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Sazani Trust

Teaching Guide 6

Sanitation and waste

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
Types of waste		X	X	X	X	X	X		X
Scavenger hunt!					X		X		
Everything is useful	X	X	X	X	X	X	X	X	X
Shop wisely 1		X			X		X		
Fun composting project	X	X	X	X	X	X	X	X	X
Shop wisely 2		X	X		X	X	X		X

Activity / Form 1-2	Maths	English	ICT	Civics	Geography	History	Biology	Chemistry	Physics	Religion	Arabic
Types of waste		X	X	X	X	X	X	X	X		X
Scavenger hunt!				X	X		X	X	X		
Everything is useful	X	X	X	X	X	X	X	X	X	X	X
Shop wisely 1		X			X		X	X	X		
Fun composting project	X	X	X		X		X	X	X	X	X
Shop wisely 2		X	X		X	X	X	X	X		X

2 Topic overview

We all need food, water and clothes to meet our basic needs. To make life easier and more comfortable, we use electricity to run appliances and transport to travel to work or school. In doing so we use up resources, many of which come from our immediate environment and others from the global environment. As a result, we create all sorts of waste products such as kitchen wastes, wastewater, fumes, plastic bags, bottles and garden wastes. What happens to all the waste products we produce? How do we prevent them from becoming environmental problems, which are unsightly and can affect our health?

Key words

Electricity: is the flow of tiny particles called electrons and protons. It can also mean the energy you get when electrons flow from place to place.

Resources: are something that can be used for a purpose. For example, tools and materials are resources.

Waste: is unwanted or unusable materials.

Contaminants: to soil, stain, or infect by contact or association.

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

Well: a hole made in the earth to reach a natural deposit (as of water, oil, or gas).

3 Environmental management in Zanzibar

It is estimated that 216 tons of waste is generated every day in Zanzibar. However only 25% of this is collected and transported to the municipal landfill site in KIBELE which is located south of Zanzibar town and includes an area of about 20,000 square meters (170m x 150m) in an old stone quarry. Due to a lack of funds, there is no management at the landfill site and no fencing around the site and so the public can access it freely.

A further sign of worry is the absence of a bottom-lining and top cover at the waste dump site which increases the risk of contaminants reaching the groundwater as well as nearby wells, which many of the surrounding households rely on for drinking water.

This considerably increases the risk of water-borne diseases spreading and affecting the health of the local people.

Although there is no formal or centralized system for solid waste management in Zanzibar, the Municipal Council of Zanzibar is responsible for solid waste management services in all 20 wards and 45 local administrative units which are also known as shehia. Most solid waste is collected in a wide variety of containers including plastic bags, baskets, buckets and cardboard boxes. This type of waste disposal can be unhygienic, cause bad smells and attract rats and cats that scavenge through the waste. In 2010, the Municipal Council of Zanzibar City proposed the Zanzibar Urban Services Project (ZUSP) which is an initiative designed to improve public health and welfare and includes:

- Providing solid waste removal equipment such as bins;
- Constructing new concrete skip slabs and providing containers;
- Providing additional steel skips.

Plastic materials

Metal materials

Organic materials

Source: Zanzibar Urban Services Project (ZUSP).

4 Types of waste produced in the environment and their sources

Key words

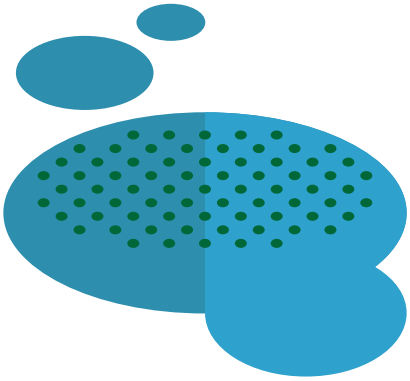
Solid: a solid can hold its shape (for example, water in solid form is ice).

Liquid: a liquid like water forms a pool: it flows or runs but it can't be stretched or squeezed.

Gas: a gas can flow, expand and be squeezed; if it is in an unsealed container it escapes (water in gas form is steam).

Waste can be classified into three major groups. These include:

- Solid waste
- Liquid waste
- Gaseous waste



1. Solid waste

This includes all hard waste such as plastics, paper, glass and construction waste.

2. Liquid waste

This is waste that comes from households, mining areas and construction areas, for example: urine, water from bathroom and kitchens and chemicals from mining areas.

3. Gaseous waste

This is waste from motor vehicles engines, from burning materials and other gases from industries e.g. sulphur dioxide.

5 Why we conserve the environment?

Key words

Landfill: site set aside for the disposal of rubbish

Poverty: lacking enough resources to provide the necessities of life – food, clean water, shelter and clothing.

Child mortality: the death of children under the age of five while infant mortality refers to the death of those under the age of one.

Maternal health: the health of women during pregnancy, childbirth and the postnatal period.

Malaria: a serious disease with chills and fever that is spread by the bite of a mosquito.

Cholera: a serious disease that causes severe vomiting and diarrhea.

Typhoid: an illness characterized by fever caused by infection with the bacterium Salmonella typhi. Typhoid fever has an insidious onset, with fever, headache, constipation, malaise, chills, and muscle pain.

Sewage contains solids such as faeces (human excretion) plastics materials, tin metals materials and faecal bacteria, which can pollute rivers and streams, underground water, flora, fauna and the marine environment where the water eventually ends up. If it is not managed effectively, diseases can spread thus affecting public health. It therefore must be conserved to a level that is acceptable in order to reduce communicable disease.

Goals of conserving environment:

- Eradicating extreme poverty and hunger.
- Reducing child mortality rates.
- Improving maternal health.
- Combating malaria, cholera, typhoid other diseases.
- Ensuring environmental sustainability and improving the ecosystem.
- Developing a global partnership for development.

6 Waste disposal

Key words

Waste management: is the collection, transport, processing or disposal of waste materials, usually ones produced by human activity, in an effort to reduce their effect on human health or local amenity.

Rodent: mammals with long, sharp front teeth that they use for gnawing. Rats, mice, squirrels, chipmunks, gerbils, hamsters, lemmings, beavers, guinea pigs, and porcupines are all rodents.

Soil nutrients: A fertile soil will contain all the major nutrients for basic plant nutrition e.g. nitrogen, phosphorous and potassium.

Waterborne disease: are illnesses caused by microscopic organisms, like viruses and bacteria, that are ingested through contaminated water or by coming in contact with feces.

Vector-borne disease: are infections transmitted by the bite of infected arthropod species, such as mosquitoes, ticks, triatomine bugs, sandflies, and blackflies.

Waste disposal refers to the collection, transportation, processing, re-use and other activities that help us get rid of waste. This can help us reduce the adverse effects of waste on human health and the environment.

6.1 Basic principles of waste disposal

- To reduce the amount of waste we produce. For example, we do not have to buy plastic bags each time we go shopping. We can carry a woven basket instead.
- Recycling helps to turn waste into useful products that can be used again (plastics, glass, paper and metals can be recycled).
- Re-using items instead of throwing them away. For instance, we can use an empty glass jar or margarine container to store sugar.

6.2. The benefits of waste management

- People develop the good habit of dumping waste in appropriate bins.
- It reduces the bad smell on the streets because the dumping sites are far from people's homes.
- Communicable diseases such as cholera can be controlled.
- Reduces the number of pests and rodents such as rats and houseflies.

7 Hazardous wastes

These are products that may be harmful or dangerous to humans and other organisms if swallowed, breathed in or if it is poorly disposed off. For example, waste would be dangerous for everyone in the community if it ends up in the water systems.

These wastes include oven cleaners, drain cleaners, toilet cleaners, medicines, bleaches, nail polish remover, hair dyes, glues, batteries used in torches and cars, floor and furniture polishes.

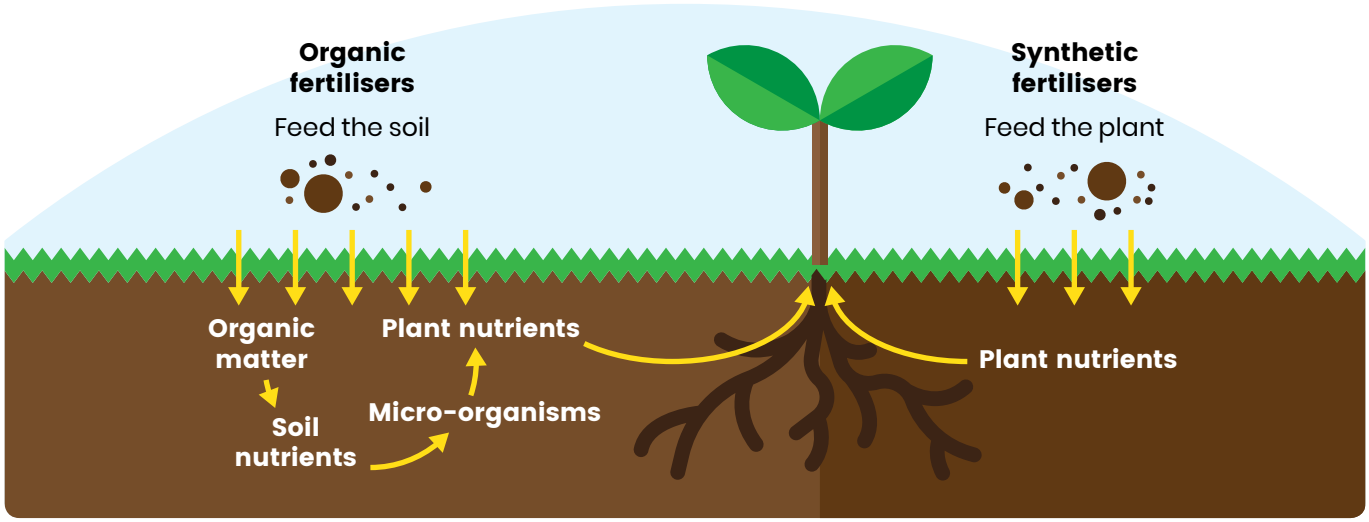
7.1 Effect of poor waste management

The following hazards are usually associated with poor waste management:

- Waste can contaminate the environment and water bodies. For example, the overflow of water from water bodies such as rivers and lakes can harm aquatic animals and plants.
- Number of pests and rodents will increase due to the waste deposited in pits over a long period of time.
- Waste increases water borne, and vector borne diseases of cholera, typhoid, and malaria.
- Land animals such as cattle, goats, and sheep sometimes eat plastic bags that cause death.

7.2 How does organic waste help the soil?

The use of manure and compost as organic fertiliser is likely to increase the soil nutrients which has been taken by crops during agricultural activities. Nutrients like, phosphorous, nitrogen and potassium, sulphur, magnesium and calcium helps to recover the soil.



8 Nature's recycle

Key words

Organism: is any living thing.

Bacteria: are small organisms, or living things, that can be found in all natural environments. They are made of a single cell. Most bacteria can be seen only with a microscope.

Fungus: is a simple organism, or living thing, that is neither a plant nor an animal. Some familiar fungi are mushrooms, molds, mildews, truffles, and yeasts.

Organic waste: is a natural refuse type that comes from plants or animals.

Compost: decayed organic material used as a fertiliser for growing plants.

Soil fertility: the ability of soil to sustain agricultural plant growth, i.e. to provide plant habitat and result in sustained and consistent yields of high quality.

Nature recyclers are organisms that decompose and recycle the organic waste materials.

Organisms such as bacteria, fungi, earthworm, millipedes, ants, snails and termites are natural decomposers of organic matter.

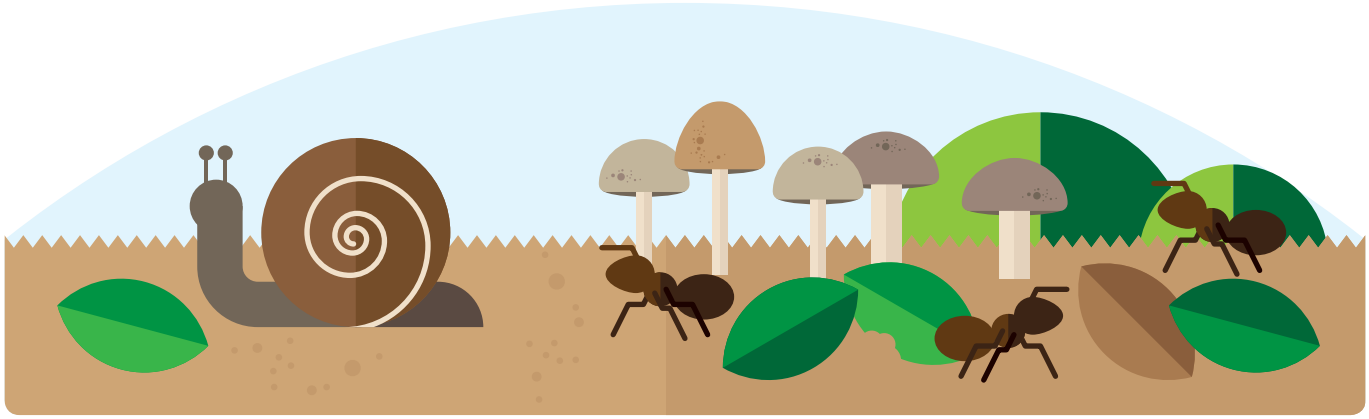
Nature helps to breakdown organic waste like leaves, twigs, branches, and dead animals to be converted to organic compost that add good nutrients to the soil.

8.1 Compost manure:

Mixture of decayed or decaying organic matter used to fertilise soil. Compost is usually made by gathering plant material such as leaves, grass clippings, and vegetable peels, into a pile or bin and letting it decompose by the actions of aerobic bacteria, fungi, and other organisms.

8.2 Benefits of using compost manure include:

- It reduces the volume of waste by 30%.
- Maintains soil fertility level.
- It reduces the need for chemical fertilisers.
- It helps to improve the soil structure.
- It adds moisture and air to soil.
- It increases the nutrient level of the soil.



9 Turning waste into useful products

Key words

Raw material: the basic material from which a product is made.

Decompose: make or become rotten; decay or cause to decay.

Biodegradable: capable of being decomposed by bacteria or other living organisms and thereby avoiding pollution.

Recycling: is a way to reduce the amount of garbage that is thrown away by making rubbish into something new. Every time you throw something away it gets sent to a landfill.

Consumption: is the using of goods and services in an economy, or the amount of goods and services used.

People produce more waste when they choose to buy packaged snacks that are non-biodegradable (that is, not easily broken down naturally), instead of a piece of fresh fruit, takeaway lunches in place of food brought from home, or canned drinks in preference to drinks served in glass.

There are various economic activities that produce waste, for example garages produce oils. Objects such as damaged tyres can be re-used to create different items such as Masai sandals.

What can we do to reduce the amount of non-biodegradable waste produced?

Masai sandals made from tyres.

Practice the 3Rs

Reduce consumption and waste. Reduce the amount of rubbish produced in your household and school compound by using bags made of cloth or strong baskets when shopping.

Reuse everything you can – wrapping paper, glass jars, plastic bags, yogurt tubs, repair shoes and clothes to extend their lives.

Recycle is the process of reworking an item. Items such as glass, plastic, paper and metals can be recycled so the same materials to create new items.

For example, newspaper produced from recycled paper and paper charcoal as well.

Do you know the source of these products and how long it takes for them to decompose in the environment?

Source	Use	Time to decompose
Organic materials • Trees	• Paper • Toilet paper • Envelopes • Books	Takes 2 – 4 weeks
Chemical substance • Sulphur • Silicon • Carbon • Chlorine • Fluorene	• Dyes • Batteries	Up to 100 years
Metals / Mining • Rock mining • Alluvial mining	• Garden hoe • Machete	100 years or more

Reuse and recycle as much as possible. By doing so you will help to:

- Save precious raw materials
- Save water
- Save energy
- Conserve natural area
- Reduce solid wastes in the environment

10 Cleaning and washing

Key words

Pollution: is when gases, smoke and chemicals are introduced into the environment in large doses that makes it harmful for humans, animals and plants.

Hazardous: If something is a hazard, it is a potential source of danger. Balloons are fun, but they're a hazard for little kids who might put them in their mouths.

Use non-polluting alternatives to cut down on hazardous substances when cleaning your home, look in your cupboards for alternative products. Here are a few ideas:

Vinegar

Vinegar or citrus fruits removes mould (mwazi), cleans inside coffee pots and teapots, glass, windows and paintbrushes. Citrus fruits include lemons, carambola, lime and pickles.

Bicarbonate of soda (baking soda)

Bicarbonate of soda and ash from wood charcoal cleans, deodorizes, polishes, scours, softens fabric, removes stains. You can use it on plastic, carpeting, sofa sets, inside refrigerators and down drains.

NOTE: Ash should only be used for metallic surface materials such as silver, copper and toilet sinks.

Salt

Salt has a variety of uses, from mopping up grease spots to unblocking drains.

11 What we have learned:

- Clean and healthy environments are essential to humans and other organisms.
- By meeting our basic needs, we use up resources and create wastes.
- Wastes pollute and can be harmful.
- By minimizing our use of resources, we contribute to waste reduction.
- We are encouraged to choose environmentally-friendly alternatives.
- There are many useful items that could be reused and recovered.

Knowledge and skills	Attitudes and values
Investigate the natural resources used to manufacture things we need; understand that by consuming things we produce waste products that pollute, therefore we should participate in waste reduction initiatives.	Appreciate that resources are finite; that using and reusing products helps in saving resources; use environmentally friendly alternatives.

12 Learning activities

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: Types of waste

Resources required:

- Paper
- Pencils / pens

Set up:

Draw the table of "What happens to rubbish produced at home" on the board (below):

Types of waste	What do we do with it
Glass jars and bottles	
Plastic bottles	
Vegetable and fruit waste	
Cardboard boxes	
Newspapers	
Waste paper	
Plastic food wrapping	
Polystyrene containers	

Activity:

- Ask learners to copy the table and fill it out to demonstrate how they dispose of rubbish in their own home.
- Once learners have completed their table, place them in small groups to discuss any similarities and differences in how they dispose of their rubbish.
- Ask learners to consider in their groups any other uses for the waste products.

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.

Activity 2: Scavenger hunt!

Resources required:

- Paper
- Risk assessment
- Pencils / pens
- Bin bags / buckets
- Camera (optional)

Set up:

Locate a suitable natural area such as a park.

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).

Provide learners with a bin bag or bucket to collect recyclable litter.

Prepare a list of recyclable litter for learners to hunt for.

Examples include:

- Cans
- Cardboard
- Aluminium trays
- Plastic bottles
- Shampoo bottles
- Empty dry paint tins
- Glass bottles
- Plastic containers
- Newspapers and magazines
- Plastic bags
- Aluminium foil

Assign points to each item based off how common or uncommon they are to find. Teachers can decide the points an object is worth as they are brought back if limited on preparation time. A prize or reward can be prepared for the winning team.

Activity:

- Give a comprehensive safety brief that includes:
  - Work in groups for safety and also for assistance.
  - Use Personal Protective Equipment (Have and use gloves, wear long trousers, long sleeves)
  - Designate how far learners are allowed to go
  - Have a complete first aid kit and know how to use it.
  - Work with bags and safely pick up debris efficiently.
  - Point out any area hazards such as bodies of water or steep edges.
  - Don't pick up any waste that could be hazardous such as medical waste or sharp objects.
  - Leave natural items such as plants and animals alone.
- Place learners into teams (the amount and size dependant on class size),
- Ensure learners have a designated drop off zone for their teams scavenged litters.
- Set a time limit and send learners off to hunt for recyclable litter.
- Once time limit has been reached tally up the points.
- A prize or reward may be given to the winning team.

Review:

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

- What is recycling?
- Why is it important to recycle?
- Call out examples of recyclable materials e.g. Paper, Plastic, Glass, Cardboard, Metal and have learners show examples from the recyclable litter they have collected and have them explain where they can get them recycled.

Activity 3: Everything is useful

Resources required:

- Paper
- Pencils / pens
- Selection of recyclable litter from "Scavenger hunt" activity
- Risk assessment
- Camera (optional)

Set up:

Follow on activity from "Scavenger hunt" learners can use their collected recyclable litter from previous activity for inspiration.

Activity:

- Keep learners in their team from the "Scavenger hunt".
- Ask learners to brainstorm in their groups creative ways they could reuse their recycled materials e.g. plastic bottle planters.
- Give learners enough time to consider a few options.
- Have learners vote on their favourite idea within their group and present their top idea to the rest of the class.
- Ensure all recyclable litter is then collected and disposed of appropriately.

Review:

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

- Back in the classroom learners can follow up by researching what products or uses have been developed from the recycled materials they have found.

Activity 4: Shop wisely 1

Resources required:

- Paper
- Pencils / pens

Set up:

Provide learners with a range of empty cleaning material containers. Make sure these are washed out and have tight fitting lids for safety.

Arrange a table with all of the empty cleaning material containers on it.

Bring in alternative cleaning products of vinegar, bicarbonate of soda and salt to use for the review activity.

Activity:

- Place learners into discussion groups.
- Have learner groups come up one at a time to look at the range of cleaning materials on display.
- Have learners read the information on the labels and group them into those which contain hazardous materials and those that do not.
- In their groups have learners discuss what they notice about the groupings.
- Ask learners:
  - What impact would these cleaning materials have on the environment?
  - What cleaning materials are used in your home?
- Have learners look at the list of alternatives.
- Ask learners to choose one in their group and to work together to produce a 30 second advert they can perform to the rest of the class that promotes the uses of their alternative cleaning product.

Review:

- Make your own window cleaner!
- Mix 10ml (2 teaspoons) vinegar and 1 litre of water. Rub this over the class windows and discarded newspapers until clean and dry.

Activity 5: Part one – fun composting project

Resources required:

- Compost cards
- Paper
- Pencils / pens

Set up:

Copy the below cards and mix up the order, there should be one set of cards per group.

Compost cards		
Observe any changes that take place over the weeks.	Cover so that animals do not dig up.	Arrange materials by alternating dry and wet layers.
If the pile is dry, add water.	Dig a hole approximately ½ meter deep in the garden or fix barrel in place.	Turnover at least once a week to ensure there is a flow of oxygen for decomposition to take place.
Finish with a dry layer of cardboard, paper or coconut husks.		

Activity:

- Place learners into groups and hand out the compost cards.
- Ask learners to rearrange the cards in their groups so that they are in the correct order.
- Ask learners to then individually draw a flowchart from the cards to illustrate the process of making compost.
- Ask learners:
  - What kind of waste products are available or can be found in your local community and environment?
- Make a list of waste products from learners' responses on the board.
- As each waste product is mentioned discuss which of these waste products can be recycled or used in composting and group those that can be used together.

Activity 5: Part two – making compost

Activity:

- Have learners use their flowchart plans to make compost.
- Learners should have created a list of compostable materials in Part one.
- Locate a suitable location in the school grounds to make a small compost.
- Ensure learners have appropriate tools and personal protective equipment.
- Follow the instructions on learners flowchart to create a compost!

Review:

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

Ask learners:

- What are the advantages of recycling / reusing waste products that are on the board?
- Are there any disadvantages?

Activity 6: Shop wisely 2

Resources required:

- Paper
- Pencils / pens

Set up:

Display the "Household hazardous waste audit" on the board.

Make copies of the "Household hazardous waste audit" to hand out to groups.

Activity:

- Place learners into groups, and hand each group a "Household hazardous waste audit" sheet.
- Ask learners to place a tick in the first column if they have the products listed in their home.
- Ask learners how they would know if the product was hazardous or not? (Placing a list of hazardous symbols on the board may aid this).
- Have learners tick the second column if the products they have in their home are hazardous.
- Ask learners to list the non-hazardous products available in their home that they could use as an alternative.
- Once learners have completed their audit review the answers on the board and compare the suggested alternatives with the list of non-toxic alternatives.
- Ask learners which alternatives would they choose? Why?

Review:

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

- Ask learners to make a shopping list of the products they would need to clean their house for a month.
- Help learners to come up with approximate costs and calculate total cost of buying all these products not using alternatives.
- Ask learners to then calculate how much their costs would be using alternatives. Ask learners if there is a significant difference in costs? Why?

Household hazardous waste audit

	In use in my home	Hazardous?	What alternatives can I use?
Living room Multi-surface spray cleaner, plant sprays, rug cleaner.			
Kitchen Oven cleaner, flea powder, insect spray, rat poison, drain cleaners, floor polish.			
Laundry Bleach, detergents, dyes, fabric softeners.			
Bathroom Toilet cleaner, hair products, medicine, air fresheners, polishing agents.			
Bedroom Perfume, nail polish remover, batteries, mothballs, shoe polish.			
Garage / storage Weed killer, insecticides, charcoal lighter, motor oil, benzene, car battery, paint, thinner, rust remover.			

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