

FOREWORD

Access to safe drinking water and hygienic sanitation facilities are enshrined in our Constitution as basic human rights. A failure to secure these basic human rights can mean the difference between life and death for the poorest of our communities. Ensuring safe drinking water is not simply a question of providing water infrastructure. Water and sanitation without the right health and hygiene practices may result in water that is not safe to drink, and sanitation that is a threat to our health. 'Water services' are therefore about providing water and sanitation services, which address the health of our communities as well as tackling the cycle of poverty and disease.

Central to safe drinking water, improved health, and poverty reduction is better-managed water, where our water resources are developed, protected, used, conserved and managed sustainably. A holistic approach is needed to avert the vicious cycle of water-related diseases, ill-health and poverty. Fundamental to this approach is developing a vision and understanding in society of sustainable water services and sustainable water resources. This vision of sustainability requires ensuring that our society is empowered with information, knowledge and skills to use water efficiently and wisely, to practice good hygiene habits for healthy living, and to protect our water resources so that they do not become contaminated.

A major initiative towards achieving this vision is the 2020 Vision for Water and Sanitation Education Programme (2020 VFWSEP), which targets learners at schools. This is a collaborative programme between the Department of Water Affairs and Forestry (DWAF) and the Department of Education (DoE). It encourages learners to participate in water resource management, to promote good health and hygiene practices and to identify problems related to water and sanitation in their schools and communities.

It is particularly significant that through the 2020 VFWSEP, water and sanitation issues have now become integrated into the school curriculum, thus ensuring continuity and sustainability of this initiative and ensuring that our children will now learn about these issues from an early stage. We also hope that this programme will stimulate the interest of learners to future career opportunities in the water sector thus addressing the skills shortage in this sector.

The integration of water and sanitation in the school curriculum necessitated the development of curriculum aligned educational resource materials for educators. Consequently, the Department of Water Affairs and Forestry in collaboration with other sector partners developed these resource materials for grades R – 9, and have been tested by 90 educators from the 9 provinces. I am confident that these materials provide excellent inputs for learners and communities about water resource management, water supply and sanitation related issues.

I would like to encourage all learners and educators to become involved in the 2020 Vision for water and Sanitation Education Programme and thereby become involved in critically important issues related to water supply, sanitation and water resource management. These are issues that have serious impacts in terms of health and well being for many communities and your involvement can make a significant difference to the quality of people's lives.

I urge all schools to identify water-and-sanitation related problems such as water leaks, blocked toilets, polluted water, and so on, and to bring these problems to the attention of their local municipalities or the Department of Water Affairs and Forestry in their respective areas.

In order to ensure continuity from Grade R to Grade 12, the Department of Water Affairs and Forestry will also develop educational resource materials for the Further Education and Training (FET) Band.

I would like to express my sincere appreciation to the team who developed the materials and to the educators who tested the resource materials. I have no doubt that your efforts will bear fruit, and instill principles of good water resource management and good hygiene, and ensure that our learners become ambassadors for sustainable water and sanitation services. This will mean better health, longer lives and greater dignity for the poorest of our people. Jointly we will work towards a better education and a better life for all.

Mrs L. Hendricks
MINISTER – DEPARTMENT of WATER AFFAIRS and FORESTRY

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SUMMARY OF MODULES

Topics	LO's (*Main and #integration)	Environmental learning focus
1. Sources of water	*NS LO1: AS2 #AL LO: AS1	Learners will be able to make their own water cycle and explain how rain falls.
2. Always use water wisely	*LO LO1:AS2,3 #AL LO 3 AS4	In this lesson learners will read and analyse information from a case study. They will gain knowledge about different strategies used to solve health and hygiene problems, alleviate poverty and improve the quality of people's lives.
3. Water shortage a reality in South Africa	*NS LO3: AS2 #AL LO3: AS1, 4	This is a report analysis exercise which gives learners an opportunity to develop the skills to organise, analyse and interpret information for the purposes of meaningful participation in political, social and economic activities of the country. Learners then practice this skill by interpreting data on water usage by various sectors of the South African society with an aim of making recommendations to the government with regard to efficient use of water and management of water as a scarce resource.
4. Do not pollute rivers	*NS LO1 AS2 #Tech LO1AS3 LO3 AS2	In this lesson learners are engaged in testing the state of pollution of a river by looking at the organisms/ animals living in the river, thus getting an idea of how polluted the water is.
5. Take action clean up campaign	*NS LO1AS1,2,3 #MathsLO5: AS8 SS (G) LO1AS1	This lesson aims to introduce learners to environmental protection, specifically river protection. Learners are able to identify and categorise different kinds of litter found in the river and make reasonable assumptions about different impacts on the river.
6. Wetlands Investigation	*NS LO1: AS2 #Tech LO1:AS3 AL LO3: AS4	In this activity learners will be able to describe a wetland, and identify major characteristics of wetlands.
7. Keep away from germs	*LO LO1: AS2 #AL LO3: AS4	Learners will come up with suggestions to solve environmental health problems.
8. What kind of sanitation system does your school have?	*SS(G)LO2:AS2, 3 #HL LO5: AS2 NS LO1: AS2	In this activity learners will conduct an audit of all sanitation systems available at school.
9. Making a class garden	*LO LO1 AS1 #AL LO3: AS4 LO4: AS4 MathsLO4:AS2	This lesson gives learners an opportunity to engage themselves in making a class garden so as to alleviate poverty in their school environment.
10 Know dangers of water	LO LO4:AS5 #AL LO3: AS1 LO5: AS3	This activity introduces learners to the dangers of playing in or with water. Different aquatic environments are explored. Learners introduced to the concept of water safety in their lower grades.
11. Plant identification	NS LO3: AS2 #AL LO: AS1	In this activity learners will be able to identify the invasive alien plants in their school grounds.

Message and guidance to the educator

INTRODUCTION

The purpose of this guide is to help educators to educate children to develop a healthy, mature and responsible attitude towards water and sanitation resource management and basic hygiene practices. The guide also aims to encourage the development of awareness to infections, so that communicable diseases do not infect people. The knowledge and skills gained from this resource pack, combined with values taught in the home, will enable and empower young children to lead healthy lives and become the ambassadors of good hygiene and water conservation. The content and teaching / learning activities are intended to be developmentally appropriate and sequential. It is appropriate that water conservation and sanitation information be infused into the established school curricula areas to ensure a comprehensive approach to health education.

This resource material, therefore, assists with the infusion mentioned above into the existing school curricula.

BACKGROUND INFORMATION

In 1996 the Department of Water Affairs and Forestry Sub – Directorate for Community Development and Environmental Education commissioned the development of the first Resource Pack as part of its commitment to support Environmental Education and Water Conservation linking directly to Outcomes Based Education (OBE). Its ultimate goal was to integrate the 2020 Vision for Water Education and Sanitation Programme into the school curriculum and community development training and capacity building programmes.

However, with the advent of the Department of Education's National Curriculum Statement, it became imperative that the second edition be developed in order to make it easy for the educators to integrate water and sanitation into the school curriculum.

Yet again, the Department of Water Affairs and Forestry, in its pursuit to support all programmes that serve to improve the immediate environment of young children invite all its partners including learners to assist in taking up the challenge of ensuring a better environment through active participation in Environmental Education for sustainable development, so that by the year 2020 the state of the said environment, water conservation and sanitation in South Africa is positively sustained.

ACRONYMS

AC -	Arts and Culture
AL -	English – Home Language
AS -	Assessment Standards
CO -	Critical Outcomes
DO -	Developmental Outcomes
EMS -	Economic and Management Science
HL -	Home Language
IAP -	Invasive Alien Plants
LA -	Learning Area
LO -	Learning Outcomes
LO -	Life Orientation
MATHS -	Mathematics
NS -	Natural Sciences
SS -	Social Sciences
Tech -	Technology

MESSAGE AND GUIDANCE TO THE TEACHER ON INVASIVE ALIEN PLANTS

Introduction to the World of Invasive Alien Plants

Invasive alien plants have a damaging impact on our environment. It is causing billions of Rands of damage to South Africa's economy every year, and are the single biggest threat to our water and biological biodiversity. They intensify the impact of fires and floods and increase soil erosion. Of the estimated 9000 plants introduced to this country, 198 are currently classified as being invasive. It is estimated that these plants cover 10.1 million hectares or about 7 % of the country and the problem is growing at an exponential rate.

The inclusion of invasive alien plant content into the resource is to provide you as the educator with relevant information about the topic and to assist you in educating learners and others about this very serious environmental threat to especially our water sources. The lessons included will also assist you in taking action to adequately respond to the problem.

The lessons on invasive alien plants were developed and implemented by a diverse group of educators during a research project which focused on the development of curriculum aligned invasive alien plant resource materials. The educators were constituted from the three phases (GET band) and supported by curriculum advisors from the Western Cape (EMDC) South Metropole. Sixteen schools with 32 educators were involved in the project. The Working for Water Programme acknowledge the following schools for their contributions:

Primary schools: Hyacinth, Siyazingisa, Huguenot, Levana, St Mary's, Westville, Qingqa Mntwana, Edendale.

Senior Schools: Glendale, Grassdale, Oscar Mpetha, Cedar, Sopumelela, I.D. Mkize, Goodhope Campus, Grassy Park.

For additional information on invasive alien plants you can contact the Working for Water Programme offices. Toll free no. 0800 005376

HOW TO USE THIS GUIDE:

SCOPE AND SEQUENCE:

The scope of this resource pack includes:

- Water is life
- Water use efficiency
- Water quality management
- Sanitation, health and hygiene
- Water safety
- Forestry and invasive alien plants

The sequence of the activities contained in this Resource Pack is graded for **Grade 7** and is aligned to the National Curriculum Statements (NCS).

LAYOUT OF EACH TOPIC:

At the beginning of each topic, learning area/s, learning outcomes and assessment standards attained in that chapter are outlined and are further interpreted in the activities that the learners will achieve in that lesson.

Mostly, each chapter begins with a tuning in activity, which serves to identify existing knowledge or gaps pertaining to the topic and to introduce the learners to the activities of the whole chapter. Please use results of these activities to inform the development of the structure of the main topic.

Finally, a suggestion of what can be assessed during the learning and teaching process has been made and linked to the learning outcomes and assessment standards in that chapter. Other aspects pertaining to assessment have been left entirely to the educators because developers of this module indicate that the choice of what assessment strategies to use is a subjective one. It is unique to each school, grade and depends on the educator's professional judgment as well as availability of space and resources.

Same applies to time allocation and other aspects such as linking the lessons to the previous or forthcoming lessons. Although there are some indications here and there, those aspects can best be catered for in the development of lesson plans, which will again be unique to different circumstances.

TEACHING / LEARNING STRATEGIES:

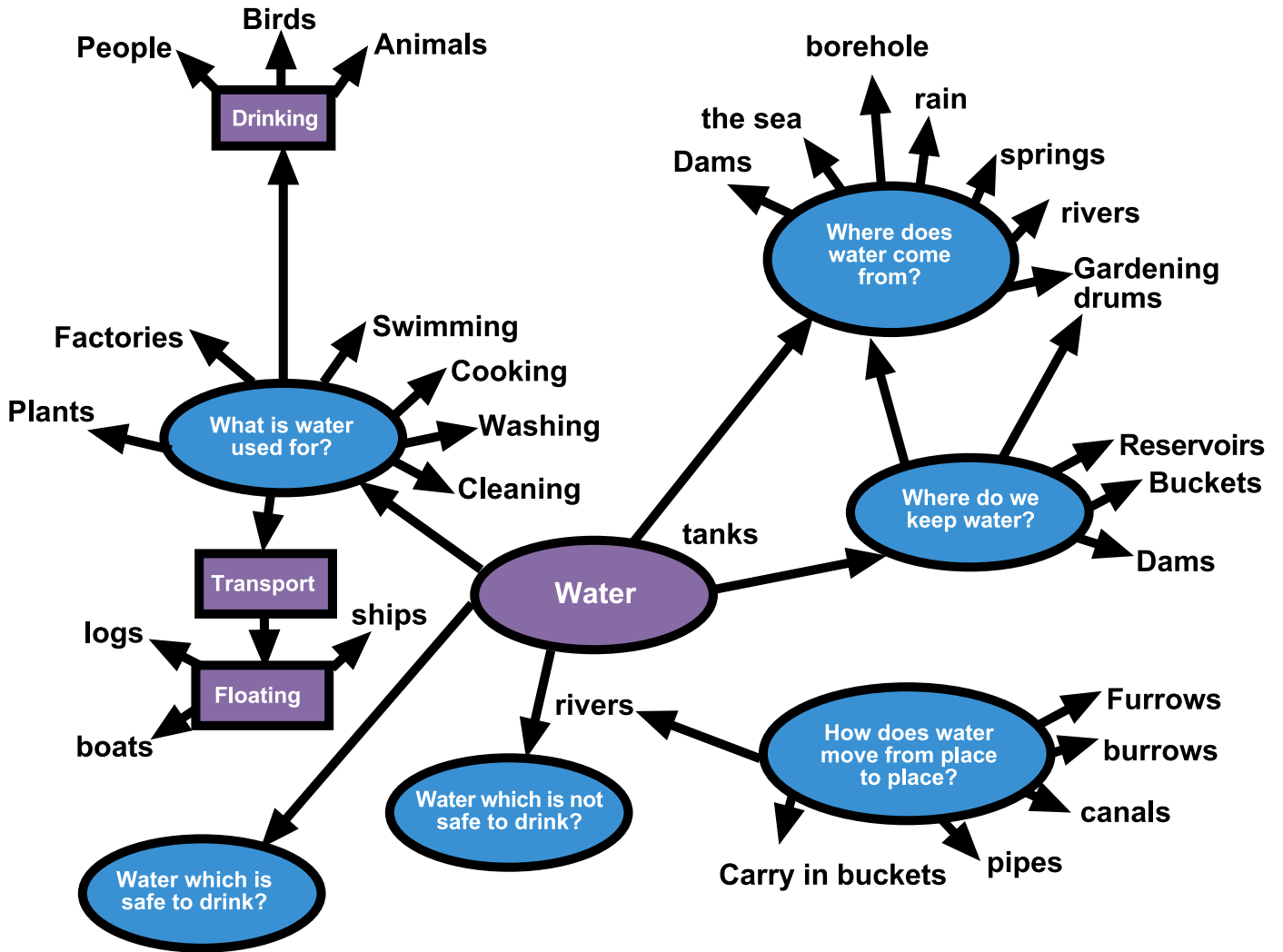
The teaching / learning suggestions in this guide are meant to serve as guidelines, not requirements. In many cases there are many suggestions for activities that will accomplish the same aspects of the outcome.

It is, therefore, not intended that you use all the given strategies. Rather, one or more of the teaching/ learning strategies will be appropriate for a particular grade or situation.

The teaching/learning strategies used in this guide use the current Outcomes Based Education (OBE) methodologies such as:

BRAINSTORMING:

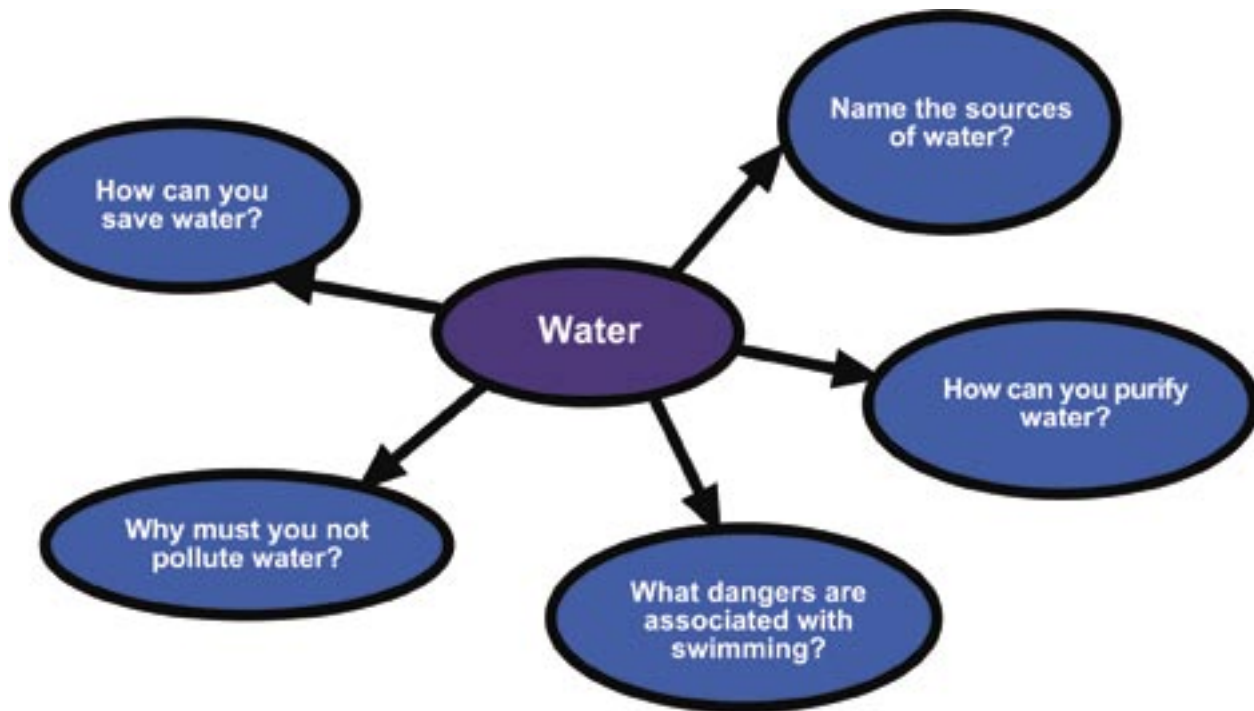
Brainstorming is used to begin discussions or generate a variety of ideas. One of the exemplars of brainstorming methodology is the use of mind / concept map shown below.



CLASS DISCUSSION:

It is used to begin a lesson, to review or to clarify information. For instance, you can use an incomplete mind map to begin a lesson an example of which is shown below.

It is important to realize that there is not only one-way to do mind maps. Different learners will know different things and you should accept these, if they are correct, even if they are not in your mind map.



GROUP DISCUSSION:

This strategy can be used to produce information or to analyse ideas while encouraging interaction among learners in line with group dynamics principles.

ROLE PLAY:

Role-play actively involves learners in learning concepts or practising behaviours in non-threatening situations by acting out an imaginary situation.

HANDS-ON ACTIVITIES:

Use of worksheets, puzzles, and games or other types of written materials to test or review learner's knowledge of a particular topic are especially effective for foundation phase grades.

ASSESSMENT:

In this guide assessment is integrated into the learning and teaching process.

An integrated approach, which assesses both the process of learning and the product of learning, is used here in order to assess holistic learning. This involves:

- ▣ Assessing learners against outcomes and assessment standards, whilst they are working on tasks and activities.
- ▣ Assess learner's investigative, problem solving and co-operative skills.
- ▣ Assessing at the end of learning cycles. This could be a product such as a project or a summative assessment.

**WATER IS
LIFE**

**MAIN LEARNING AREA****NS: LO1: SCIENTIFIC INVESTIGATION**

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

AS2: Conducts investigations and collects data: Conducts simple tests or surveys and records observations or responses.

- Contributes entries to the class logbook (e.g. about changes in a growing plant or a caterpillar).

INTEGRATION WITH OTHER LEARNING AREAS**AL: LO4 WRITING**

The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes.

AS1: Writes to communicate information:

- Writes one or two paragraphs describing a process (e.g. how to change a tyre)

ACTIVITY

Learners will be able to:

- Make the water cycle.

For activity 1a, each group will need:

- A glass or clear plastic bowl
- A small dish or tin lid, which will fit on the bottom of the bowl
- Water
- Clear plastic wrap or a sheet of clear plastic and an elastic band
- A small stone

Guideline for the activity

Ask learners where they think our fresh water comes from. They will probably say rain. Then work backwards: Where does rain come from? Where do clouds come from? Where does water vapour come from? Make sure that learners grasp the idea that water occurs due to a chain of events that happen over and over again (in a continuous cycle).

In grades 4,5,and 6 learners were introduced to phase changes. The water cycle is an excellent way to see phase changes in action.

ACTIVITY 1A: Make your own water cycle

Follow these steps:



Step 1: Place the dish or tin lid on the bottom of the bowl.



Step 2: Pour some water into the bowl around the dish. The water should be about 1 cm deep. Make sure no water splashes into the dish.



Step 3: Put the plastic wrap over the bowl and stick it down. Or put the sheet of plastic over the bowl and hold it down with the elastic band.



Step 4: Put the small stone on the plastic. Leave the bowl outside in a hot, sunny place for a few hours.



Step 5: After a few hours, you should see droplets of water on the inside of the plastic. These droplets fall off the plastic into your dish or tin lid.

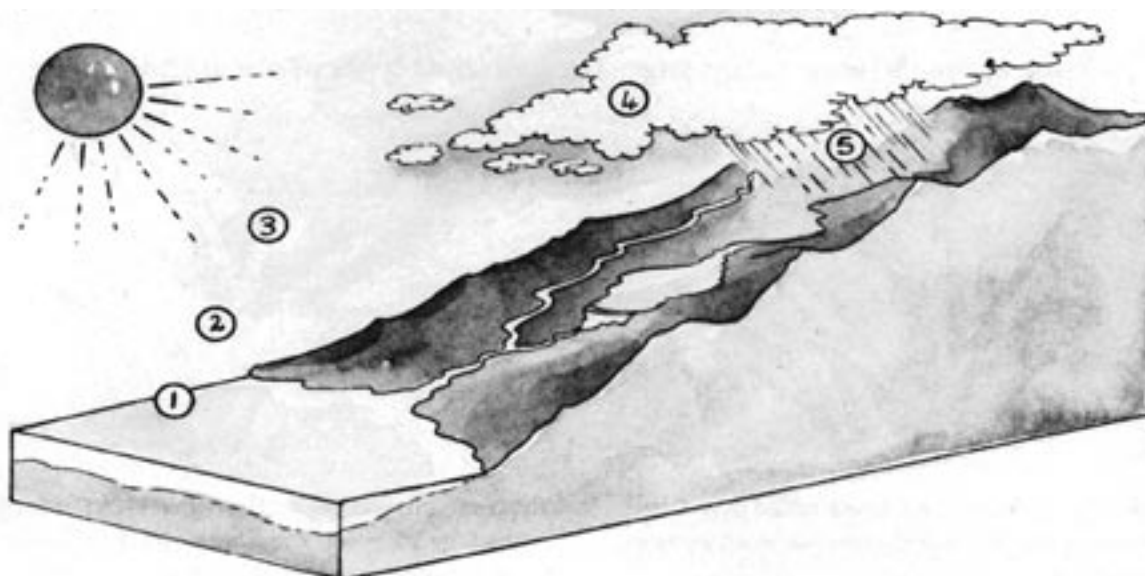
Go through each step with the class and then let groups make their own water cycle. Walk around and observe. Assist where necessary.

ASSESSMENT

Group or peer assessment:

- Can the learner conduct a scientific investigation?
- Can the learner discuss the findings of the experiment?

Ask learners to look at this picture, which shows these things happening in the world.



1. The sun shines on the sea and heats it up.
2. The water from the surface of the warm sea changes into vapour. The water vapour stays in the air.
3. The warm air with water vapour rises.
4. When the water vapour cools down, it changes back into tiny droplets of water. Millions of water droplets form a cloud.
5. In the cloud, the water droplets join together to make rain. The rain falls on the land and fills the rivers, lakes and dams.

ACTIVITY 1B: THE WATER CYCLE

Ask learners to copy and complete the sentences in their notebooks. Discuss the answers with them.

Answers

The sun heats the surface of the SEA. The warm water changes to water VAPOUR. The water vapour stays in the AIR. The air rises and COOLS. The water vapour changes into WATER droplets which form a CLOUD. The water droplets join together to make RAIN.

ASSESSMENT

- Can the learner explain how rain falls?

Learners can answer the self-assessment questions (they are not intended as a formal assessment) as homework or in class at the end of the lesson. Go over the answers with the whole class and explain anything that they have not fully understood.

Answers

1. a. In the water cycle, water changes from a liquid to a gas phase at the surface of the sea.
b. This phase change is called evaporation.
2. a. Water vapour in the air changes into water droplets in a cloud.
b. This phase change is called condensation.
3. The diagram is called a cycle, because the processes lead from one to the next in a continuous circle.
4. The sun provides the heat energy to evaporate the sea water.

ASSESSMENT

If you want to use this activity for formal assessment, use this rubric.

LO&AS	Achieved with merit	Achieved	Partially achieved	Not achieved
LO2	The learner answered all the questions correctly, and shows that he or she has fully understood the concept of the water cycle.	The learner answered all the questions correctly but could have made explanations a little fuller. Learner understands the concept of the water cycle.	The learner answered one or two questions incorrectly, showing that he or she has not fully understood the concept of the water cycle.	The learner answered three or more questions incorrectly, showing that he or she has not fully understood the concept of the water cycle.

WATER USE EFFICIENCY

2. ALWAYS USE WATER WISELY

MAIN LEARNING AREA

LO: LO1 HEALTH PROMOTION

The learner will be able to make informed decisions regarding personal, community and environmental health.

AS 2: Evaluate actions to address an environmental health problem.

AS 3: Describe strategies of living with diseases, including HIV /AIDS.

INTEGRATION WITH OTHER LEARNING AREAS

AL: LO3 READING AND VIEWING

The learner will be able to read and view for information and respond critically to the aesthetic, cultural and emotional values in texts.

AS 4: Reads for information follows information texts, reads simple diagrams, graphs and charts and summarises information.

ACTIVITY

In this activity learners will:

- Read the case study that explores best methods of conserving water.
- Demonstrate the suggested method in their small experimental garden.

WHAT TO DO:

- Assist learners in reading the following abstract about water use.
- Learners would have to respond to the questions that follow.

ABSTRACT

Water wise Reel Gardening for rural areas in the developing world From DWAF 2020 VFWSEP - 2003

In South Africa alone thousands of people each year are dying from starvation. Most of these people have the land to grow food for themselves but lack the resources needed, number one being WATER. We know that an average 2-sqm tomato garden uses 100l in one watering! Which is ridiculous when realising that these people hardly have any water to drink, let alone spray all over the soil in hope it reaches a seed.

The next is poverty, which comes through lack of education. Therefore these disadvantaged people are not able to follow planting instructions thus reducing the seed's chance to germinate. The need for reel gardening is not only found in rural farms in Africa but all over the world. It can be used universally from poor rural farmers to family vegetable gardens to large subsistence farmers. Over 50% of the world's water is used in agriculture so surely this would be the target area for water conservation. Nearly everyone in the world plants something each year be it a tree or a bean, so if all of these plants consumed less water each, the conservation of water would be great.

My objectives were to find a form of growing vegetables in rural areas in the developing world where one has hardly any water, money or education.

I came up with Reel Gardening and tested it with various different vegetables. The results were amazing. The water used was cut down by 80% because the newspaper absorbs most of the water and cuts down on leakage into the soil thus keeping the seed constantly moist and accelerating germination. I was able to water my vegetables with just more than a glass of water! It is easy to plant and extremely cost effective.

The water wise Reel Gardening plants were of a far higher standard because the germination had happened so quickly. The soil did not need compost because the seed strip slowly decomposes nourishing the soil. The water wise Reel Gardening plants were not prone to black frost because the roots were kept warm by the newspaper.

The strips can be bought at an extremely cheap price and only need a few glasses of water a week to survive.

The following questions are based on the above abstract

QUESTIONS:

1. What is the problem identified in this case study?
2. What is the cause of the problem?
3. What effect does the problem have on the lives of the people concerned?
4. What group of people is targeted by the action / project?
5. What actions are undertaken to address the problem?
6. What impact did those actions have?
7. Did those actions successfully solve the problem?

8. Would you say it was the best option to address the problem? Why
9. Why are the water wise Reel garden plants of a higher standard?
10. The water wise Reel garden plants were not prone to black frost, why?

Activity 2B: Reusing Wastewater for food

In this activity, learners will:

- Make the tower-garden to demonstrate the methods of saving water.
- Construct their tower-gardens.

Did you know?

You can use grey water for food farming/gardening?

Background Information

One of the most innovative and user friendly ways of using grey water is the “tower-garden”. In tower-gardens, vegetables are grown in a column of soil.

PREPARATION FOR THE ACTIVITY

Ensure that the following are assembled before:

- Branch trimmers or fencing droppers
- Shade netting
- A soil mix made up of dry cow manure, wood ash and soil
- Pile of stones
- Soil
- Seedlings

Making the tower-garden

Guide the learners in making their own tower-gardens. Learners may work in a group of four or in partners for this activity.

Assist the learners when carrying out the following steps to erect their tower-garden.

1. Erect four upright poles using branch trimmers or fencing droppers.
2. Place the shade netting to form the sides of the tower. Ensure that you use nylon string or fishing line to join up the ends of the shade netting so as to form a cylinder around the poles.
3. Prepare a soil mix made up of dry cow manure, wood ash and soil. The soil mix provides fertility.
4. Pack a pile of stones in the middle of the tower-garden. The stone column must be exactly in the centre for even distribution of water. Pack flat stones or building rubble to ensure even distribution of water in the tower.
5. Fill the tower with soil. The soil must be dampened to provide cohesion but should not be compacted.
6. Create the holes diagonally along the shade netting.
7. Tower gardens are ideal for leafy crops, spinach being successfully grown and planted through the holes in the side of the shade net cylinder.
8. Other varieties of crops, like tomatoes, and bulbs crops, like beetroot and onions, can be grown in the centre of the tower.



ASSESSMENT

This is a project that does not only end by the erection of the tower garden. Assess the learners' ability to execute the following skills:

- Ability to follow instructions.
- Assembling the apparatus.
- Erecting a model that fits the purpose.
- Taking care of the garden.

GLOSSARY OF WORDS

Dehydration – To become weak or ill through losing too much water from the body.

Germinate – To grow or cause to grow.

Prone – Having a tendency to be affected by or do something.

SEP – School Environmental Policy.

3. WATER SHORTAGE A REALITY IN SOUTH AFRICA

MAIN LEARNING AREA**NS: LO3: SCIENCE, SOCIETY AND THE ENVIRONMENT**

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

AS2: Understands sustainable uses of the earth's resources: Analyses information about sustainable and unsustainable use of resources:

- (i) Analyses data provided about water use in South Africa, comparing the amounts used in various production processes and noting amounts released as effluent,
- (ii) Presents the analysis as a report to the policy making body such as Parliament with recommendations.

INTEGRATION WITH OTHER LEARNING AREAS**AL: LO 3: READING AND VIEWING**

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

AS 1: Reads text (fiction or non-fiction)

- Notices how the text is constructed to represent a particular view of the world (point of view)

AS 4: Reads for information:

- Follows information texts,
- Reads simple diagrams, graphs and charts,
- Summarises information.

ACTIVITY

Learners will be able to:

- Interpret data about the use of water resources.
- Analyse and report on use or misuse of water by various sectors.
- Analyse different data sources and reach generalised conclusions and make appropriate suggestions.
- Draw generalised conclusions from different data sources.
- Make viable suggestions to overcome the problem.

GUIDELINES FOR THE CHAPTER:

This chapter contains a report analysis exercise which gives learners an opportunity to develop the skills to organise, analyse and interpret information for the purposes of meaningful participation in political, social and economic activities of the country. Learners then practice this skill by interpreting data on water usage by various sectors of the South African society with an aim of making recommendations to the government with regard to the **efficient use of water and management of water as a scarce resource**.

ACTIVITY 3A: The plight of water shortage in South Africa

Ask learners to read the following background information so as to see the plight facing the South African government and make use of the activities below to make recommendations with regard to efficient use and the management of water as a scarce resource.

WATER SHORTAGE A REALITY FOR SOUTH AFRICA

(Media release by the Department of Water Affairs and Forestry 18 January 2005)

The Minister of Water Affairs and Forestry, Ms Buyelwa Sonjica, today urged all the people living in

South Africa to use water sparingly as the water situation in our country is serious at present and there is still reason for concern.

The Minister said that “the overall situation in the country is worrisome and has not improved over the last few months despite the rain in certain parts of the country since December 2004. Some areas appear green and the crops are growing but that does not reflect a true picture of our country’s water situation at present.”

Minister Sonjica said the average increase in the dam levels in Gauteng, Limpopo, KwaZulu- Natal and Mpumalanga since last week in December 2004 and the first week of January 2005 is only 1%, whilst the dam levels in the Free State remained more or less unchanged. The situation in the Eastern Cape is slightly better and there the dams have risen by 3% on average and in Lesotho by 4,5%. The situation in the Western Cape is deteriorating however . Dam levels have decreased steadily over a period and during the last week declined from 43,7% to 42,4% on average. Water restrictions in this province will continue to be enforced and strictly monitored. This province faces hardship if rain does not fall soon. Areas that are particularly dry are along the west coast and the Karoo area.

Minister Sonjica appealed to everyone in the country to contribute towards the situation using water sparingly. “Dripping taps and the unnecessary and extended use of hosepipes and sprinklers are taxing on our current water situation. South Africa is a water scare country and all water users should exercise discipline in water use. Adhering to water restrictions that have been imposed is critical. Farmers and other water users should carefully review their commitments and use water with the utmost care”.

For further information please contact Amelius Muller

Tel: (012) 336 8746

Email: mullera@dwaf.gov.za

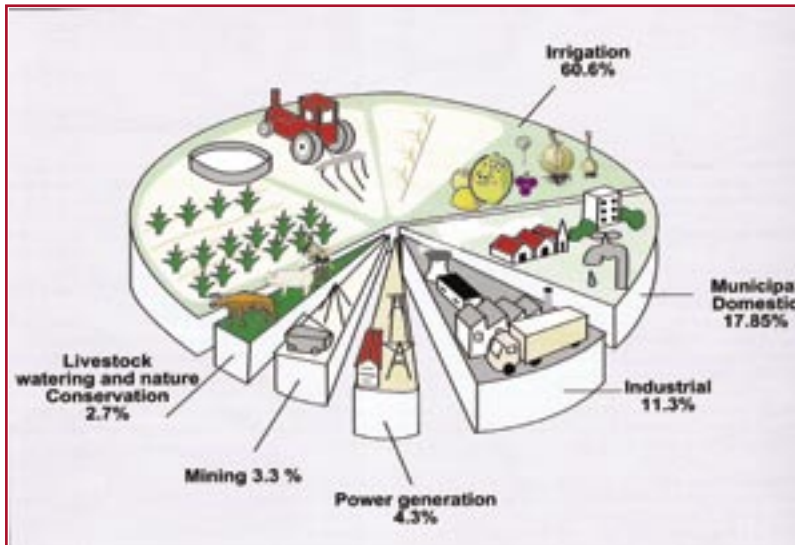
QUESTIONS

Award learners full marks if they have responded in the following way:

- (a) What is the problem facing South African government currently? *Water shortage*
- (b) What advice does the Minister of Water Affairs give to the people of South Africa? *To use water sparingly*
- (c) Which part of our country experiences a major challenge regarding water shortage? *Areas along the coast and the Karoo areas.*
- (d) Which province is facing a lot of challenges with regard to water shortage? *Western Cape*
- (e) Mention things that the Minister of Water Affairs singles out as causing water shortage in our country? *Dripping taps and the unnecessary and extended use of hosepipes and sprinklers*
- (f) Where can you get further information about water conservation?
Contact Amelius Muller, Tel: (012) 336 8746, Email: mullera@dwaf.gov.za

ACTIVITY 3B: WATER USE IN SOUTH AFRICA

Ask the learners to study the following **pie graph** as a group and answer the questions that follow in their individual books:



Taken from: EnviroTeach Vol 11, May 2004, P.4

ASK THE LEARNERS THE FOLLOWING QUESTIONS:

1. List the water use activities indicated in the pie chart starting from the most to the least.
2. Which sectors are using the water and how much of that? Use the following table to represent your answer?

Sector	Activity	% of Water Usage
1. Mining industries	Mining	3.3%

3. Which sector uses the most water and for what purpose?
4. Were you aware of the situation reflected in the pie chart? Yes/No
5. Which sector did you think was the highest water consumer before seeing this pie chart?
6. Would you say the pie chart reflects the water consumption in your local community? Explain
7. Which sector/s has a chance of reusing its water? Explain how.
8. Would you say the sector/s mentioned in number 7 is/are misusing the water by consuming as much as they do? Explain.

TAKE ACTION

Ask the learners to read the pie chart

- In their groups they must discuss the following and prepare presentations to raise the **red flag** and make suggestions to the municipalities / water boards / Department of water Affairs & Forestry officials in their area.

Ask them to:

1. Justify the use of water by the highest water-consuming sector.
2. Justify the government's action of providing high subsidy for this sector.
3. What suggestions would they give this sector as well as the government to try to reduce this high rate of water consumption?

ACTIVITY 3C: WATER USER PAYS AND POLLUTER PAYS

Did you know that not everyone pays the same amount for water in South Africa?

The government has, through the National Water Act, established a pricing strategy which differentiates among geographical areas, categories of water users or individual water users. It applies a principle of "user pays and polluter pays".

Water use charges are to be used to fund the direct and related cost of water resource management, development and use, and may also be used to achieve an **equitable** and efficient allocation of water.

Ask the learners to study the following **extract** as a group and answer the questions that follow in their individual books:

QUESTIONS

1. Why would the government use a varying pricing strategy? *To differentiate among geographical areas, categories of water users or individual water users.*
2. Which sector receives most subsidies from the government? *Agriculture*
3. Why do you think it is important for the government to subsidise this sector? *The sector is the primary producer of food and it mainly uses more water than any other sector. Provision of food is the basic mandate of the government in any country.*
4. What basic needs of the country does this sector address? *Production of food.*
5. Do you consider this action economically viable? Support your statement. *It is economically viable. Besides the fact that provision of food is the major mandate, agriculture contributes to the economy when goods are exported*
6. What alternative water saving options would you suggest to the major consumers of water? *Construction of dams, boreholes, watering during certain times of the day when evaporation rate is low; harvesting water during rainy seasons; using water sparingly – these are some of the ways learners can mention.*

ASSESSMENT:

LO&AS	Achieved with merit	Achieved	Partially achieved	Not achieved
NS LO3	The learner answered all the questions correctly, and shows that he or she has fully understood the case study of water shortage in SA and water use in SA.	The learner answered all the questions correctly but could have made explanations a little fuller. Learner understands the case study of water shortage in SA and water use in SA.	The learner answered one or two questions incorrectly, showing that he or she has not fully understood the case study of water shortage in SA and water use in SA.	The learner answered three or more questions incorrectly, showing that he or she has not fully understood the case study of water shortage in SA and water use in SA.
AL LO3:AS4				

GLOSSARY OF WORDS

Equitable – Fair/ reasonable.

Subsidy – Financial aid supplied by government, for example to industry or for public welfare.

WATER QUALITY

4. DO NOT POLLUTE RIVERS

MAIN LEARNING AREA**NS LO1: SCIENTIFIC INVESTIGATIONS**

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationship and solve problems in scientific, technological and environmental contexts.

AS 2: Conducts investigation and collects data: Organises and uses equipment or sources to gather and record information.

INTEGRATION WITH OTHER LEARNING AREAS**TECH: LO1 TECHNOLOGICAL PROCESSES AND SKILLS**

The learner will be able to apply technological processes and skills ethically and responsible using appropriate information and communication technology.

AS3: Investigates by performing simple practical test relating to aspects of the technological knowledge areas. (Structures, Processing, and Systems and Control).

LO3: TECHNOLOGY, SOCIETY AND THE ENVIRONMENT

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

AS2: Impact of technology: expresses some reasons why products of technology affect the quality of people's lives positively and negatively.

ACTIVITY 4A: CONDUCTING A RIVER AUDIT

In this activity we shall conduct a river audit to determine the quality of water in the river.

By engaging in this activity learners will be able to:

- Complete an investigation step by step.
- Interpret their findings.
- Apply scientific environmental knowledge.
- Understand that some pollutants cannot be seen.
- Relate a pollution prevention message through words or art.

Note to the teacher:

This chapter must be preceded by a lesson on dirty and clean water. Unpack the concept of dirty & clean water in terms of scientific knowledge before learners embark on testing the state of pollution in the river.

APPARATUS NEEDED:

- Net (to scoop animals under the rocks and from the river bed)
- Plastic containers (to collect animals in)
- White clear tray (on which you will identify the animals)
- Bud viewer with magnifying glasses
- SWAP water quality kit with test slides
- Record sheet for each group
- Rubber gloves
- Plastic garbage bag

PREPARATION FOR THIS ACTIVITY

- Before attempting these activities with learners, you need to become competent with the SWAP kit they will be using, learn how to read and interpret results, and be prepared to

implement appropriate safety procedures. Many types of test kits are available at different price ranges, sensitivities, and levels of user friendliness.

- Select and pre-test the kit and equipment to be sure everything performs as it should. Check the uses for which tests and equipment are intended.
- Develop a data sheet for the field.
- Visit the river beforehand to become familiar with the aquatic environments suitable for testing. Select several test sites.
- Ask learners to give their ideas about how they can tell if pollution is present, or if it is not. List their responses on the board. Lead the exercise towards recognising the need to identify and quantify the presence of individual pollutants.
- Tell the class about the planned field trip. Familiarise them with the equipment and test the kit and point out how it can be used to test for various types of water quality.
- In class, practice doing all of the tests with appropriate safety procedures and equipment care. Use plain tap water, which you may enhance with a pinch of something (non-toxic) for which you will be testing (e.g. salt, vinegar or fertiliser).

BACKGROUND INFORMATION

WHAT IS POLLUTED WATER?

Water quality is defined as water, which is safe, drinkable and appealing to all life on earth. It should contain no chemical or radioactive substance that is harmful to the health of any life. It should be free of disease-causing organisms and stable in terms of corrosion or scaling. Polluted water is water that is not safe and not healthy for people and animals to drink or to wash in. Polluted water is particularly dangerous to water plants and animals. Polluted water is also particularly dangerous to people who get their water directly from a river or dam. In South Africa the scarce fresh water is decreasing in quality because of an increase in pollution and the destruction of river catchments, caused by urbanisation, deforestation, damming of rivers, destruction of wetlands, industry, mining, agriculture, energy use, and accidental water pollution. As the human population increases, there is an increase in pollution and catchment destruction.

POLLUTION SOURCES

Pollution sources are frequently referred to as “point” or “non-point” sources. Point sources have an identifiable origin, such as a waste pipeline from an industry or sewage treatment plant. Non-point pollution is carried into waterways primarily by rainwater runoff from urban areas and the countryside.












WHAT TO DO:

- Review the river and plan logistical details. Organise items for taking measurements at each site.
- Take time to enjoy the natural features of the river. Water quality exists within the context of the environment. Hopefully, serious pollution will be hard to find in the river.
- Taking learners to the river helps them to become more aware of the water around them.
- Take with you paper, pencil, clipboard, rubber gloves, plastic garbage bags.
- When you get to the site divide learners into groups of 3 or 4.
- With the class, examine site maps to locate test sites. Proceed according to the plan.
- Each group is to look around the river and find as many sources / types of pollution as possible.
- Each group will record the different type of visible pollution found often in the form of litter. Record the types on the following worksheet.

Potential Pollution Source	Solution
1.	
2.	
3.	
4.	
5.	
6.	

- After 5-7 minutes, come together as a class and discuss the types of litter observed in water.
- Since the visible pollution is often in the form of litter, discuss with your learners the pollution that may be present, but not seen.
- Ask each group to choose one point of the river to investigate.
- Discuss that some kinds of pollution can't be seen. If you have local creeks, streams, or other water ways that are unsafe for human use, this is a good jumping off point to discuss the problems these bodies water have.
- Read out and explain the steps to be followed by the learners in their investigations.

- STEP 1** Disturb the bottom of the riverbed or scrape under rocks in the river.
- STEP 2** Scoop through the water with your net to collect any organisms floating in the water.
- STEP 3** Place these organisms on the trays provided. Make sure that you do not kill the organisms.
- STEP 4** Use the net to collect organisms under the rocks in the river into the container.
- STEP 5** Identify the organisms you have found using the test in the SWAP kit. Use a magnifying glass if necessary.
- STEP 6** Put all the organisms back into the river or similar water body after the investigation is completed.
- STEP 7** Record your findings on the record sheet attached.

		PRESENT	WATER QUALITY
Mayfly nymph			Clean Water
Stonefly nymph			Clean Water
Flatworm			Slightly polluted water
Caddisfly			Slightly polluted water
Whirligig beetle			Slightly polluted water
Dragonfly			Slightly polluted water
Water snail			Moderately polluted water
Blood Worm			Moderately polluted water
Water Algae			Moderately polluted water
Rat-tailed maggot			Badly polluted water
Sludgeworm			Badly polluted water
No life			Toxic Pollution
TOTAL ORGANISMS			

RECORD SHEET OF RESULTS

NAME OF LEARNER: -----

NAME OF RIVER: -----

DATE:-----

Instructions:

- Study the schedule below of possible organisms that you may find in the rivers to support your answers to the following questions.
- List the names of the organisms identified in the schedule to show that you understand the difference between polluted and clean water.

Circle the appropriate answer:

1. Is the water clear? **YES** **NO**

Reason/s:-----

2. Is the river flowing? **YES** **NO**

Reason/s:-----

3. Are there plants in the water? **YES** **NO**

Reason/s:-----

4. Are there visible signs of pollution? **YES** **NO**

Reason/s:-----

ASSESSMENT

Design an assessment tool to assess the learner's ability to:

- Complete an investigation step by step.
- Record information appropriately in the record sheet.
- Interpret their findings.

5. TAKE ACTION: CLEAN UP CAMPAIGN

MAIN LEARNING AREA**LO: LO1- HEALTH PROMOTION**

The learner will be able to make informed decisions regarding personal, community and environmental health.

AS 2: Evaluates actions to address an environmental health problem.

NS: LO1: SCIENTIFIC INVESTIGATIONS

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

AS 1: Plans investigations: Plans simple tests and comparisons, and considers how to make them fair.

AS: 2 Conducts investigations and collects data: Organises and uses equipment or sources to gather and record information.

AS 3: Evaluates data and communicates findings: Generalises in terms of a relevant aspect and describes how the data supports the generalisation.

INTEGRATION WITH THE LEARNING AREAS**MATHS: LO5: DATA HANDLING**

The learner will be able to collect, summaries, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation.

AS 8: Draws a variety of graphs by hand/technology to display and interpret data (grouped and ungrouped) including: bar graphs and double bar graphs.

SS (G): LO1 GEOGRAPHICAL INQUIRY

The learner will be able to use enquiry skill investigate geographical and environmental concepts and processes.

AS 1: Identifies a variety of geographical and environmental sources relevant to an inquiry [finds sources].

ACTIVITY:

In this activity learners will be able to:

- Work effectively in a group.
- Collect and organise litter into categories.
- Identify what type of litter causes the greatest impact on the river.
- Draw a bar graph to present their findings giving their recommendations.
- Complete investigations step by step.
- Interpret the findings.
- Apply scientific environmental knowledge
- Understand that some pollutants cannot be seen.
- Relate a pollution prevention message through words or art.

You will need:

- Black bags
- Recording table for each group
- Pencils
- Exercise books

GUIDELINES FOR THE CHAPTER

A river cleanup is an outdoor exercise where a group of learners undertake to remove the dirt out of the river or water body. In cases where there are no rivers the educator can take learners to a dam. It is a **water quality** study that aims to introduce learners to environmental protection, specifically river protection. It allows learners to audit a “stretch” or defined section of a river. Learners are also able to remove physical dirt such as garbage etc. from the river / dam. They are able to identify and categorise different kinds of litter found in rivers / dams and are able to make reasonable assumptions about different impacts on the river. The overall aim is to restore the river back to its original state or beauty.

WHAT TO DO:

Ask learners questions to:

- Establish what they know about water pollution.
- Determine whether they understand the health risks involved in consuming polluted water.
- Establish short and long-term solutions that they can suggest to ensure that their water source is not polluted.

ACTIVITY 5A: RIVER CLEAN UP PROJECT

In this activity learners are engaged in a river clean up campaign.

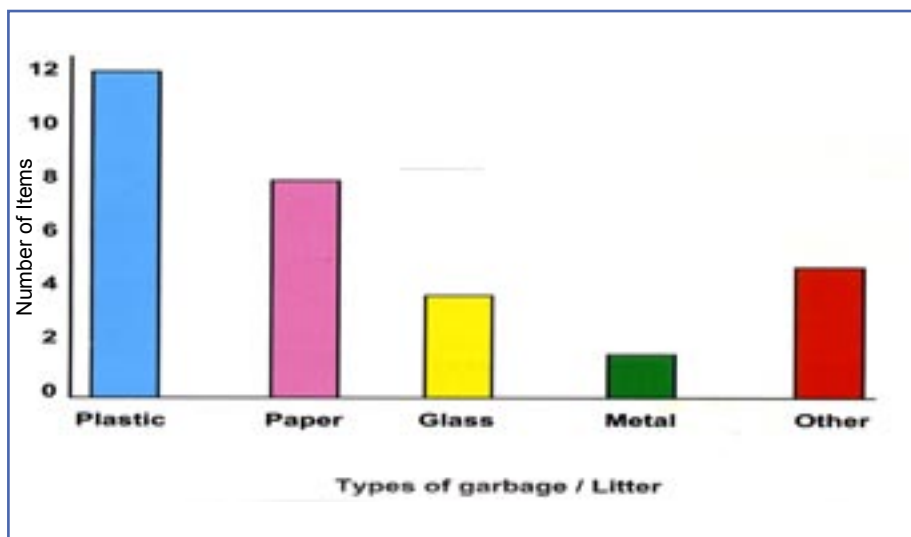
- Identify the closest river/ dam to your community and organise an excursion.
- Choose a 50m river section.
- Ask learners to remove all the garbage (litter) out of that river / dam section and dump it in one spot.
- Divide them into groups according to categories of litter found.
- Ask each group to identify and sort their category of garbage (litter).
- Let them count the number of items found in their categories.
- Let them record their results into a table like the one below:

RESULTS

Audit of 50m river section.

GARBAGE/LITTER CATEGORY	NO. ITEMS/ CATEGORY
Plastic	12
Paper	8
Glass	4
Metal	2
Other (e.g. Tyres; builders rubble;etc	5
TOTAL NO. OF ITEMS	31

- When they return to the classroom, each learner has to draw a bar graph of the information (See example on the next page).



Ask learners the following questions.

1. Which type of litter is predominant in that river?
2. What might have caused that large amount of litter in that river?
3. What affect does that litter have in the life of the organisms in that river?

ACTIVITY 5B: ADOPT A RIVER SPOT

Ask learners to:

- Work as a group for this activity.
- Learners should design a plan with a slogan “Clean-up campaign” that they will use to clean up the river.
- Plan the ongoing monitoring of the river.
- Plan their future follow – up campaign of **recycling** with the highest number of items.
- Plan an action that they will take to the nearest 2020 vision facilitator, environmentalist and local municipality.

REFERENCE: RIVER CLEAN-UP KIT

ASSESSMENT:

Design an assessment tool to assess the learner’s ability to:

- Classify and sort the garbage into different categories.
- Draw a bar graph accurately labelled with dependent and independent variables drawn on the correct axes.
- Draw up a plan to clean up the garbage identified.
- Plan practical future actions.
- Complete the investigation step by step.
- Interpret the findings.

GLOSSARY OF WORDS

- Water quality** – The purity of water.
Recycle – To reprocess (something already used) for further use.
Garbage – Household waste or worthless rubbish.

6. WETLANDS INVESTIGATION

MAIN LEARNING AREA**NS: LO1 SCIENTIFIC INVESTIGATION**

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

AS 2: Conducts investigation and collects data: Organises and uses equipment or sources to gather and record information.

INTEGRATION WITH OTHER LEARNING AREAS**TECH: LO1 TECHNOLOGICAL PROCESSES AND SKILLS**

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technology.

AS3: Investigates by performing simple practical test relating to aspects of the technological knowledge areas.

AL: LO3 READING AND VIEWING

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

AS4: Reads for information: follows information texts.

ACTIVITY

Learners will be able to:

- Describe what a wetland is.
- Identify a major characteristic of wetlands.
- Identify some plants and animals found at a wetland site, both in and around the water.
- Show understanding that a wetland ecosystem involves interaction between living and non-living things both in and around the water.
- Predict why wetlands may be important to humans.

GUIDELINES FOR THIS ACTIVITY

You may take learners on several excursions to the nearby wetlands if possible to observe the plant and animal life, the sounds of the wetland, the smells, the soil, and other important information seen in the wetland. As an activity, allow the children to draw another picture of the wetland and see if their pictures are somewhat accurate or show them pictures of different types of wetlands as shown in the pictures below.

Have a group discussion, have learners predict why wetland have to be important to humans. After brainstorming, allow learners to follow up and research on the importance of wetlands. Learners can take their daily journals and adapt them into a story. The journal can become their “diary” of the things they saw and experienced while travelling through the wetlands. Each day should be dated and include a story integrating their research or what they learnt that day. The learners should be allowed to present them in class. This activity can be used in larger units discussing the different ecosystems and environments around the community.

BACKGROUND INFORMATION

Read the following fact file to the learners:

- A wetland is a place covered with shallow water, and is another word for a vlei or marsh. Wetlands are important for many animals and plants. They are often threatened habitats because they are drained for growing crops or are easily polluted. A wetland is found where the land is wet enough (i.e. saturated or flooded) for long enough to be unfavourable

to most plants but favourable to plants adapted to anaerobic soil conditions. In areas which are not wetlands water drains away quickly and soil remains saturated. However, in wetlands the water persists or drains away very slowly and the soil remains saturated or flooded for long periods. Wetlands differ in size and location and are areas with poor drainage.

- They store water and maintain water quality. Wetlands filter out sediment and decomposing plant matter from water.
- Sediment is often a major pollutant in aquatic systems. Wetlands reduce sediment by serving as pools where sediment can settle.
- Other pollutants can settle out of the water column in a wetland, leaving the outgoing water cleaner than when it entered.
- Wetlands can be used to treat water waste, acting as sinks for nutrients and pollutants. Plants in the wetland trap particles of soil in the water so that the water becomes clear.
- Marshes, bogs, swamps, vleis and sponges are examples of wetlands. Wetlands can be used for fish farming and can provide raw materials for people to use, as well as store water.
- A wetland audit can help learners in understanding what a wetland is, how it functions and the value of maintaining it.

ACTIVITY 6A: WETLAND HEALTH CHECK-UP

- Help the learners to explore the wetland near your area.
- You can obtain equipment that is needed for the wetland check-up from your Department of Water Affairs & Forestry 2020 regional co-ordinator.
- Divide the learners into the groups they worked with in the previous exercise.
- Take the groups to the identified wetland area.
- Give each group a wetland observation grid.
- Assist the learners to identify any problems the identified wetland may have.

- Let the groups record their findings in the observation grid.



WETLAND OBSERVATION GRID

Answer the questions below	Yes or No	How bad is the problem?				What do you think this means to the wetland?			
		Do not know	Not a problem	A slight problem	Bad	Do not know	It is bad	Okay to not so good	It is good
Has the water in the wetland got a strong unappealing smell?									
Has the water in the wetland got a strong, unusual colour?									
Is there foam, slime or raw sewage in the water or wetland itself?									
Are there any signs that the wetland is been or was drained?									
Has the wetland being dammed?									
Are there any outlet pipes leading into the wetland e.g. sewage, industrial effluent or storm water drains?									
HUMAN IMPACT ON A WETLAND									
Is there litter?									
Is the wetland a dump site?									
Are there animals or human faeces in the wetland?									
Are there any signs that the wetland is used for recreational purposes?									
Do people live in or very close to the wetland? E.g. are there shacks, houses on or alongside the wetland?									
What is the quality of the wetland?	BAD					NOT SO GOOD		OKAY	

ASSESSMENT

Criteria	Exceeds requirements of the Learning Outcome	Satisfied requirements of the Learning Outcome	Partially satisfied requirements of the Learning Outcome	Not satisfied requirements of the Learning Outcome
The learner can describe what a wetland is.				
The learner can identify major characteristics of wetlands.				
The learner can identify some parts and animals found at a wetland site, both in and around water.				

ACTIVITY 6B: TAKE ACTION ABOUT THE WETLAND

This is a follow-up activity from activity 6A. Depending on the results of the audit conducted, the groups need to decide which action to take if the wetland was found to be either bad, not so good or okay.

What should the groups do?

- The groups should decide on what type of action should be undertaken.
- Actions can include adopting the wetland, educating others on the importance of wetlands, cleaning up the wetland, fencing the wetland off or removing alien plants etc.
- Inform members of the community about environmental issues (water quality) and risks that you have identified and highlight serious problems.
- Report to media *via* a local newspaper. The educator can assist the learners when they are writing to a local newspaper.

ASSESSMENT

In assessing the learner's abilities, consider the following:

- The identification of the problem in the wetland.
- The articulation of the plan of action to be taken to address the problem.
- The tool the learners would use to communicate the information to the community about the importance of the wetlands.
- The way the letter to the newspaper is written.

GLOSSARY OF WORDS

Pollution – This is a changing, from good to bad, of our water supplies. This change can be due to leaks from our pit latrines, leaks from kraals nearby and from waste disposal sites.

Water life – Animals that live in water.

Wetland – A collective term used to describe land where an excess of water (i.e. water logging) is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface.

SANITATION, HEALTH AND HYGIENE

7. KEEP AWAY FROM GERMS

MAIN LEARNING AREA**LO: LO1 HEALTH PROMOTION**

The learner will be able to make informed decisions regarding personal, community and environmental health.

AS2: Evaluates actions to address an environmental health problem.

INTEGRATION WITH OTHER LEARNING AREAS**AL: LO3 READING AND VIEWING**

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

AS4: Reads for information: follows information texts.

ACTIVITY

Learners will be able to:

- Evaluate the impact of actions taken to solve environmental health problems.
- Suggest alternative effective strategies.

You will need:

- Class work book.
- Pen /Pencil.

ACTIVITY 7A: WATER-RELATED DISEASES

- Divide learners into pairs for this activity.

CASE STUDY

Sister Matiti works in Ragland Road Clinic in the Eastern Cape. She is famous for helping mothers and small children who suffer from illnesses that are caused by polluted water and poor food. On average, she successfully treated 8 patients per month in the last year.

The children often suffer from stomach pains and diarrhoea they have runny tummies, and have to go to the toilet all the time. They lose a lot of bodily fluids through the diarrhoea. This loss of water is called dehydration. Dehydration is dangerous because when a person's body is **dehydrated** they become weak and can die. Sister Matiti treats them by giving them lots of clean water to drink, mixed with a little sugar and a pinch of salt.

Sometimes, when children are very weak, Sister Matiti has to give them fluids through an injection and a drip. She also gives them multivitamin pills to strengthen their bodies. She is loved by everyone in the community.

- Their task will be to study the above case study and answer the questions that follow in their class workbooks.

QUESTIONS

1. What is the problem identified in this case? *Illness of children and mothers*
2. What is the cause of the problem? *Polluted water and poor food*
3. What effect does the problem have on the lives of the people concerned? *Lose a lot of fluid - dehydration*
4. What group of people does the action / project target? *Young children*

5. What actions are undertaken to address the problem? *Sister Matiti treats them by giving them lots of clean water to drink, mixed with a little sugar and a pinch of salt. Sometimes, when children are very weak, Sister Matiti has to give them fluids through an injection and a drip. She also gives them multivitamin pills to strengthen their bodies*
6. What impact will the non-solving of the problem have in the community? *Too many deaths of children*

You may like to alert learners about the following important things that they can do to decrease the risk of disease:

- Do not defecate or urinate near water sources.
 - Wash your hands with soap and water after going to the toilet.
 - Do not drink water that you think might be unclean – boil it if you are unsure.
 - Wash all fruit and vegetables well before eating them and do not cook with unclean water.
 - Do not leave empty containers or any litter lying around for disease transmitting insects to breed in.
 - If you have access to pit latrine facilities, ensure that they are away from sources that are used for drinking and bathing. The pit should not penetrate groundwater.

ASSESSMENT

Assess learners' ability to:

- o Evaluate the impact of actions taken to solve the environmental health problems.
- o Suggest better strategies to solve environmental health problems.

The learners should write a report and present it in class

8. WHAT KIND OF SANITATION SYSTEM DOES YOUR SCHOOL HAVE?

MAIN LEARNING AREA

SS (G): LO2 GEOGRAPHICAL KNOWLEDGE AND UNDERSTANDING

The learner will be able to demonstrate geographical and environmental knowledge and understanding.

AS2: Investigates and explains why some people face a higher risk than others with respect to natural hazards [people and resources].

AS3: Identifies how risks and hazards can be managed [people and the environment].

INTEGRATION WITH OTHER LEARNING AREAS

HL: LO5 THINKING AND REASONING

The learner will be able to use language to think and reason, as well as to access, process and use information for learning.

AS2: Uses language to investigate and explore: identifies information needed to assist in investigating the problem.

NS: LO1 SCIENTIFIC INVESTIGATIONS

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

AS2: Conducts investigation and collects data: organises and uses equipment or sources to gather and record information.

ACTIVITY

Learners will be able to:

- Conduct an investigation to establish the kind of sanitation systems available at school.
- Conduct an investigation to establish the efficiency of this system.
- Develop an action plan the management of the sanitation at the school.

Background information

Do you ever wonder which sanitation systems are available at home/school; and what effect the inefficiency of the system has in our lives? Sanitation is a crucial topic since it deals mainly with issues that affect our health and hygiene. Poor sanitation can lead to illness and even death. It is therefore important that we know what kinds of sanitation systems are available at schools and also the risks carried by the mismanagement of these systems.

Activity 8A: Investigating the sanitation systems at school

In this activity learners will conduct an audit of all sanitation systems available at school.

WHAT TO DO:

- Let learners conduct an audit of all sanitation facilities at school, including the types of toilets and drinking facilities.
- Ask learners to list all the facilities in their answer book.
- They must then use the following questionnaire to establish the efficiency of the sanitation systems identified in 2.

Question	Yes	No	Description/Comment
(a) What kind of toilet is used at the school?			
(b) Are the toilets waterborne or not?			
(c) Are there washbasins available with running water where there are toilets?			
(d) Do the toilets all have doors for privacy?			
(e) Are there dustbins close to the toilets?			
(f) Are the toilet areas well ventilated or are they stuffy?			
(g) Do the toilets smell bad?			
(h) Are there enough toilets for both girls and boys?			
Maintenance			
(i) Who cleans the toilets?			
(j) Are the toilets cleaned often ?			
(k) What is used to clean the toilets?			
(l) Is the toilet paper provided?			
(m) In the case of storage tanks, are the tanks emptied regularly?			
(n) Are there unpleasant smells?			
(o) Are the toilets accessible after hours ?			
(p) Have they been used and/or damaged by vandals?			
Other problems			
Do the learners use drugs and smoke around the toilets?			
How safe is it to use the toilets at school during school hours?			Explain your answer

Adapted from EnviroTeach, 14 September 2005

- After conducting this survey, learners should declare the condition of the environment at school with regard to sanitation facilities. Is it a conducive environment or a risky environment?

ACTIVITY 8B: Management of the sanitation system at school.

In this activity learners must develop an action plan to improve the management of the sanitation at school.

What should learners do?

Come up with a viable action plan learners must do the following:

1. Review the findings made in the questionnaires and develop an action plan to address the identified sanitation problems at school. Learners may work with their partners in this activity.
2. Learners should develop an action plan to improve the management of the sanitation at the school. The plan should be based on the findings of the research conducted on the management of sanitation systems at school.
3. The action plan should be based on the following sanitation problems identified:
 - a. Many toilets are not managed appropriately, e.g. in the case of French drains, septic

tanks or pit toilets, bacteria are supposed to do the work of breaking down the waste. If chemicals are used on such systems, these bacteria are killed and cannot do their work. Suggest a cheap, efficient and safe way of managing these toilets.

- b. Where there are no washbasins available with running water the toilets.
- c. Dealing with safety in toilets.

ASSESSMENT

Criteria	Exceeds requirements of the Learning Outcome	Satisfied requirements of the Learning Outcome	Partially satisfied requirements of the Learning Outcome	Not satisfied requirements of the Learning Outcome
The learner can conduct an investigation to establish the kind of sanitation system used in his/her school.				
The learner can collect data and interpret the information.				
The learner can develop an action plan to improve the management of sanitation at school.				

9. MAKING A CLASS GARDEN

MAIN LEARNING AREA**NS: LO1 HEALTH PROMOTION**

The learner will be able to make informed decisions regarding personal, community and environmental health.

AS1: Proposes ways to improve the nutritional value of own personal diet.

INTEGRATION WITH OTHER LEARNING AREAS**AL: LO 3 READING AND VIEWING**

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

AS 4: Reads for information: follows information texts.

NS: LO4 WRITING

The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes.

AS4: Writes creatively: shows development in the ability to write stories, poems and playscripts.

Maths: LO4 MEASUREMENT

The learner will be able to use appropriate measuring units, instruments and formulae in a variety of contexts.

AS 2: Solves problems involving: length.

EMS: LO2 SUSTAINABLE GROWTH AND DEVELOPMENT

The learner will be able to demonstrate an understanding of sustainable growth, reconstruction and development, and to reflect critically on related processes.

AS2: Identifies steps required to redress socio-economic imbalances and poverty.

ACTIVITY

Learners will be able to:

- Describe poverty in a creative way.
- Make a class garden so as to curb poverty.

PREPARATION FOR THIS UNIT

Ensure that the following apparatus are assembled beforehand:

- A patch of ground in the school yard
- Spade and forks
- A watering can
- Seeds
- A spot for their compost heap
- Pen
- Exercise books

You may request learners that stay nearby the school to borrow some of the equipment from their parents to be returned once the task is completed.

GUIDELINES FOR THE ACTIVITY

In this lesson learners are engaged in making a class garden so as to curb poverty in their school environment thus improving the quality of people's lives.

The lesson gives learners an opportunity to understand that most definitions of poverty agree that poverty means living in circumstances where individuals do not have access to some or all of the following: clean water, sanitation, electricity, healthy food, job opportunities etc.

ACTIVITY 9A: DEFINING POVERTY

- Ask learners to write down words or short sentences on pieces of card/paper that describe poverty. They can also make a mind map.
- NB: There is no right or wrong answer, all the learners' thoughts and ideas are valuable.
- You may probe them on their responses and make a summative description of how poverty is viewed in the context of social stratum.
- Play around with words that will make learners internalise the concept. You may describe poverty in the following context:

P eople try to scratch a living
O pen your ears to their voices
V oices raised, despite their weariness
E ach day takes an eternity to pass
R iches would be enough bread, and a roof
T he world turns, and turns its back
Y ears go by, the desert grows wider

You will realise that learners might view poverty only in terms of the lack of enough and healthy food. Make them aware that government can do that much to address these issues, but it is important that we also take responsibility for our lives. There are various ways in which we can address the issue of poverty with regard to the shortage of food, which would not even require sophisticated methods of food production. One of the cost-effective ways is making our own gardens either at school or at home.

ACTIVITY 9B: MAKING A CLASS GARDEN

This activity aims at imparting learners with knowledge and skills of making the school or home garden by using the available materials that are considered to be waste.

MAKING COMPOST

Nature maintains the fertility of the soil by returning to it all dead animal and plant material. This is decomposed to humus naturally on the surface by bacteria and other microbiological activity assisted by worms, slugs, insects and birds. This natural process can be sped up through the construction of compost heaps.

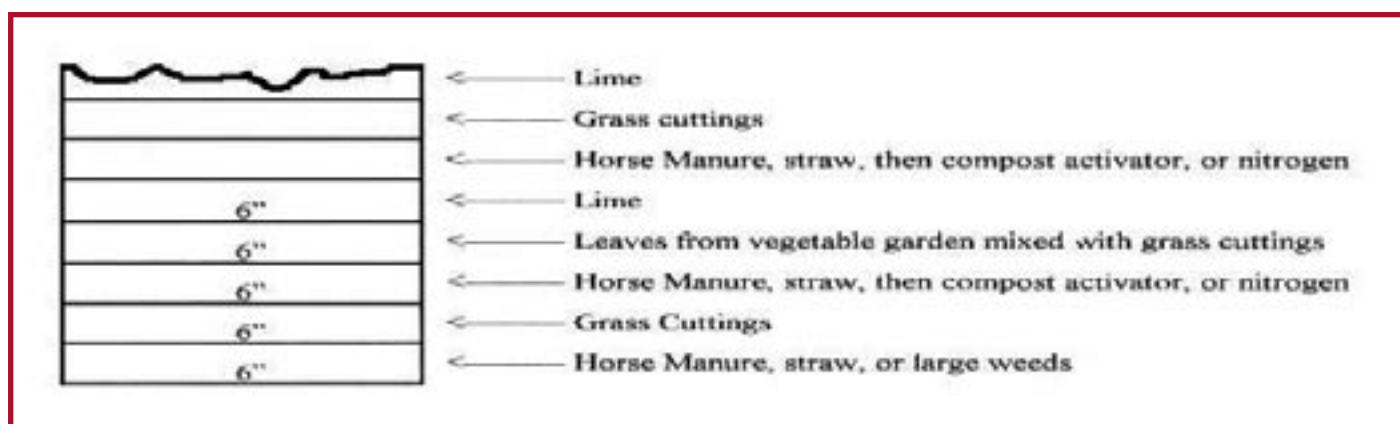
Soil with compost in it makes available most of a plant's nutritional requirements. Compost encourages microbiological activity, improves the water-holding capacity of the soil and improves the soil structure. It feeds and replenishes the soil and will produce healthy and relatively disease-free crops.

The main agent involved in composting is a huge population of micro organisms living in a moist, warm and aerated environment. They do all the work in decomposing the material in a compost heap, and must be provided with the best possible living conditions.

HOW TO BUILD A COMPOST HEAP

Virtually all plant material will decompose in a compost heap, but if there is insufficient organic material for the building of a compost heap in one operation, then it is a good idea to store this material in a dry place. Once enough waste has been collected, then the construction of the heap can begin.

- Arrange the bottom and central air supplies through the use of coarse material as the first layer and by placing poles upright to act as air vents within the heap.
- Bring together all organic garden and kitchen waste. Break up any tough stems and large pieces of material and mix this together until the composition is reasonably uniform.
- Build up the heap using layers of this material. It is a good idea to moisten each layer during building.
- Manure is a source of nitrogen and can be mixed in with the organic material or can be added in thin layers. This will speed up the composting process.
- Finally, put on a heat- retaining layer of straw, soil or old sacking.



For a successful compost pile (rapid microbiological activity) the following factors must be maintained:

MOISTURE

The heap should always be damp, but too much moisture destroys the structure necessary for aeration. In order to retain maximum moisture the heap should preferably be constructed in the shade.

WARMTH

A certain amount of heat has to be created for a quick and effective decomposition and for the destruction of any weed seeds that might be present. For weed-free compost the heap must be turned once after 2 or 3 weeks. This is also important for aeration.

AERATION

for sufficient air for the micro organisms to work it must be supplied mainly from underneath the heap through the placing of twigs, maize stalks, etc. as the bottom layer.

Well-made compost is dark brown or grey and has the sweet smell of good clean earth as its main characteristic. It should only be used at this stage and can now be dug into the top few centimetres of the soil.

VEGETABLE SPACING

VEGETABLE	WITHIN-ROW	SPADE MEASUREMENT
Beetroot	5 - 10cm	A/2
Broccoli	30 –60cm	C
Cabbage	30 – 60cm	C
Carrot	2,5 –7,5cm	A/2
Cauliflower	3,5 –60cm	C
Lettuce	25 –40cm	D
Onion	2,5 –10cm	A/2
Potato	30 – 45cm	D
Tomato	60 -90cm	B

Adapted from: HEALTH GARDENING A guide to growing food for life. Compiled by: THE VALLEY TRUST in co-operation with: UMGENI VALLEY PROJECT

Read the following information to the learners:

PREPARATION FOR THIS ACTIVITY

- Get permission to make a class garden from the school principal.
- Tell the learners that they need to create a water wise garden to alleviate poverty in their school environment.
- Explain the advantages of creating a garden and discuss the responsibilities attached.
- Explain to the learners that the most important requirement for the cultivation of a garden is patience.
- Set aside time after school or during breaks for them to work on their garden.

Starting school gardens

School gardens can provide an environment in which you can learn to work with educators, parents and neighborhood resident volunteers while growing plants and learning the relationship between people between people, plants and wildlife. The lessons that are taught at the garden site are limited only by one's creativity. School gardens are a special kind of a learning centre. Like libraries, they need responsible and knowledgeable people to do all the jobs necessary to maintain them as functional places in which children will learn. They should be seen as permanent additions and must be utilised year-round to reinforce natural science classroom studies.

Below is a framework which you can consider before starting your garden.

Step 1 – Form a garden committee

As the educator you may not have the time that is needed to coordinate the garden programme. Someone else has to be responsible for the garden work, find funds to support the garden, schedule educational activities, find and train volunteers, research and disseminate information. Forming a garden committee from a pool of dedicated people with those skills will enhance the success of your programme. Look for volunteers among the school staff, parents, and local residents. Or if you know of a gardener, ask that person to volunteer, or to recommend another gardener.

Step 2 – Define the purpose and objective of your gardener

Every school garden must fulfill some need or objective. This is why each garden is unique. All educators can utilise the garden as a learning aid. For some educators it may reinforce natural science classroom studies. For others it may reinforce social studies. Some educators may utilise the garden across all curriculums. Whatever your needs are, by addressing these issues you will have a better understanding of the work involved at this stage.

Step 3 – Lay out your learners' garden activities

By determining your objectives at this early stage, you will have the opportunity to look at your lesson plans to see when and what types of garden lessons are needed. If you need help in finding educational exercises and activities, there are many resources available for educators. You will need to determine which groups of learners will be doing what and when, and determine how bed space will be allocated. The experiences and input from your garden committee will be helpful at this stage. This is your opportunity to schedule specific activities at specific times or assign certain task to your volunteers.

Step 4 – Define a year-round garden plan

You have identified what your garden will be like while school is in session, but now you need to think about your garden during school holidays. The main question is, “who is going to keep this garden maintained until school starts?” “What do you want the garden to look like on the first day of school?” A year-round garden use plan will account for any school break.

Step 5 – Choose a permanent garden site and design your garden

Your garden site should be in an area that receives plenty of sunlight, has good drainage, and is in close proximity to water, electricity and accessible to learners, volunteers, and educators. The site should have enough room for your garden, tool storage and learners. Maintaining a large garden will use up all your time and energy so select a relatively small area.

Step 6 – Build your garden according to plan

This is the big moment when educators, volunteers, learners and their parents pool their resources and build this permanent addition to the school.

PART A: MAKING A COMPOST HEAP

- Start a school / class compost heap.
- Ask learners to bring **biodegradable** material such as rotting vegetables, grass clippings, egg shells etc. to school.
- Add them to the compost heap while you teach them about making a compost and how it fertilises plants.
- Ask the science or biology teacher for help in this regard.
- Ask learners to turn the soil, plant seeds, pull out weeds and water the garden. The garden should look like the one depicted in this picture.



- Work out a schedule that gets everyone involved.
- Ensure that each learner has a responsibility that will give him/her a sense of ownership of the garden and award points for duties performed.
- If the class decides to share the produce among themselves, it can be shared according to the point system, with those learners who most diligently perform their tasks taking home more than those who shirk their duties.
- Ensure that the class plant seeds for plants that are easy to maintain, such as carrots, mielies, spinach and tomatoes.

Extension

This is a project which can be used as a demonstration garden to teach many concepts such as water conservation through soil mulching, using grey water to irrigate crops, using buckets to irrigate the plot and other food production principles such as increasing the lush growth of the crop, adding food nutrients to the crops etc.

ASSESSMENT

Criteria	Exceeds requirements of the Learning Outcome	Satisfied requirements of the Learning Outcome	Partially satisfied requirements of the Learning Outcome	Not satisfied requirements of the Learning Outcome
The learner was able to describe poverty in a creative way.				
The learner was actively and practically involved in the project.				

WATER SAFETY

10. KNOW THE DANGERS OF WATER

MAIN LEARNING AREA**LO: LO4 PHYSICAL DEVELOPMENT**

The learner will be able to demonstrate an understanding of, and participate in, activities that promote movement and physical development.

AS5: Investigates fair play in a variety of athletic and sport activities.

INTEGRATION WITH OTHER LEARNING AREAS**AL: LO 3: READING AND VIEWING**

The learner will be able to read and view information and respond critically to the aesthetic, cultural and emotional values in texts.

ASI: Reads for information: follows information texts.

AL: LO5 THINKING AND REASONING

The learner will be able to use the language to think and reason, as well as to access, process and use information for learning.

AS3: Collects and records information in different ways: transfers information from one mode to another (e.g. uses information from visual or written text to create a graph or

ACTIVITY

In this activity learners will:

- Investigate the dangers that are related to water.
- Explore the basic water safety tips
- Discover how water-related activities can lead to drowning.
- Demonstrate how to swim safely.

Background Information

Children enjoy water-based recreational activities. Unfortunately, playing in an aquatic environment poses a great danger in the lives of children if they are left unattended or during a brief lapse of supervision by the elder person. Childhood drowning and near-drowning can happen in a matter of seconds. It has been established that for every child that drowns, an additional three receive emergency room treatment for unintentional drowning-related incidents. It is therefore important that every child has a thorough understanding of the differing aquatic environments he plays in and safely make the most of every aquatic experience. Children should always swim with a grown-up. Every child over the age of three should have swimming lessons. It is important for children to learn and practice water safety rules.

GUIDELINES FOR THIS ACTIVITY

This activity introduces learners to the dangers of playing in or with water. Different aquatic environments are explored and learners are introduced to some basic safety guidelines. You need to divide learners into groups to carry out this activity. Learners were introduced to the concept of water safety in their lower grades. You may begin this activity by referring to such exercises and ask the learners the following questions?

- What do they do during holidays?
- Are there any that like to play in water?
- Which type of water environment do they swim in i.e. dams, rivers, oceans, pools or ponds?
- Who do they swim with?
- What dangers are associated with swimming?

Did you know? Severe and permanent brain damage affects as many as 20 percent of near-drowning victims. Drowning can occur during swimming, boating, hunting and fishing, and even while taking a bath.

You may pose the problem by alerting the learners about the following fact:

ACTIVITY 10A: Water safety basics

1. Ask learners to read the following helpful water safety rules for children:
 - Swim only if a lifeguard or a grown-up gives you permission.
 - Always swim where there are rules posted/displaced giving you permission to do so.
 - Do not swim where it is too deep; rather check with the lifeguard to find out how deep the water is.
 - Always swim in the company of the other grown-up/ adult.
 - Never jump or dive unless the lifeguard or a grown-up says it is okay to do so.
 - Never swim at night or if there are signs of a thunderstorm or lightning.

Understanding these basic rules will enable learners to identify the wrong things associated with swimming and also the dangers of not following the rules.

2. The following picture indicates all the dangerous environments where children are not supposed to swim in. Ask learners to look at the following picture carefully and respond to the questions. Remind them that they need to analyse the picture in relation to the safety basics that they have read. You may need to point out the critical areas that you would like them to carefully observe in the picture.



Learners should work in pairs to do this exercise:

- Identify the wrong things that these children are doing.
- Identify the dangers they think these children will encounter if they swim in this environment?
- Describe the place that they think would have been ideal for these children to swim in .

ASSESSMENT

In assessing the learners you need to consider the following:

- The ability of the learners to extract the information from the picture.
- Identification of the dangers in swimming in an unprotected environment.
- The way the learners describe an ideal environment for swimming. Refer to the safety basics as the basis for their response. In their responses you also need to consider that learners are coming from different environments hence might not respond the same.

ACTIVITY 10B: Water safety game

In this activity you shall be testing if learners know how to keep safe around water.

This is a build-up activity from the first activity; therefore learners can work as individuals for this activity. In this activity learners are supposed to identify things that should be done before swimming and those that should not be done. NB: It will be helpful to conduct this activity before learners go out for swimming in the river, lake or pond. Learners need to redraw the table and place a tick in the appropriate column and indicate to you when they are finished.

The following serves as a guide for the responses of the learners. You might also expect that learners from rural areas who have never seen the boat might struggle with some of the questions. May be they will be a need to supplement these questions with concrete pictures showing the boat etc.

Water Safety	DO	DO NOT
1. Follow water safety rules	✓	
2. Take swimming lessons	✓	
3. Wear a personal floating devise	✓	
4. Stand up in a boat	✓	
5. Sit on the boat with arms hanging over the edge		✓
6. Swim with a friend or an elder person	✓	
7. Swim only if there is a lifeguard	✓	
8. Swim when I am tired		✓
9. Dive off rocks		✓
10. Insert the feet first into the river, pond or lake.	✓	
11. Eat anything when you are swimming		✓
12. Get out of the water when you hear thunder or see lightning	✓	
13. Run around the pool, lake or river		

ASSESSMENT

1. Learners will be assessed on their ability to complete the exercise given.

ACTIVITY 10C: SWIMMING SAFETY

The best thing that anyone can do to stay safe in and around water is to learn how to swim. It is important that a swimmer be knowledgeable of the water environment he/she is in and the potential hazards such as the shallowness and depth of the water, currents, obstructions and the entry and exit points. For starters, it is important that a personal floating device (PFD) is used until a person is confident that he/she can swim without the supporting device. A PFD is a device to help you float and it can save your life if you fall in the water by mistake. PFDs add buoyancy to your body (allow you to float), hold your head and body higher in the water so you can see better, and help keeps your body warm.

Remember, air-filled swimming aids such as inner tubes, water-wings, and inflatable rafts are not

substitutes for approved PFDs.



In this activity we will:

- Visit a public or residential pool to demonstrate how the PFD is used.
- Investigate how the PFD assists somebody to learn to swim.

You will need the following:

- Personal floating device (your teacher will organise one)
- Lengths of floating on water, with and without the PFD.
- Record sheet

GUIDELINES FOR THIS ACTIVITY

In this activity learners are demonstrating:

- The use of the personal floating device as a means of protecting young ones from drowning.
- Learners would need to be provided with these devices; therefore you will need to ensure that each group has one. Make sure that you choose a safe pool with all the safety basics.
- Learners must be given the worksheet with the following information. In this activity learners would need to demonstrate and explain the difference between swimming with and without the PFD.
- There is a difference between swimming with the PFD and without the PFD, in that the PFD enables the learner to float on water thereby reducing the risk of drowning.

What to do?

1. Divide yourselves into groups of four.
 2. Ensure that the educator gives a Personal Floating Device each group.
 3. Visit a nearby pool (public, residential), lake or beach. Your teacher will ensure that he selects a safe place for you to swim.
 4. Agree in a group who is to enter into the pool or small dam first. You will interchange this role until everyone has had an opportunity to swim.
 5. Float on your back, whilst other record the time it has taken you to float on your back before getting tired.
 6. Then, repeat the exercise wearing the PFD. How long does each one float on water using the PFD?
 7. Did the PFD make it easier to float?
-
-

Brainstorm in your group, why do you think wearing a PFD makes floating easier than swimming without the PFD?

ENRICHMENT ACTIVITY

This activity should be carried out when you are sure that learners have mastered the skills of swimming. It teaches the learners the importance of swimming as a group to strengthen the support. Encourage the learners to ensure that they follow the steps as described below:

- This must be done in the shallow end of the pool or swimming area.
1. Now put on your PFD and float as a group.
 2. Put your hands around each other and hold onto one another by wrapping your legs together. Ensure that the younger group members are in the middle of the group.



3. Is there any difference from when were floating alone?

4. What lesson have you learnt from this exercise?

Glossary of terms

PDF - Personal floating device.

INVASIVE ALIEN PLANTS

11. PLANT IDENTIFICATION

MAIN LEARNING AREA

NS LO3: SCIENCE, SOCIETY AND THE ENVIRONMENT

The learner will be able to demonstrate an understanding of the interrelationship between science and technology, society and the environment.

AS2: Understands sustainable use of earth's resources: Analyses information about sustainable and unsustainable use of resources.

INTEGRATION WITH OTHER LEARNING AREAS

AL: LO 3: READING AND VIEWING

The learner will be able to read and view for information and respond critically to the aesthetic, cultural and emotional values in texts.

ASI: Reads for information: follows information texts.

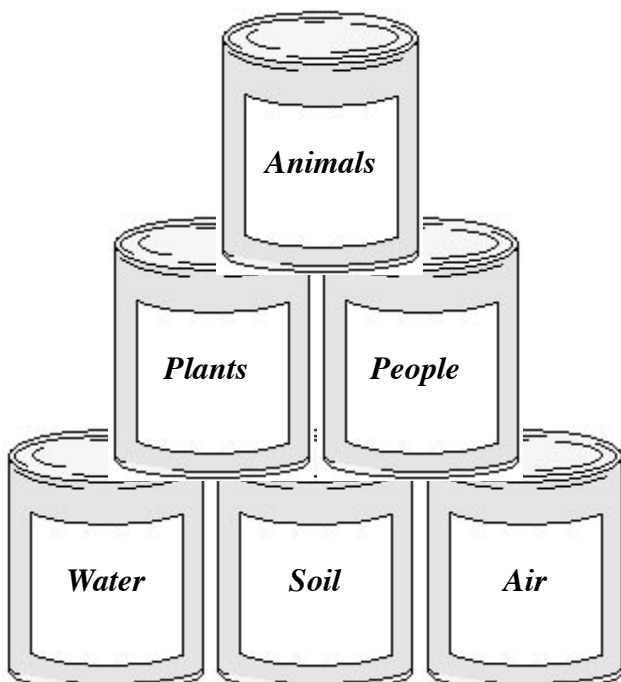
Learners will be able to:

- Identify invasive alien plants

YOU WILL NEED

- Flash cards, branches of the plant assessment sheet,
- 6 tins marked and stacked as indicated by the picture below.

ACTIVITY 11A: CONNECTION BETWEEN PEOPLE AND PLANTS



The tins represent the things the creator created.

QUESTIONS

- (a) According to the creation what was created after Heaven and Earth and what else?
- (b) What will happen if one part other than the top one is taken out?
- (c) Is there any connection between the parts: What is it?
- (d) Why are people put on top?
- (e) Are people in control of all things on earth?
- (f) Give a reason for your answer?

ACTIVITY11B – IDENTIFICATION OF IAP'S

Ask learners to read the following information and answer the questions that follow.

Acacia saligna (Labill) H.L. Wendl
 (= *A. cynaphylla* Lindl.)
 Port Jackson willow
 Port Jackson of goudwilger
 Family Fabaceae



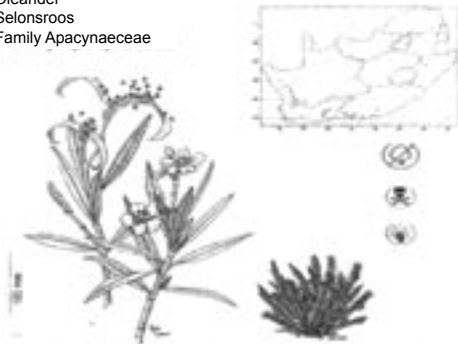
Description: Unarmed, evergreen shrub or tree 3-7 (-10)m high with a willow-like appearance: stems usually deformed by large, brown irregularly shaped swellings or galls (caused by an introduced rust fungus). Leaves: phyllodes, blue-green turning bright green, up to 200mm long, and 10-50 mm wide. Slightly erect to pendulous, with a single midvein, wider and wavy on young plants. (A) Flowers: Bright yellow, globular flowerheads, August-November. Fruits: Brown pods (B), with hardened, whitish margins. Cultivated for: Dune reclamation, shelter, tankbar, o=provides fodder. Invades: Fynbos, woodland, coastal dunes, roadsides, watercourses. Origin: SW Australia. Invasive status: Transformer. Declared invader (category 2). Herbicide registration. Biocontrol: Effective agents available.

Acacia Cyclops A. Cunn.
 ex G. Don
 red eye
 rooikrans
 Family
 Fabaceae



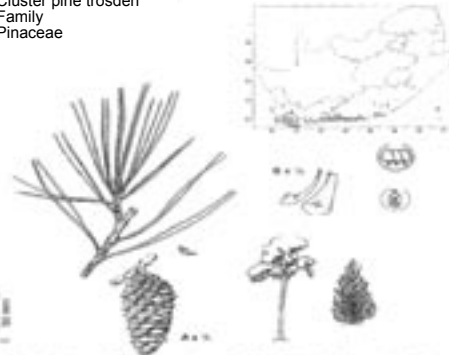
Description: Unarmed, evergreen rounded shrub or small tree 1.5-4.0(-6.0) m high: sometimes very low and wind clipped at the cost. Leaves: Phyllodes, bright green, ± straight. Flowers: Bright yellow, globular flowerheads, sporadic, October- February (all year). Fruits: Brown pods, as broad as leaves, 8-12 mm wide, not constricted, curved and finally twisted, persisting after seeds shed; seeds (A) encircled by a double row of bright red or orange, fleshy stalks. Cultivated for: Dune reclamation, shelter: provides firewood. Invades: Fynbos, forest gaps, dunes, roadsides, watercourses. Origin: SW Australia. Invasive status: Transformer, Declared invader (category 2). Herbicide registration, Biocontrol: Seed feeders available.

Nerium oleander L.
 Oleander
 Selonsoos
 Family Apocynaceae



Description: Multistemmed, evergreen shrub or small tree up to 6 m high. Leaves: Dark dull-green, paler below, held erect distinctively veined having a prominent midrib and numerous parallel cross-veins. Flowers: Pink, red or white; invasive forms usually have pink, scanty aromatic flowers with a brown single row of petals. September-March. Fruits: Reddish-brown follicles, finger-like, 100-200mm long, ridged, splitting longitudinally into two halves; seeds have tufts of hairs. Cultivated for: Ornament, screening. Invades: Watercourses; particularly rocky and gravelly watercourses in semi-arid mountain valleys. Origin: Mediterranean. Invasive status: Special affect weed (competitive, poisonous) Declared weed excluding sterile, double-flowered cultivars. Poisonous: Whole plant hight toxic and lethal, Irritant: Skin (sap)

Pinus pinaster Alton
 Cluster pine trosdien
 Family
 Pinaceae



Description: Coniferous tree 8-15 (- 30) m high: conical when young, becoming cylindrical with a tall, bare trunk when older; bark reddish-brown, deeply cracked into plates. Leaves: Needles, dull-grey green, in bundles of two, long (80- 240mm). Thick and rigid. Cones: Initially purple (A), turning light brown, woody, conic-ovoid, 90-180 mm long, shortly stalked, often clustered and persistent, cone scales (B) have a distinct ridge with a short, hard, curved point. Cultivated for: Timber. Invades: Mountain and lowland Fynbos. Origin: Mediterranean. Invasive status: Transformer. Declared Invader (category 2 Herbicide registration. Biocontrol: Under investigation.



52. *Pinus pinaster*.
 cluster pine, p. 110



72. *Nerium oleander*.
 oleander, p. 159



64. *Acacia cyclops*.
 red eye, p. 142



65. *Acacia saligna*.
 Port Jackson, p. 147

- If they know it, they have to describe it, if not they have to imagine the plant and describe it i.e. what its leaves, and stem look like, does it have flowers or not, where does it usually grow and what do people usually do with it?
- In their groups discuss and then report to the class about their plant.

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EnviroTeach Volume 4, September 2005.

EnviroTeach Vol 11, May 2004

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RIVER CLEANUP KIT - 2020 VFW PROJECT

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Swimming South Africa