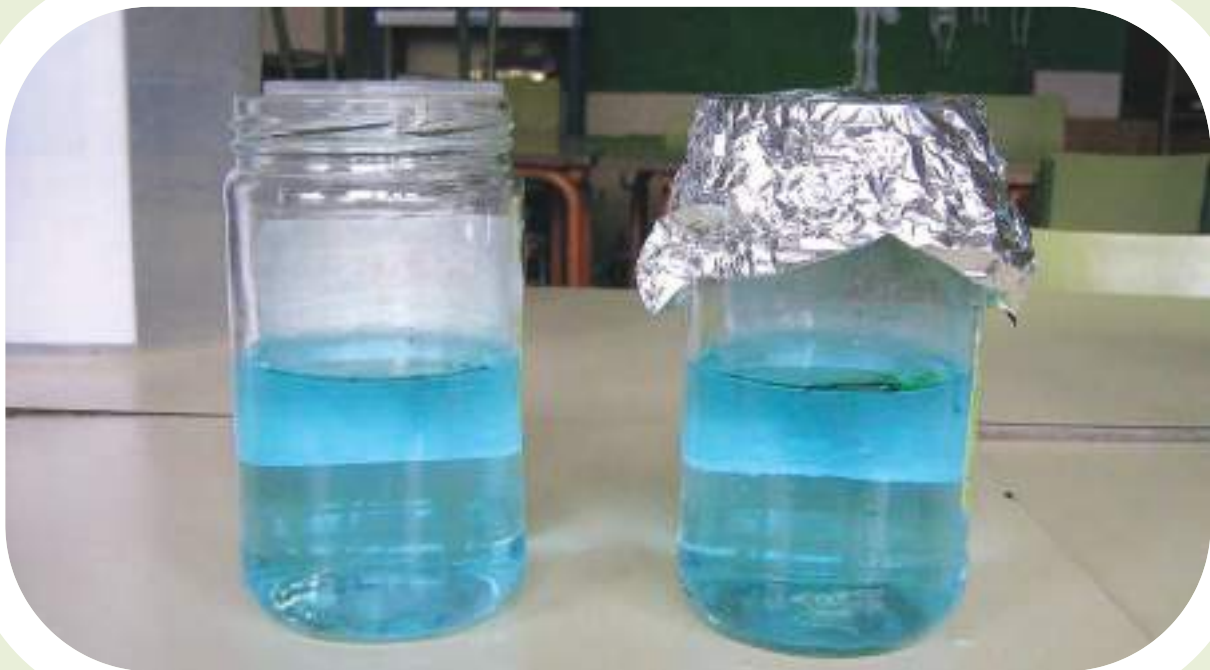
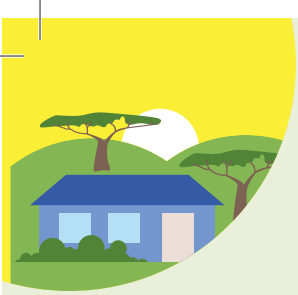


Image source:
Elements of Science

6.13

MAKE A WATER CYCLE

For students to understand how evaporative loss happens.

MATERIALS

**TWO GLASS JARS
OF THE SAME SIZE**

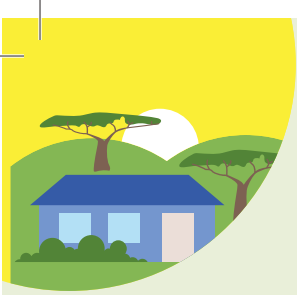
WATER


ALUMINIUM FOIL

A MARKER PEN


EXERCISE

- Fill two identical glass jars with the same amount of water.
- Leave one of the jars uncovered and cover the other with a lid. Make the lid as secure as possible.
- Take the jars outside, place them both in an equally sunny spot and take note of the current water levels.
- With the students, return to the experiment every day for the next week to observe and mark the new water level.
- Discuss with students what happens: This experiment demonstrates that when water is left uncovered and exposed to the sun, it evaporates far quicker than water that is covered. This illustrates the value of covered water tanks in hot climates.







Step 1
Pour a small amount of water into the bottle and screw on the lid.




Step 2
Shake until the sides of the bottle are wet.



Step 3
Squeeze the bottle tightly, release and observe what happens.



Step 4
Open the bottle, light a match and drop it inside (it will go out once it touches the water).



Step 5
Replace the lid and squeeze the bottle again (as for step 3).

Cloud-making facts:
What's happening?

Water mixes with the air inside the bottle to form water vapour when the bottle is shaken. Some of this vapour will condense when smoke is added to the bottle, forming tiny water droplets.

These droplets condense around the smoke particles suspended in the air inside the bottle and reflect the light, allowing you to see them as white or grey clouds.

When you squeeze the bottle, the water droplets will evaporate into the air as the air pressure inside the bottle increases. The clouds will disappear as the droplets evaporate.

CLOUDS ARE FORMED WHEN RISING MOIST AIR COOLS.

The water molecules condense around particles of dust or smoke forming water droplets.

6.14

CLOUD IN A JAR

For students to understand the process of condensation, which forms clouds and makes it possible for rain to fall.

MATERIALS

GLASS JAR (PREFERABLY A GALLON)

GARBAGE BAG OR PLASTIC WRAP

LARGE RUBBER BAND

MATCH

ICE CUBES

VERY HOT WATER

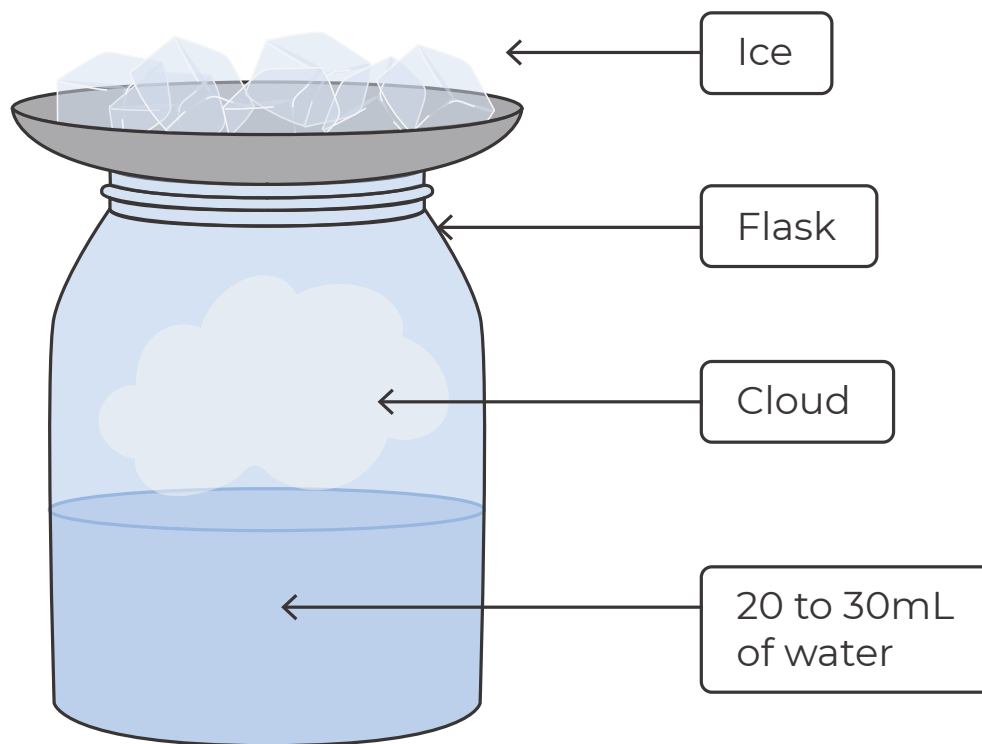
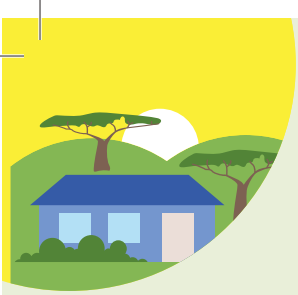
EXERCISE

- Prepare for the experiment:
 - Warm up the jar by partially filling it with hot water. Leave the water in the jar until you are ready to start the experiment.
 - Put a handful of ice cubes into the plastic bag or a pouch made from plastic wrap. Keep the bag of ice at hand.
- At the beginning of the experiment, swirl the warm water around the sides of the jar to clear any condensation. Then pour out the water and pour several cups of very hot or boiling water back into the jar.
- Light a match and drop it into the jar. The water will extinguish the flame and a small amount of smoke will rise from the surface of the water.
- Quickly place the bag or plastic pouch with the ice cubes over the top of the jar so it hangs slightly into the jar. Pull the sides of the plastic bag down over the mouth of the jar and secure it with a rubber band or the jar lid.
- Explain to students this is how clouds are formed.



Image source:
Herald Sun

Science Illustrated
The Water Project



WATER VAPOUR REQUIRES CONTACT WITH A COLD SURFACE

in order to condense and become liquid. In the jar that surface is the glass and in the air it is the dust.

6.15

RAIN IN A JAR

For students to understand how precipitation takes place.

MATERIALS

GLASS JAR

PLATE

BOILED WATER

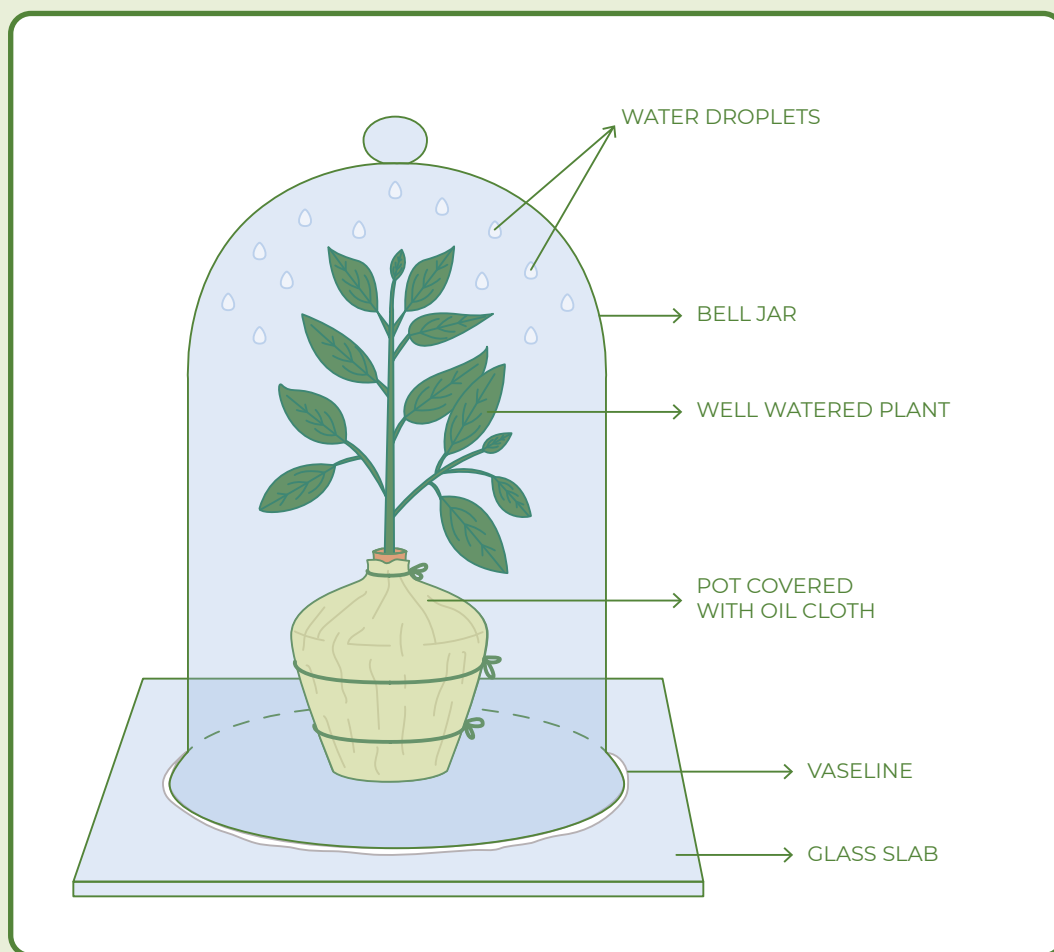
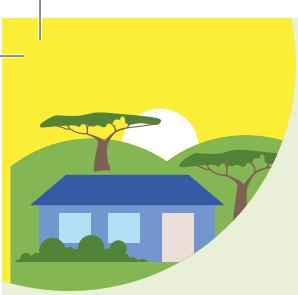
ICE CUBES

EXERCISE

- Boil water until steaming.
- Fill 1/3 of a glass jar with steaming water. Cover the mouth of the jar with a plate. Wait two minutes.
- Put some ice cubes on the plate and watch carefully what happens in the jar. You should be able to see little streams of water running down the sides of the jar just like the way rain runs down a windows when it is raining outside.



Image source:
Rusticremnants



6.16 EVAPORATION IN A JAR

For students to understand how transpiration from plants works.

MATERIALS

PLANT

A PLASTIC BAG AND STRING OR A BELL JAR

EXERCISE

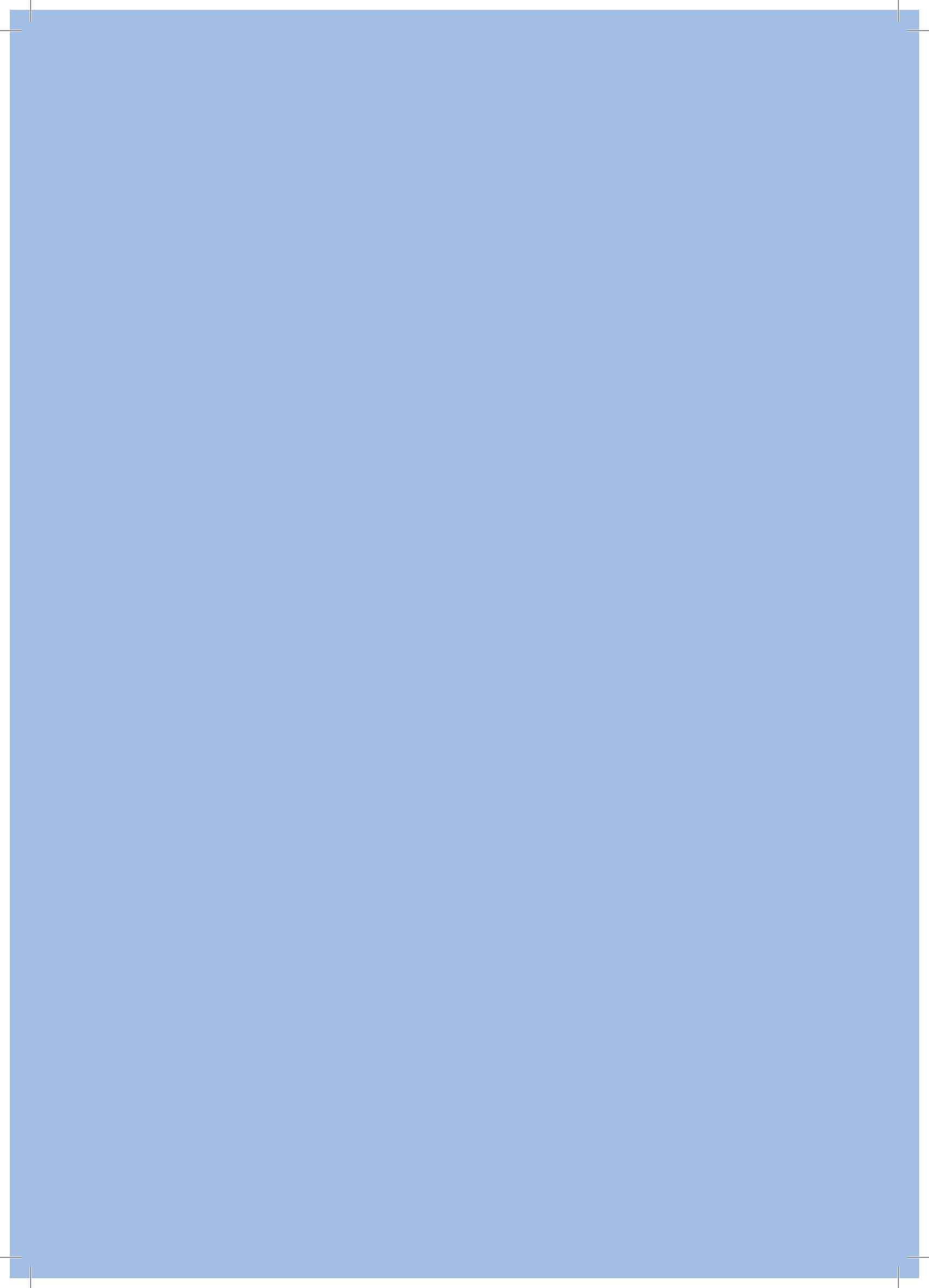
- Identify a plant and cover the whole plant or part of it with a plastic bag or glass jar.
- Ask students what they observe: Condensation will form on the surface of the bag or jar, revealing the transpiration process of the plant.

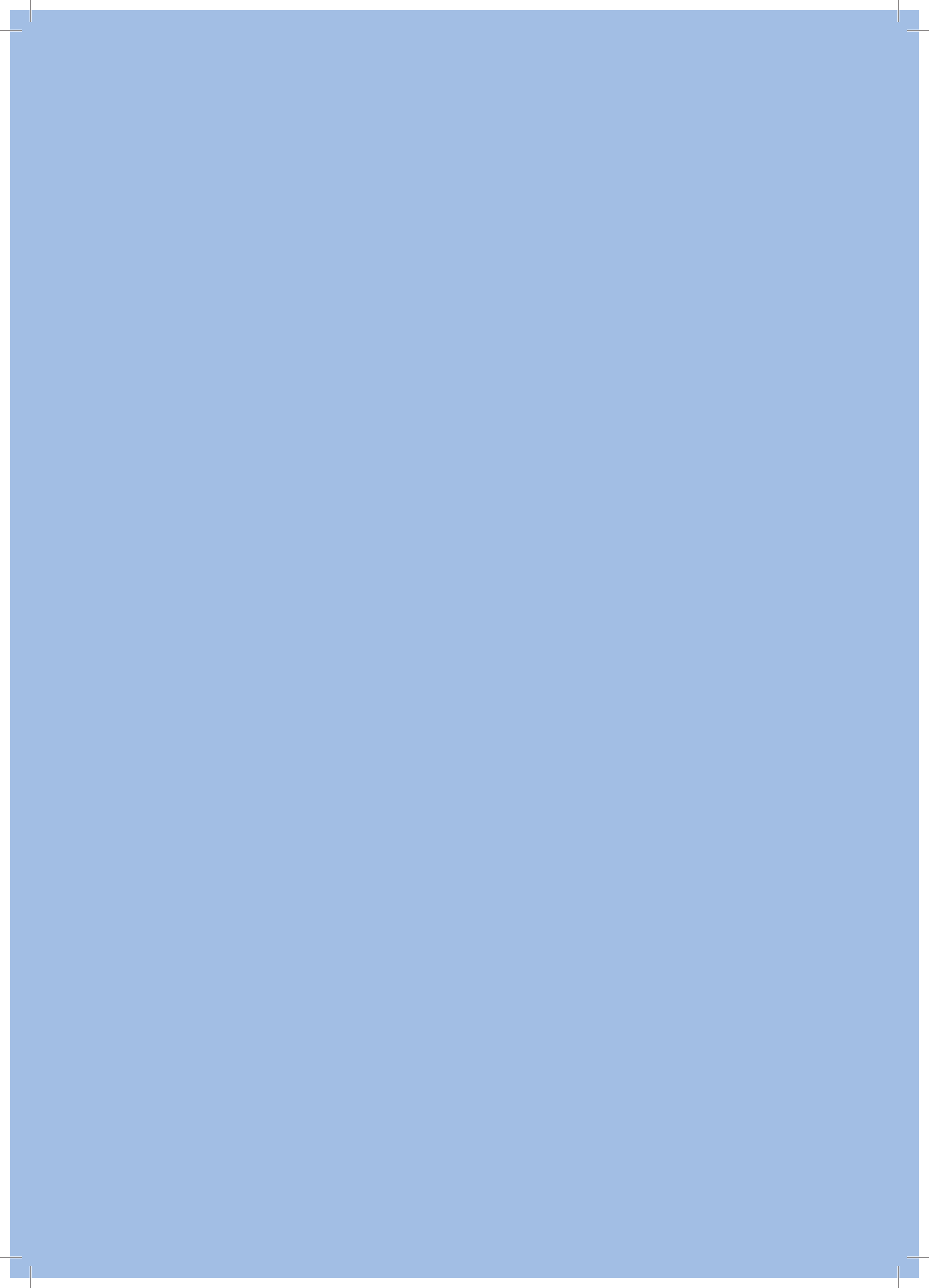


Image source:
Teach Beside Me







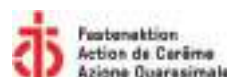


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