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Sazani Trust

Teaching Guide 5

Water

Healthy and Sustainable Schools Programme 2nd Edition

Preface

The Healthy and Sustainable Schools Programme is a result of Sazani Associates UK and Sazani Trust Zanzibar's ongoing partnership with the Ministry of Education to improve the quality of education and learning in Zanzibar.

The project is aligned with the Sustainable Development Goals and actively supports teachers and schools in achieving Global Education Target 4.7.

By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development (UNSD, 2021).

Focusing on the combined importance of key skills and healthy and sustainable life skills, we have revised and updated our series of fifteen Teaching Guides to support competency based curriculum linked learning.

The teaching materials are suitable for use in the last two years of primary across the transition to the first two years of secondary school.

There are fifteen Teaching Guides in this series, themed around topics that contribute to healthy and sustainable life styles within the context of Zanzibar, as follows:

1. Why we need to eat well
2. Getting enough food
3. Keeping food safe and clean
4. Population and health
5. Water
6. Sanitation and waste
7. Tourism
8. Biodiversity
9. Agriculture
10. Fisheries and marine resources
11. Energy
12. Land transport
13. Land use
14. Climate change
15. Participatory action learning

Each Teaching Guide is themed and contextualized to bring Zanzibar and contrasting localities into a classroom setting and to make learning engaging and relevant to local livelihoods. Activities are gender responsive, participatory and proven to support numeracy, literacy, English language and critical thinking.

For more information please visit our website **www.sazani.org**

Acknowledgements

This series of fifteen Teaching Guides has been adapted from Sazani Associates HSSP topic books by Rajab S. Ali, Safia M. Abdalla, Mwanawije M. Makame, Patrick Rutledge, Nicola Shone, Joshua Shawe and Rashid O. Shehe, with editorial review by Marilyn James and Dr Cathryn MacCallum. Graphic design and layout by Seven Six Design.

Contents

1 Introduction

The learning content and activities in this Teaching Guide have been designed to be easily integrated across the curriculum. Throughout the resource, knowledge, skills, attitudes, and values are interlinked and are built into all the topic areas addressed.

We have revised and updated our series of fifteen Teaching Guides to support competency-based, curriculum linked learning and development by focusing on the combined importance of key skills including numeracy, literacy, critical thinking and English language for healthy and sustainable lifestyles. The teaching materials are suitable for use in the last two years of primary across the transition to the first two years of secondary school.

There are different methods of displaying this information, through text, tables, diagrams, images and activities. Each activity includes icons to illustrate which curriculum area and which key skills are used as summarized in the tables below.

Key skills				
Numeracy	Literacy	Critical thinking	English language	Creativity
				

Activity / STD V-VI	Maths	English	ICT	Civics	Geography	History	Science	Religion	Arabic
Field trip				X	X	X	X		
Water		X		X	X	X	X		
Water conservation		X		X	X	X	X		X
Water shortage in Zanzibar		X		X	X		X		
Rainfall in Zanzibar	X	X			X		X		
Household water consumption	X	X			X		X		
Water usage in industry	X	X			X		X		
Be a water detective		X			X		X		

Activity / Form 1-2	Maths	English	ICT	Civics	Geography	History	Biology	Chemistry	Physics	Religion	Arabic
Field trip					X	X	X	X			
Water		X		X	X	X	X				
Water conservation		X		X	X	X	X				X
Water shortage in Zanzibar		X		X	X		X				
Rainfall in Zanzibar	X				X		X				
Household water consumption	X				X		X	X	X		
Water usage in industry	X	X		X	X						
Be a water detective		X			X		X				

2 Topic overview

Key words

States of matter: Solids, liquids and gases are called the three states of matter.

Irrigation: the supply of water to land or crops to help growth, typically by means of channels.

Commercial farming / agriculture: large-scale production of crops for sale, intended for widespread distribution to wholesalers or retail outlets.

Manufacturing: the making of articles on a large scale using machinery; industrial production.

Hydroelectric power: is a form of energy that harnesses the power of water in motion – such as water flowing over a waterfall – to generate electricity.

Water is a colourless, odourless and tasteless liquid that can be changed into solid or gas. Water is vital for sustaining all life on our planet, be it plant or animal. About 70% of the human body is made of water. It is used to maintain life as drinking water, to cleanse our bodies and to maintain clean environments.

2.1 The world's water supply

About three quarters (75%) of the earth's surface is covered with water. Almost all of this (97%) is salt water which makes it unsuitable for drinking unless it is treated to remove the salts. Only 3% of the earth's water is fresh and 2% of that is held in ice caps, most of which surrounds the North and South Poles. Fresh water makes up less than 1% of the world's potable water, which is water that is safe to be consumed by humans.

3 The importance of water

Water has traditionally been used for daily activities such as drinking, bathing and for river transport but as populations grew and industries developed water became important for other purposes.

Today water resources are important for the irrigation of crops (the artificial watering of the land in commercial farming); in manufacturing, and for producing hydro-electric power using dams. Unfortunately, some people use rivers and seas as a dumping ground for many of their waste products.

Did you know?

- Earth is the only planet known to have water to support life.
- Every living thing consists mainly of water.
- A person can live for weeks without food but will only survive a few days without water.
- The Zanzibar Poverty Reduction Plan (ZPRP) of April 2002 affirmed openly "the government recognizes the access to safe and adequate water as a fundamental right."

All living things consist mainly of water. Below is a list of living things along with the percentage (%) of water that each consists of.

Earthworm – **70% water**

Pineapple – **80% water**

Cucumber – **95% water**

Carrot – **90% water**

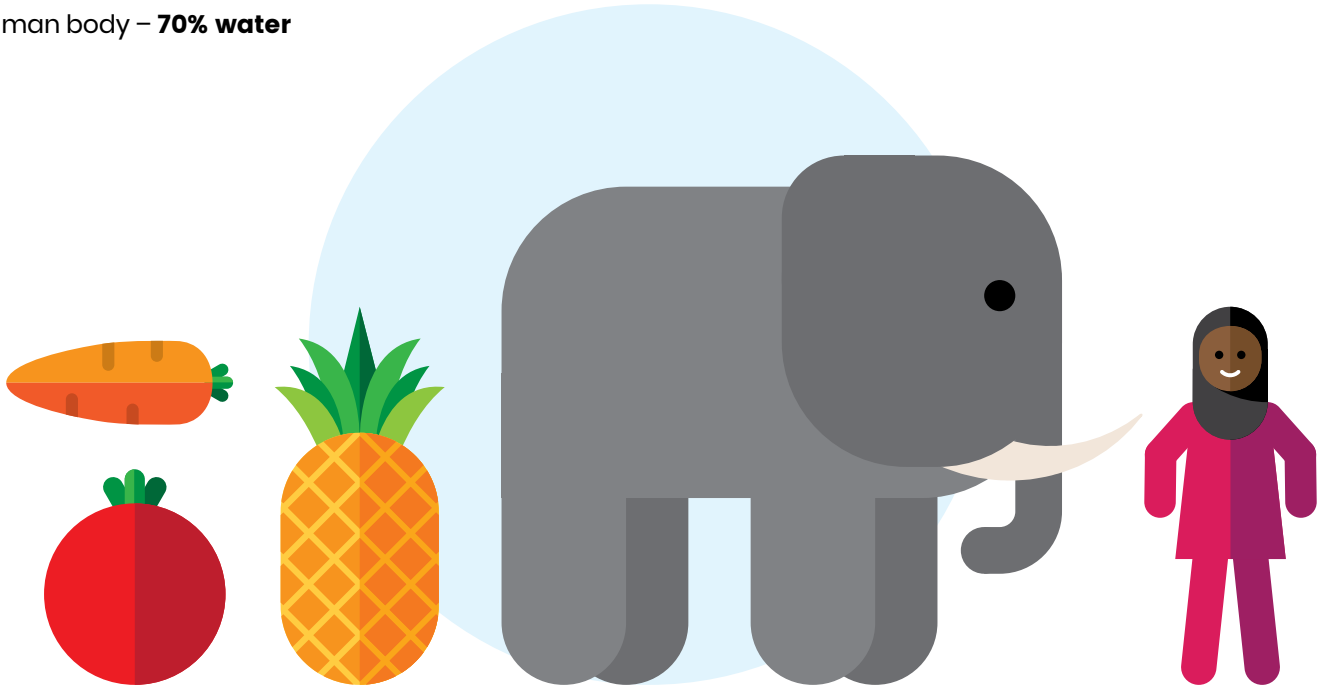
Milk – **85% water**

Tomato – **95% water**

Watermelon – **92% water**

Elephant – **70% water**

Human body – **70% water**



4 Sources of water

Key words

Rain: is the liquid form of water that falls from the sky in drops.

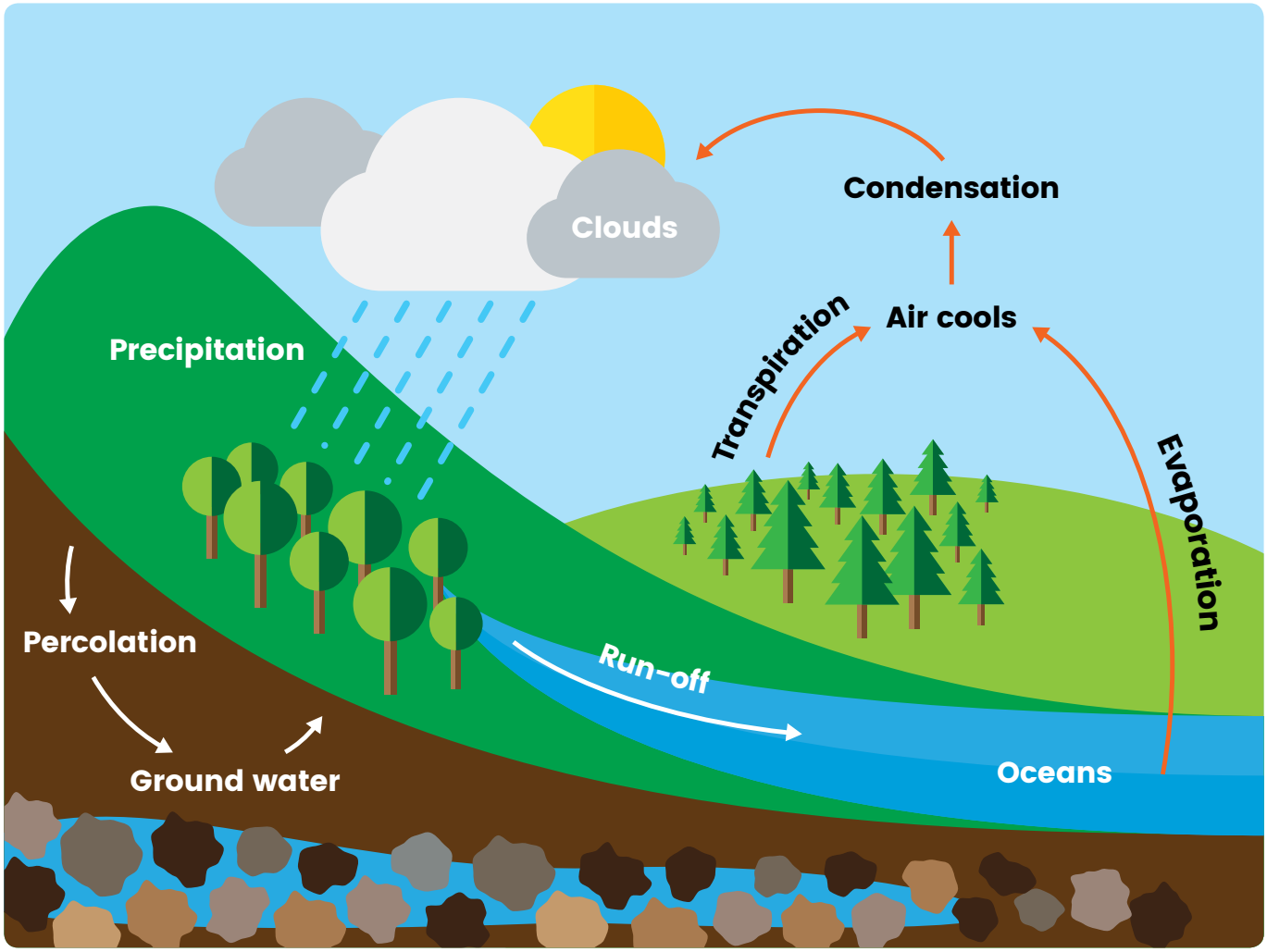
Groundwater: is water located beneath the ground surface in soil pore spaces and in the fractures of lithologic formations.

Surface water: is water on the surface of the planet, above the ground. It is the water in rivers, lakes, wetlands and oceans.

Rainwater-harvesting: is the collection and storage of rain, rather than allowing it to run off.

When rain falls to the ground, it travels along the surface as streams or rivers or it may be soaked up by the ground and stored underground between rocks.

1. **Evaporation:** heat from the sun causes water on earth (in oceans, lakes etc.) to evaporate (turn from liquid into gas) and rise into the sky. This water vapour collects in the sky in the form clouds.
2. **Transpiration:** as plants absorb water from the soil, the water moves from the roots through the stems to the leaves. Once the water reaches the leaves, some of it evaporates from the leaves, adding to the amount of water vapour in the air. This process of evaporation through plant leaves is called transpiration.
3. **Condensation:** as water vapour in the clouds cools down it becomes water again, this process is called condensation.
4. **Precipitation:** water falls from the sky in the form of rain, snow, hail, or sleet, this process is called precipitation.
5. **Runoff:** much of the water that returns to earth as precipitation runs off the surface of the land, and flows down hill into streams, rivers, ponds and lakes. Water evaporates into the sky again and the cycle continues.
6. **Infiltration:** is an important process where rainwater soaks into the ground, through the soil and underlying rock layers. Water stored underground in rocks can be brought to the surface by pumping.
7. **Aquifers:** are underground layers of rock that are saturated with water that can be brought to the surface through natural springs or by pumping. The groundwater contained in aquifers is one of the most important sources of water on earth: **about 96 percent of our liquid fresh water is ground water**.



4.1 Water sources in Zanzibar

Zanzibar is endowed with plentiful water resources. As an island, the sea surrounds it. It also receives substantial annual rainfall. Groundwater is the primary source of water in Zanzibar with groundwater being of good quality that complies with international and regional standards. Unguja island has annual groundwater potential of 307mm³ and surface water of 70mm³ whereas Pemba has about 43mm³ of ground water and about 717mm³ of surface water.

4.2 Rainfall distribution in Zanzibar

Rainfall amounts in Zanzibar are high with an average of 1,900mm of rainfall a year. There is higher rainfall in Pemba at above 2,000mm on average. However, Zanzibar loses about half of its rainfall through runoff via rivers into the seas. In Unguja, only 24% of rainwater ends up in groundwater and even less so in Pemba at only 7%. Given that agriculture accounted for more than a third (36%) of the country's gross domestic product (GDP) and requires lots of water for production, there is a great need to introduce water-harvesting technologies to increase water availability. This is also important given that more and more people are using water in homes, hotels and industries. Seasonal differences in rainfall also make it necessary for water to be stored.

- Can you list three industries that use up a lot of water?
- What would the water be used for?
- Why do hotels use up so much water? (see Teaching Guide 7: Tourism).

5 Access to clean water

Key words

Tariffs: a tax or duty to be paid on a particular class of imports or exports.

Piped-water: tap water from the distribution lines of a piped-water supply station.

Well: structure created in the ground by digging, driving, or drilling to access liquid resources, usually water.

Water pollution: contamination of water bodies, usually as a result of human activities.

Agricultural chemicals: a contraction of agricultural chemical, is a chemical product used in agriculture.

Drainage basin: is any area of land where precipitation collects and drains off into a common outlet, such as into a river, bay, or other body of water.

In 1972, the Government of Zanzibar made water free for all domestic consumers. However, in 2008, after 36 years, the government introduced tariffs because of the deterioration of the water supply.

The number of households that have access to clean water has greatly increased in some areas since 2003, particularly in Unguja where around 93% of households had access to safe water in 2009, compared with only 20% in 2003. In Pemba, the percentage of households with access to safe water did not increase and remains at around 70%.

In Unguja, around 90% of urban households have piped water supply whereas the figure is lower in rural areas at 69%. In Pemba, only 61% of urban households have access to piped water supply whereas only between 7% and 10% of rural household have this service. The Zanzibar Water Authority (ZAWA) was established in 2006 with the sole responsibility of managing water as well as the water supply services.

5.1 Sourcing water

Several programs have been introduced by the Government of Zanzibar to support water supply including:

- Hand-dug and machine-drilled wells fitted with hand pumps.
- Construction of water storage facilities (tanks) which are large canisters which are used to collect rainwater.

People also source water from rivers.

5.2 Fresh water is running out

It is estimated that 1/3 of the world's population will suffer from severe water shortages in the next 25 years. This shortage is to a large extent the result of human activities where we consume water more quickly than it can be replaced naturally.

5.3 So what can we do?

Control pollution levels and encourage people to be environmentally friendly citizens, who recycle materials and reduce the use of agricultural chemicals.

- Help to protect water catchment areas (which are areas from which rain fall flows into rivers) by not cutting down trees in forested areas and close to rivers.
- Make water conservation a way of life. We, as individuals, can make a difference if we make it our responsibility to use less water every day. Try out the following at home to see how much water you could conserve.

Normal usage of water	Litres of water used	Water-saving activities to try out at home	Litres of water used	Litres of water saved
Have a bath	110	Have a shower	30	
Wash vegetables under a running tap	69	Wash vegetables in a bowl	9	
Wash clothes under a running tap	240	Hand wash clothes in a bucket	40	
Use treated water for washing a car or watering the garden	230	Use rainwater for washing a car or watering the garden	30	
Wash your car using a hose	300	Wash your car using a bucket of water	18	
Use normal taps for washing things i.e. dishes, plates	90	Install spray taps for washing up to minimise the outflow of water	30	
Leave the tap running when brushing your teeth	45	Fill a mug with water	0.5	
Leave the tap running	30	Wash dishes by filling two bowls or sinks; one for washing, one for rinsing	25	
Use a hose for five minutes	78	Use a mop and bucket to clean floor	18	

Complete the column on the right.

Questions to ask learners:

- How many of the above do you regularly do at home?
- List three things you do that save the most water.
- Can you think of other ways you could help to save water at home?

N.B. All figures are approximate

6 The alternatives

Key words

Conservation: is the protection of things found in nature. It requires the sensible use of all Earth's natural resources: water, soil, minerals, wildlife, and forests.

Gutters: a shallow channel or trough for draining water, as under the eaves of a roof or along the edge of a road or street.

Desalination: any process that removes the excess salt and other minerals from water in order to obtain fresh water suitable for animal consumption or irrigation.

Water purification: is the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water.

Wetland: are areas where the land does not drain well. The ground in a wetland is saturated, or full of water. Often the ground is covered with shallow water.

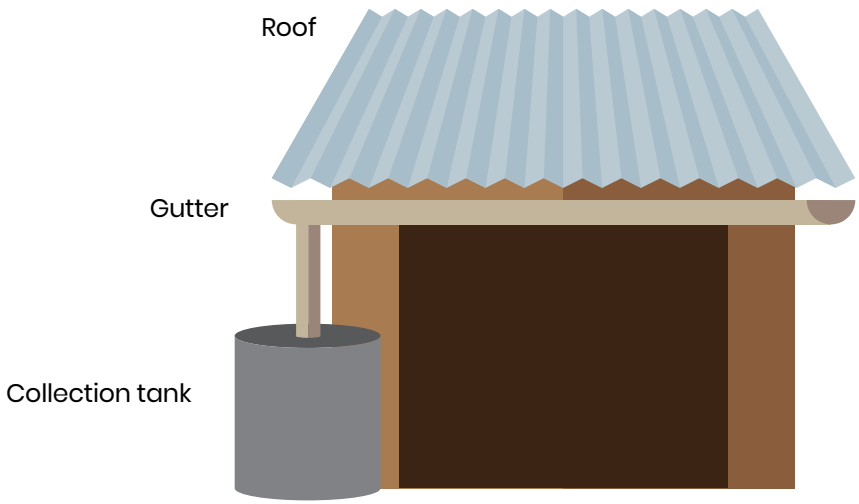
Marshes: is a type of wetland with soil that is rich in minerals. Marshes are very similar to swamps.

Sewage: is the liquid waste produced by us all when using the toilet, having a bath or shower or washing clothes and dishes.

Flooding: is a rise of water with no place to go. Causes of floods include hurricanes, broken levees or dams, rapidly thawing snow, ice jams, and heavy slow moving rain or repeated rains.

Habitats: a place that an animal lives. It provides the animal with food, water and shelter. There are many different sorts of habitats around the world from forests to grasslands and from mountain slopes to deserts.

One potential alternative to conserving or harvesting water is to install gutters (see diagram below) that collect rainwater that runs off a slanted roof; this can be made of plastics or bamboo. The rainwater flows across the gutters into the tank, which can be made of bricks or a recycled plastic barrel. The container should be covered so that mosquitoes do not breed in it and other particles do not fall inside it thereby contaminating the water. The water collected in the tank can be used in the laundry, to flush toilets and water the garden. This will help families conserve water for times when additional water is usually needed and provide time and cost benefits.



6.1 Other solutions

To meet the increasing demand for water, alternative ways of generating water supplies are required. Since Zanzibar is surrounded by seawater, one alternative is to turn seawater into fresh water that can be used for drinking. This is referred to as desalination. Desalination, however, means purifying the water so much that you then need to add essential minerals to it. Chlorine must be added to the water before and after the purification process. These materials must be imported and cost money. The purification process uses up a lot of energy and the wastewater will be dumped into the sea. Its high salt content may affect coastal ecosystems.

6.2 Case study: From toilet to tap – Singapore turns to recycled water

Fancy a glass of recycled water from sinks and toilets? That is the reality Singaporeans may soon face as the city state searches for alternatives to cut its dependence on neighboring Malaysia which supplies half of its water needs.

The public utilities board is looking at the findings of an international panel that has declared recycled water, the so-called NEWater, safe to drink. The tests carried out over two years, showed that the water produced at a demonstration plant was of consistently high quality and met the World Health Organisation (WHO) guidelines. Resource-scarce Singapore plans to build two plants that will produce 68 million litres of water a day for industrial use by the end of 2002. The recycled water will be fed to reservoirs where it will be treated to produce drinking water, a practice in place in the USA for over 20 years now with no adverse or negative health effects. This method, it is hoped, will make the use of recycled water more acceptable to the consumers.

Extract from nation article, July 17, 2002

Questions:

- What are your views on drinking recycled water?
- Why was water imported from Malaysia?
- What alternative(s) has the Singaporean government got?

Polluted water can cause infections to humans and animals

Water is a liquid that can dissolve most substances and is therefore most likely to become easily polluted. Rivers get polluted by sewage which is waste matter (especially human waste) from our homes, litter, factory discharge, oil from boats, chemicals and slurry (animal wastes, also known as manure, in a liquid form) from agricultural lands. Water is also polluted by hot water released by some factories. These may have negative impacts on ecosystems and have long-term effects on organisms. Another form of pollution is siltation, which is the build-up of fine particles of sand deposited by water and is a result of rainwater eroding the topsoil during heavy rainstorms. The silt is deposited on the riverbed and may lead to floods in times of storms as the water level rises.

Wonderful wetlands

A wetland is an area of land that is covered in water for part of the year and includes freshwater and salt-water bodies. Marshes act as nature's kidneys, breaking down sewage and many chemicals, leaving clean water and soil behind. They also act like great sponges, soaking up rain before they drain into rivers and the sea. This way they help to reduce flooding after heavy rains and keep soils nearby moist in dry spells. The Bumbwisudi wetland in Zanzibar covers about 560 hectares, of which about 390 hectares is devoted to rice cultivation.

Wildlife need water too

Wetlands are important habitats for a host of animals and plants; animals include frogs, butterflies, grasshoppers, lizards and birds such as the grey heron, black-shouldered kite, white-browed coucal, wood owl, green wood hoopoe and woodpeckers.

Although there have been no formal studies, discussion between the Department of Environment and villagers indicate a decline in some of the species mentioned above.

(Future Harvest, 2005)

7 What we have learned:

- We tend to take water for granted; it is time we treated it like liquid gold.
- We are as dependent on water to drink as we are on air to breathe for survival.
- Water resources are finite.
- We can all contribute to water conservation and make a difference.
- Now that you know how important water is, help to take action to conserve it.

Knowledge and Skills	Attitudes and Values
Understand the importance of water in our lives; analyse and interpret data, work in groups; negotiating skills.	Appreciate that water is a finite resource; identify ways to conserve water; and contribute to national efforts to save water.

8 Learning activities

Find out:

- **Prioritise.** Decide which information is most important to share with the class.
- **Choose communication methods.** For example: illustrated talks, discussions, and demonstrations of foods.

How How How activity

Refer to the **How How How activity** detailed in the "Participatory Action Learning" book to help the student explore different ideas and concepts and challenge each other's points of view.

Activity 1: Field trip

Resources required:

- Risk assessment
- Pens and pencils
- Paper
- Camera

Set up:

Locate a suitable water-based location, this could be a river, beach or reservoir in the nearby area.

Conduct a risk assessment and put in place measures to ensure learners safety while carrying out the field trip. This may include minimum groups sizes, a supervised safety point and a specified area that learners may be in. Please refer to the risk assessments section of the Participatory Action Learning Book (Teaching Guide 15).

Activity:

- Visit a local water-based location with learners.
- Place learners into groups, have them take photos and make notes about the plant and animal life that is found there.
- Once back in the classroom, write learners' findings on the board.
- Each learner can then design a leaflet promoting the location, illustrating the plant and animal life found there and why the area is an important environment.

Review:

The following questions or points may be used to review the activity:

- What makes this location unique? How have you demonstrated that?
- A selection of learners can be asked to present their leaflets to the class.

Activity 2: Water

Resources required:

- Large piece of paper (one per group)
- Pens and pencils

Set up:

Lay out one large sheet of paper per group.

Draw an example concept map on the board with a few example ideas.

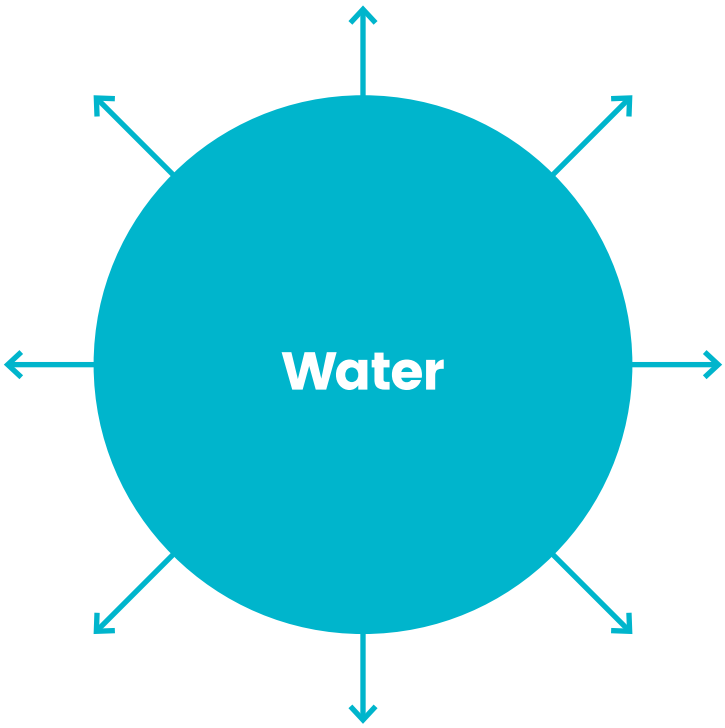
Activity:

- Place learners into small groups with one large piece of paper per group.
- Ask learners to create a concept map about "Water".
- Have learners write "Water" at the centre of their piece of paper and then use lines to create and link different ideas about water.
- Ideas could include sources of water (rivers, stream, lakes), uses of water (cooking, drinking, washing), water pollutants (industry, sewage).

Review:

The following questions or points may be used to review the activity:

- Write the learners ideas on a large class concept map on the board.
- Ask learners: Are there any extra links that could be drawn? Has anything been left out?



Activity 3: Water conservation

Resources required:

- Large piece of paper (one per group)
- Pens and pencils

Set up:

Place paper and pens on learners desks.

Activity:

- Place learners into pairs.
- Give the pairs five minutes to work with a partner and come up with as many ideas as they can about how we can save water.
- Ask learners to feedback their ideas and create a list on the board.
- Place learners into small groups and ask them to write a song or a rap incorporating these ideas.
- Remind learners they will need to make their song catchy, perhaps using a repeated phrase or a chorus.
- The song must also be clear and informative. Learners may include actions if they wish.
- Ask learners to perform their work.

Review:

The following questions or points may be used to review the activity:

- Following on from the performance ask learners to evaluate what they have heard / seen.

Activity 4: Water shortage in Zanzibar

Resources required:

- White board
- Pens and pencils
- Large sheet of paper

Set up:

Write on the board the following three questions:

- Zanzibar is an island, but there is a shortage of fresh water, what can we do to save water?
- Why is water so vital?
- Zanzibar has several rainy seasons including spring (masika) and autumn (yuli). How can we harvest rainfall, in order to reduce water shortages?

Activity:

- Place learners into groups.
- Ask learners to write the three questions onto three separate large sheets of paper.
- Ask learners to discuss all three questions in their groups and to write their answers on each sheet in large writing.
- Once learners have written their answers one or two learners from the group will stay with the papers and "sell" their ideas to other learners.
- The rest of the learners can move around the classroom and look at other groups sheets and make a note of any different answers to their own ideas.
- The moving learners can then report back to their groups and add to the sheets of paper.
- Learners can then rank their answers and choose a favorite for each question.
- The teacher can then call upon each group to give their favorite answer to each question which can then be written on the board.
- Learners can then vote on which answer to each question is their overall favorite. The teacher can ask learners to explain why.

Review:

The following questions or points may be used to review the activity:

- Ask learners if any groups ideas that were not chosen as the favourite stood out in particular? Why?
- Ask learners how they might put the ideas on the board into action within their own lives?

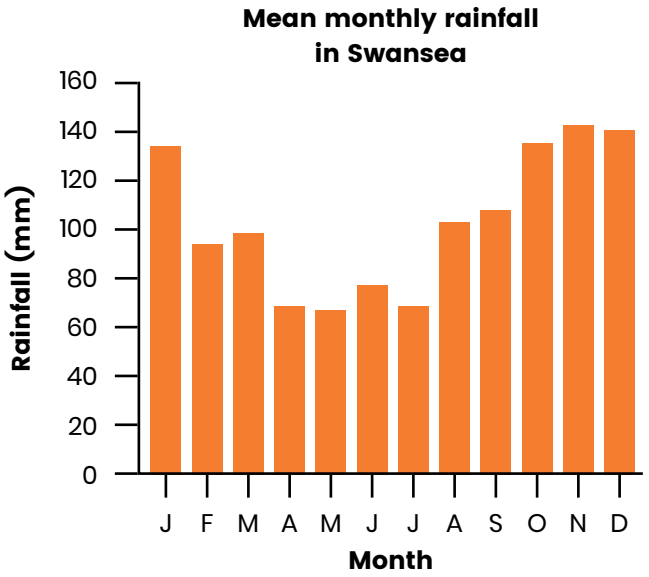
Activity 5: Rainfall in Zanzibar

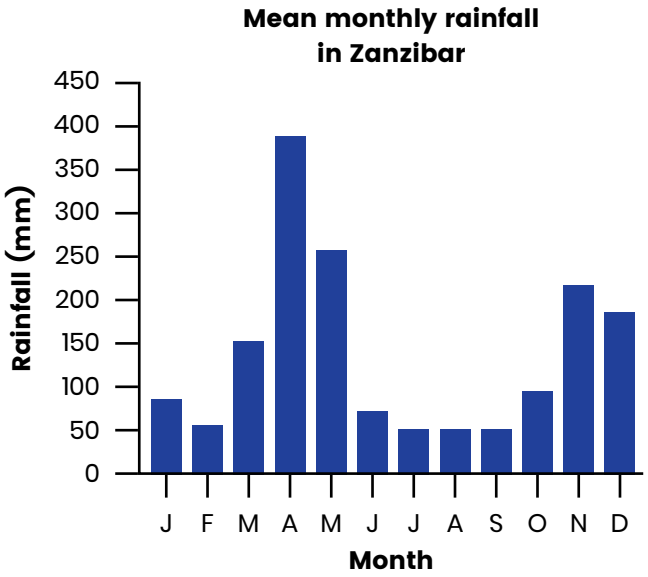
Resources required:

- Pens and pencils
- Paper
- Bar chart showing Swansea rainfall
- Bar chart showing Zanzibar rainfall

Set up:

Display both charts for Zanzibar and Swansea on the board.





Activity:

- Ask learners to compare the two charts on the board. Get learners to point out one or two obvious differences and discuss why this might be.
- Ask learners to draw a table showing both countries rainfall.
- Once learners have completed their table place them into groups.
- Ask the groups to compare and discuss the differences in rainfall patterns.
- Example questions that could be used to prompt discussion:
  - Are there any similarities in rainfall pattern? If so why might this be?
  - When does Zanzibar have its most rainfall? How does this compare to Swansea?
  - Which country has least rainfall in April? What is the difference?

Review:

The following questions or points may be used to review the activity:

- Following learners discussion in groups ask each group to elect a spokesperson to summarise the group's main points to the rest of the class.

Activity 6: Household water consumption

Resources required:

- Pens and pencils
- Paper
- Calculators
- 5 Litre Container (optional)

Set up:

Draw the "Household water consumption" table on the board (see below).

Display the 5 litre container at the front of the class to help learners understanding.

Alternatively draw a five litre container on the board.

Note to teacher – this activity is designed to help learners find out how much water they consume in a day and how they could minimise water use if necessary. Students may use a calculator.

Household water consumption						
	Number of 5 litre gallons needed per day	**Number of litres used per day**	**Total number for a week**	**Cost in sr for a week**	**Cost in sr per month**	**Total cost per year**
Per person						
Your family						
Your neighbour in class						

Activity:

- Get learners to think of a 5 litre container or 'gallon' as an average unit to help work out water usage around the home (refer to container or drawing on board).
- Ask learners to refer to the "Water usage table".
- From the "Water usage table" ask learners to calculate how many 5 litre containers they would need for their own daily activities.
- Refer to the "Household water consumption" table on the board. Ask learners to copy the table down and fill it out.
- Ask learners to compare their results with their neighbour. Ask learners: What are the differences between you and your neighbour? Can you think of the reasons behind the differences in your respective households.
- Have learners feedback some of their answers to the class.
- Ask learners to consider the following questions:
  - Does age, occupation, sex or lifestyle make a difference?
  - Can you think of other factors that could make a difference in your water usage?
- Make a large chart on the board so you can compare water usage for the whole class.

Review:

The following questions or points may be used to review the activity:

- Examine the chart on the board with learners and ask them if there are ways in which they could all help to save water at home?
- Ask learners to discuss what they could do differently.

Activity 7: Water usage in industry

Resources required:

- Production of case study fact sheet
- Pencils / pens
- Paper

Set up:

Identify a local business that can be used as a case study for water usage. Ensure that you have the business' permission and produce a fact sheet that answers the following questions:

- How much water is used in a month?
- What is the water used for?
- What percentage of their production costs does water usage take up?
- What measures have they taken to ensure they have water all year round?
- Is any of the water recycled / reused? Are there any costs involved?

If it is not feasible to produce a local example a case study can be made from online resources.

Write out the questions used to produce the fact sheet on the board.

Activity:

- Hand out the case study fact sheet to learners.
- Ask learners to write answers to the questions on the board based off the fact sheet.
- Ask learners to draw a pie chart to represent the production costs that water usage takes up.
- Split learners into groups and ask them to discuss if there are any ways water use could be minimised in the business? Have learners write down their ideas.
- Ask learners to compare their results with another group and discuss which they think will be most effective.
- Have the group pairings feedback their solutions to minimising water in the business to the rest of the class.

Review:

The following questions or points may be used to review the activity:

- Write on the board the final solutions the paired groups feedback to the class.
- Ask learners: which solution do they think would be the most cost effective? Why?
- Ask learners: which solution do they think would be the best for the environment? Why?
- If there was a different answer for the previous questions discuss with learners why that might be.

Activity 8: Be a water detective

Resources required:

- Paper
- Pencils / pens
- Camera
- Risk assessment

Set up:

Locate a suitable water-based location that may contain signs of pollution. This could be a river, marsh or local drainage ditches.

Conduct a risk assessment and put in place measure to ensure learners safety while carrying out field trip. This may include minimum groups sizes, a supervised safety point and a specified area that learners may be in. Please refer to the risk assessments section of the Participatory Action Learning Book (Teaching Guide 15).

Activity:

- Place learners into groups of "water detectives".
- Inform the groups that they will be carrying out an investigation into the pollution of a nearby water-based location.
- In the classroom have learners create a clue sheet from the indicators of water pollution.
- Ask learners to feedback examples of the indicators of water pollution and write these on the board.
- Ask learners to expand upon their answers and explain what sources of pollution each indicator shows.
- Ensure all groups update their clue sheets to include all the indicators they will be looking out for.
- Take learners out to the water-based location and give them time to make their investigations using their clue sheet, a camera can be used to take photos of any indicators found.
- Once back in the classroom ask learners to put together a poster using their photos and clue sheets that summarises their investigation.
- Have learners in their groups use their poster to give an investigation report to the rest of the class. This should detail their investigation from start to finish and include any information about the possible sources of a pollution found.

Review:

The following questions or points may be used to review the activity:

- After the reports ask learners if there are any other theories about where the sources of pollution may have come from?
- Ask learners what measures could be taken to reduce the sources of pollution for the water-based location.

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