WOOLWORTHSEDUCATIONAL PROGRAMMES

NATURAL SCIENCES & TECHNOLOGY

GRADE 6 EDUCATOR RESOURCE



Dear Educators,

It is now ten years since we introduced our Woolworths Making the Difference Educational Programme for primary schools. We're pleased to say that this programme is now used in over 2 000 schools around the country, and, through its resource material, interactive classroom activities and teacher training, continues to make a valuable contribution to the education and skills development of South Africa's young people.

Over the past few years, it has become evident that there is a need to extend both the scope and the reach of the programme. While Healthy Living and the Environment remain the focus, the content has now been revised and expanded and the target group broadened to include the entire Intermediate Phase of Grades 4, 5 and 6.

The programme now includes three educator resources: Life Skills for Grades 4 and 5, Social Sciences (Geography) for Grade 4, and Natural Sciences and Technology for Grade 6.

Like the previous modules, the three new resources have been developed in collaboration with the Western Cape Education Department. All the material is curriculum based and designed to meet the requirements of the new Curriculum and Assessment Policy Statement (CAPS) introduced in January 2013.

New material, including valuable case studies from Woolworths, has been added to supplement the curriculum. Theoretical content and experiential learning activities are now more closely linked, with worksheets and posters that complement experiential learning activities now incorporated into the resource material.

The creation of these new resources would not have been possible without the commitment and contribution of the Western Cape Education Department, the Marine Stewardship Council, the Woolworths Good Business Journey team and our in-house and consulting dietitians. We would like to take this opportunity to thank them for their assistance and for their ongoing support.

Healthy living and caring for the environment are both very close to our hearts at Woolworths. We hope that this 2nd edition of The Making the Difference Programme will help your learners gain an understanding of the importance of both to their futures and the future of our country.

Kind regards,

Pieter Twine General Manager: MySchool & Loyalty



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NUTRIENTS IN FOOD TERM 1

YOU ARE WHAT YOU EAT

STRANDS: NATURAL SCIENCES: LIFE & LIVING; TECHNOLOGY: PROCESSING TOPIC: NUTRIENTS IN FOOD CONTENT & CONCEPTS: FOOD GROUPS TERM 1

INFORMATION FOR EDUCATORS:

As per CAPS, in Term 1, you are required to teach learners about Nutrients in Food (page 48). This resource provides you with content that your learners are required to know about this topic aligned to CAPS. It also gives you ideas about how to present the content, a worksheet that you can copy and use, and suggested classroom activities.



TO DO: Write this saying, **"You are what you eat"**, on the board. Ask your learners if they have heard this saying before. What do they think it means?

Summarise the answers for your learners:

- Our bodies are made up of elements such as carbon, oxygen and hydrogen as well as minerals such as calcium, that we get from digesting and absorbing the nutrients in our food. In this way our bodies are formed and maintained by what we eat
- The nutrients in our food also supply us with the energy we need to carry out life functions such as breathing, sensing, moving and eating. We have to eat to have the energy to eat
- Consuming nutrients to build and maintain structure, and to release the energy for life functions is fundamental to all living things



WOOLWORTHS EDUCATIONAL PROGRAMMES



TO DO: Present the following information to learners:



CONSUMING NUTRIENTS IS A BASIC FUNCTION OF ALL LIVING THINGS





WHAT'S IN OUR FOOD?

TO DO: Ask your learners, "What's in our food?", and lead them into identifying the four major nutrient groups.

THE 4 MAJOR NUTRIENTS

Nutrients in food are divided into four main groups:

- Carbohydrates
- Proteins
- Fats
- Vitamins and minerals

These nutrients are found in different foods and are used in different ways in order to grow and maintain our bodies.

Most foods that we eat contain nutrients from more than one nutrient group, for example:

- An apple contains carbohydrates in the form of sugars, as well as vitamins and minerals
- Chicken contains protein, fats, vitamins and minerals

Many foods are processed to assist with food preservation, safety and manufacturing processes. 'Processed food' is any food that is changed from its natural, raw state. Food processing techniques include: peeling, slicing, mincing, emulsification, cooking, spray drying or adding an ingredient to enhance shelf life or for functional reasons.

Also refer to 'Food Processing' page 24.

TO DO: Present the following detailed information about each of the major food groups to learners:







What are Carbohydrates?

Carbohydrates are organic compounds made up of carbon, hydrogen and oxygen. The carbohydrates that we eat are the starches and sugars provided by plant and animal foods. They are essential to both plant and animal life.

How does your body use Carbohydrates?

Foods rich in carbohydrates are known as energy foods. Our bodies use carbohydrate both for cellular functions and for cellular structure. Our bodies can use carbohydrates immediately or store it in our livers or muscles for when it is needed. Our bodies also convert carbohydrate to fat stores in order to meet our energy needs.

DID YOU KNOW?

Every time we breathe, chew food, blink our eyes or move in any way we are using the energy we get from the carbohydrates we have eaten.

Which foods are sources of Carbohydrates?

Foods that contain high amounts of carbohydrates include:

- Breads, mielie meal, samp, cereals, porridge, rice, pasta and grains
- Fruits
- Legumes or pulses (such as dry beans, chickpeas, beans, lentils)
- Milk and milk products
- Foods containing added sugars such as cakes, biscuits, chocolates, sweets, cookies, and sugar-sweetened drinks

How do Carbohydrates work in a balanced diet?

It is important to get the balance of carbohydrates in our diet right. If we don't eat enough carbohydrates, our bodies will have to get the energy they need from our fat and muscle stores instead. If we eat too much of sugary and starchy foods, then our fat stores will increase and could lead to us becoming overweight. High-fibre starchy carbohydrates, legumes, fruits and vegetables are better for our bodies than sugary drinks and treats such as sweets, chocolates, cakes and biscuits.

SA FOOD-BASED DIETARY GUIDELINE:

- Make starchy foods the basis of most meals
- Use food and drinks containing sugar sparingly and not between meals
- Eat plenty of fruit and vegetables





What are Proteins?

Proteins are complex compounds of carbon, hydrogen, nitrogen, oxygen and small amounts of sulphur or iodine. Protein is present in every cell of our bodies and they are involved in every cellular activity.

How does your body use Proteins?

Foods rich in protein are known as growing and fixing foods. They build and repair all our body's tissues including all of our muscles and organs.

Which foods are sources of Proteins?

Animal sources of proteins include meat, fish, chicken, eggs, yoghurt, milk and cheese. Plant sources of proteins include chickpeas, beans, lentils, nuts and soya.

How do Proteins work in a balanced diet?

Proteins are a very important part of our diet. Our bodies cannot grow well or stay healthy without eating proteins often. However, we must also remember that animal sources of protein also contain fats. In order to ensure that we eat fats sparingly, we can choose lower fat options of proteins such as low fat or fat free dairy and lean meats.

SA FOOD-BASED DIETARY GUIDELINES:

- Eat dry beans, split peas, lentils and soya regularly
- Chicken, fish, milk, meat or eggs can be eaten daily





What are Fats?

Like carbohydrates, fats are compounds of carbon, hydrogen and oxygen. However, they are richer in carbon and hydrogen and poorer in oxygen, and can provide the body with more energy than carbohydrates.

How does your body use Fats?

Fats provide energy and they also have a very important protective role in our bodies. For example, fatty stores around our kidneys help to protect them from injury, and all of our nerves are covered by a fatty sheath for protection. Certain fats support the functioning of the immune system and play important roles in brain and eye development. We also store fat under our skin to help keep us warm. Our bodies will use our fat reserves for energy if there is a shortage of carbohydrates.

Which foods are sources of Fats?

Animal sources of fats include butter, meat with fat on and oily fish such as sardines. Plant sources of fats include cooking oils, peanut butter, olives, nuts and avocado pears.

How do Fats work in a balanced diet?

The fats we store in our bodies can come from our food, but most of it comes from carbohydrate metabolism. Therefore, we do not need to include a lot of fats in our diet. There are certain fats that are healthy, such as the fats found in oily fish like sardines or the fats in nuts, but we only need them in small amounts. Eating a lot of fatty foods can cause us to become overweight if we are not active enough.

SA FOOD-BASED DIETARY GUIDELINE:

Eat fats sparingly





What are Vitamins and Minerals?

Vitamins are organic substances that we get from plant and animal foods. Minerals are inorganic elements that come from the soil and water that are absorbed by plants or eaten by animals. Vitamins and minerals are essential for our health because they play vital roles in many different cell structure and system functions in our bodies. Because vitamins and minerals are so important to maintaining a healthy strong body, foods that are good sources of them are called protection foods.

How does your body use Vitamins and Minerals?

Vitamins and minerals support healthy growth and development, boost your immune system, and help every organ in your body to do its job well. Our bodies are able to create reserves of fat-soluble vitamins such as Vitamins A, D, E and K. However, vitamins such as Vitamins C and B are water soluble and our bodies are unable to store them. We need fresh supplies of these vitamins every day in our diet. Our body needs larger amounts of some minerals, such as calcium, to stay strong and healthy. We refer to other minerals like chromium, copper, iodine, iron, selenium, and zinc as trace minerals because we need very small amounts of them each day.

How do Vitamins and Minerals work in a balanced diet?

To maintain a healthy body we need to include sources of vitamins and minerals in our diets every day. Eating a variety of foods from each nutrient group each day will ensure that we get enough vitamins and minerals in to stay healthy. Fruit and vegetables are excellent sources of vitamins and minerals.

SA FOOD-BASED DIETARY GUIDELINE:

• Eat plenty of vegetables and fruits every day



WHICH FRUIT AND VEGETABLES ARE SOURCES OF DIFFERENT VITAMINS AND MINERALS? Here are examples of the benefits and sources of some of the essential vitamins and minerals:

VITAMINS AND MINERALS	RALS FRUIT & VEGETABLE SOURCES BENEFITS	
Vitamin A	Orange veg such as carrots and sweet potatoes; green vegetables such as spinach; orange fruits such as sweet melon, peaches and mango	Prevents eye problems; promotes a strong immune system; essential for cell growth and development; promotes healthy skin
Vitamin C	Fruits such as red berries, guavas and citrus; vegetables such as tomatoes, broccoli, spinach and bell peppers	We need Vitamin C to form collagen, the connective tissue that holds our cells together. It boosts the immune system and helps with wound healing. It is essential for healthy gums, teeth and blood vessels. It helps our bodies absorb iron and calcium
Vitamin E	Vegetable oils, avocados, nuts, and green leafy vegetables	Protects our cells from damage, keeps our skins healthy and maintains the health of red blood cells
Vitamin B6	Vegetables such as potatoes, beans and spinach; fruits such as bananas; seeds and nuts	Supports brain and nerve functions. Helps to release energy from proteins and helps to make red blood cells
Vitamin B9 (Folate)	Legumes such as dried beans and lentils; green leafy vegetables such as spinach; fruits such as citrus fruit	Helps the body make red blood cells and DNA
Calcium	Dark green vegetables such as broccoli and spinach; nuts and seeds such as almonds and sesame seedsBuilds and maintains street and teeth	
Iron	Legumes such as beans and lentils; nuts such as almonds and cashews; green leafy vegetables such as spinach	Helps red blood cells carry oxygen throughout the body; supports normal functioning of brain cells and the immune system
Magnesium	Vegetables such as spinach, potatoes, beans and avocados; fruits such as bananas; legumes such as dried beans and lentils; nuts and seeds	Supports muscle and nerve functions. Maintains regular heartbeat. Helps the body make proteins. Helps to build bones



WORKSHEET 1:

UNDERSTANDING THE NUTRITIONAL COMPOSITION OF DIFFERENT FOODS

TO DO: Make a copy of the following worksheet for each learner. You can choose whether they are to complete the worksheet on their own as a classroom activity, whether you would like them to work in pairs or small groups or whether you would prefer to guide learners through completing the worksheet as part of your teaching.

(Refer to worksheet 1 on page 41 & 42.) (The worksheet provided can be used as an informal assessment.) (Skills: 13 - Interpreting information.)

CLASSROOM ACTIVITY 1:

PUTTING OUR KNOWLEDGE OF NUTRIENTS IN FOOD INTO PRACTICE

TEACHERS NOTE:

Prior to this activity, you will need to ask your learners to collect a variety of food packaging and labels and bring them to school. Make sure you ask them to wash food containers well.

This is a small group-based activity that will enable learners to apply their knowledge of nutrients in food, and will give them experience in reading food labels.

- 1. Organise learners into small groups of 3 to 4 learners.
- 2. Give each small group a collection of 3 to 4 food packages with labels.
- 3. Ask them to work together to identify the nutrients from each major food group as stated on each label.
- 4. Ask them to note any food additives.
- 5. Ask each group to present their findings to the class.

(Oral presentation can be used as an informal assessment.) (Skills: 5 - Sorting and classifying, 13 - Interpreting information.)

CLASS ROOM ACTIVITY 2: CLASS LESSON: HEALTHY LIVING IS FUN

You can enhance this lesson by booking a Woolworths Educational Programme Class Lesson for your class. Contact your Woolworths Educational Programme Regional Coordinator to book the **Class Lesson – Healthy Living is Fun**. A professional educational entertainer will come to your school to present a fun and interactive lesson that uses rhyme, movement, storytelling, games and group participation to convey key information about healthy living. This class lesson will reinforce your teaching about Nutrients in Food.

(The worksheet provided when booking the lesson, can be used as an informal assessment.)



NUTRITION TERM 1

VARIETY IS THE SPICE OF LIFE!

STRANDS: NATURAL SCIENCE: LIFE & LIVING; TECHNOLOGY: PROCESSING TOPIC: NUTRITION CONTENT & CONCEPTS: BALANCED DIETS TERM 1

INFORMATION FOR EDUCATORS:

As per CAPS, in Term 1, you have to teach learners about Nutrition (page 49). This resource provides you with content that your learners are required to know about this topic aligned to CAPS. It also gives you ideas about how to present the content, worksheets that you can copy and use, and suggested project activities that will reinforce their learning about Nutrition.

LESSON 1: A BALANCED DIET

TO DO: Write this saying, **"Variety is the Spice of Life!"**, on the board. Ask your learners if they have heard this saying before. What do they think it means?

Summarise the answer for your learners:

- Spices are used to add value to food, because they offer great taste sensations. We can enjoy food more because of spices.
- When we use the saying, **"Variety is the Spice of Life!"**, we mean that having variety in our life improves our experiences. We get more benefits out of life if we experience variety.

Ask your learners the following questions:

1. Why do they think that eating a variety of foods can be important to our health?

Answer: We have learnt how different foods provide us with the different nutrients that our bodies need. Eating a variety of foods ensures that our diets are balanced and that we get all the different nutrients that we need.

2. What is a diet?

Answer: Our diet is the selection of different foods we choose to eat every day. It includes our meals and snacks. It also includes our drinks.

3. What is a balanced diet?

Answer: A balanced diet refers to:

- Eating foods from all the major food groups each day
- Eating the right amounts of foods from all the major food groups each day

4. Why is it important to eat a balanced diet?

Answer: A balanced diet provides our bodies with the variety of nutrients needed for our bodies to function normally. Each day we all make choices about what to eat. It is important to take responsibility for our health by making healthy eating choices. Unhealthy, unbalanced diets affect normal growth and development. Unhealthy, unbalanced diets can lead to frequent sickness, serious health conditions and disease.

5. What are the challenges of making healthy eating choices?

Answers:

• Healthy food options aren't always readily available

Solution: Encourage your family to plant a vegetable garden; encourage your family to have fruit and vegetables available at home; encourage your school tuckshop to sell healthy food options

• We may be tempted to eat less healthy food, such as sweets, fizzy cold drinks and fatty take-away foods **Solution:** *Pack healthy food in your lunchbox*

• We may choose foods that are less healthy because we think they are convenient, such as crisps and take-away foods

Solution: Fruits are nature's very own fast-food – ready to eat! Cereal bars, yoghurt and nuts are convenient and healthy food options

6. How do we achieve a healthy balanced diet?

Answer: There are 11 **South African Food-based Dietary Guidelines** which we can follow to achieve a healthy, balanced diet. Write these guidelines on the board and discuss them with your class.

1. Enjoy a variety of foods

- 2. Be active
- 3. Make starchy foods the basis of most meals
- 4. Eat dry beans, split peas, lentils and soya regularly
- 5. Chicken, fish, milk, meat or eggs can be eaten daily
- 6. Drink lots of clean, safe water
- 7. Eat plenty of vegetables and fruits every day
- 8. Eat fats sparingly
- 9. Use salt sparingly
- 10. Use food and drinks containing sugar sparingly and not between meals

11. If you drink alcohol, drink sensibly (only for adults)

TO DO: Make a copy of worksheet 2 for each learner. Read the story of friends Sipho and Ben out loud to the class. Ask learners to complete the worksheet individually.

(Refer to worksheet 2 on page 44.)

READ OUT LOUD: A Day in the Lives of Two Friends

This is the account of a typical weekday in the lives of Sipho and Ben. They are friends who are in the same Grade 6 class. Sipho and Ben live in the same neighbourhood and have similar opportunities in life. However, they make different daily choices that result in them leading quite different lifestyles.

Sipho likes to wake early on a school day, and he always starts his day with a glass of water. At breakfast-time he eats a bowl of oats with sliced banana and he drinks a glass of low-fat milk before he walks to school. Ben prefers to sleep as late as he can and he often has to eat his breakfast on his way to school. On this day, he eats a buttered white bread and jam sandwich with a fruit juice while sitting in a taxi.

At break-time, Sipho eats an apple and drinks a glass of water before playing soccer on the field with their group of friends. Ben eats a packet of salt and vinegar chips while watching Sipho and the others play soccer. At lunch-time Sipho is still at school and he eats a whole-wheat cheese and tomato sandwich with carrot sticks and drinks the low fat milk that he has brought with him before going to Athletics practice. Ben catches a taxi and when he gets home he defrosts and warms up a frozen cheese and tomato pizza. He eats this and drinks a fizzy cold drink while sitting and watching TV.

Later in the afternoon when Athletics is over, Sipho drinks two glasses of water and eats a bunch of grapes as a snack before he walks home from school. Meanwhile, Ben has moved from the lounge to his bedroom where he sits and plays games on his computer. He has a bowl of ice cream, two sweet biscuits and another fizzy cold drink as a snack.

For supper that night, Sipho's mom has freshly prepared roast chicken, samp and butter beans with tomato and onion gravy, baby marrows, marog, butternut and avocado pear. This is one of his favourite meals, and he enjoys it with a glass of water. Sipho doesn't add salt. Ben is also having one of his favourite meals for supper. His mom has come home with take-aways. Ben eats fried chicken, fried chips and a white bread roll with a fruit juice. Although they already come salted, Ben adds extra salt to his fried chicken and chips.

After supper both boys settle down in their homes to do their homework. When they have finished their homework they are allowed to watch TV. Sipho watches for an hour, has a glass of water and then he goes to bath and brush his teeth before going to bed. Ben watches TV for over two hours and then has a quick shower. He is tired and he forgets to brush his teeth.



PROJECT ACTIVITY 1: DISEASES RELATED TO DIET

Remind your learners that there are adverse physical consequences to not achieving a healthy, balanced diet. Poor food choices can lead to a variety of possible ailments, and even serious diseases. Give them this opportunity to develop their investigative skills and deepen their understanding of the impact of food choices on their health.

Steps:

- 1. Ask learners to research a disease that it is related to poor diet.
- 2. They can make use of books from libraries and the internet to do their research.
- 3. They need to answer the following questions:
- **a** What is the disease/sickness/health condition called?
- **b** Who is mostly affected by this disease/sickness/health condition?
- **c** What factors in a diet can cause this disease/sickness/health condition?
- **d** What are the effects of the disease/sickness/health condition?
- e Which of the South African Food-based Dietary Guidelines can be followed to help prevent this disease/sickness/ health condition?

4. Write a selection of the diseases and conditions related to diet that your learners have researched on the board, such as anaemia, rickets, diet-related cancers and obesity. Revise their project questions and enable them to offer the answers they have discovered.

(Skills: 1 - Accessing and recalling information.)





PROJECT ACTIVITY 2: HEALTHY EATING IN MY COMMUNITY

HEALTHY EATING IN MY COMMUNITY

This project will expand your learners' understanding of this topic by getting them to collect and analyse data from their community. They will gain insights about how factors such as socio-economic conditions and culture may affect people's food choices.

Steps:

1. Make a copy of the following Project Activity 3 worksheet for each learner.

Ask learners to interview a member of their community who is not in the same age group as them. Their interviewee may be a friend or family member provided that they don't live in the same household as them.
 They must use their worksheet to record their findings and answer questions.

4. When they have completed this task, ask them to work in pairs in class. Instruct them to use the 11 South African Food-based Dietary Guidelines to evaluate whether their interviewees have made healthy eating choices.5. Let a representative of each pair present their joint findings to the class.

6. Discuss any challenges that community members may face in making healthy eating choices – such as availability of healthy food choices, cultural attitudes to food, food shortages, lack of nutrition education etc.

(Refer to worksheet 3 on page 49.) (Skills: 5 - Sorting and classifying, 13 - Interpreting information.)







FOOD PROCESSING TERM 1

FOOD PROCESSING

STRANDS: NATURAL SCIENCES: LIFE & LIVING; TECHNOLOGY: PROCESSING TOPIC: FOOD PROCESSING CONTENT & CONCEPTS: NEED FOR PROCESSING FOOD TERM 1

INFORMATION FOR EDUCATORS:

As per CAPS, in Term 1, you have to teach learners about Food Processing (page 49). This resource provides you with ideas about how to present the content, worksheets that you can copy and use, suggested classroom activities and project activities that your class can participate in to expand and reinforce their learning about Food Processing.

TEACHER NOTES:

- Food processing used to be done at home. Nowadays most of the food we eat is processed in factories
- A staple food such as bread is processed first grains of wheat are ground up in a mill to form soft, powdery flour. Then other ingredients are added and loaves of bread are baked in an oven. Even if you bake your own bread at home, the flour and other ingredients that you may use have been processed
- Food processing helps us to make food edible, easier to store and more convenient
- However, food processing can also cause problems if unhealthy ingredients are added
- There are many ways to process food. Cooking, preserving, drying, canning, salting and bottling are all ways to process food. Some food processing such as fermenting can enhance the nutritional quality of food, but some food processing can also reduce the nutritional content



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READ OUT LOUD: WHAT IS FOOD PROCESSING?

TEACHER NOTE:

You can read the following article out loud to your learners and make a copy of the following worksheet for each learner. After you have read this article to your class, hand out the worksheets and ask learners to complete them in class. Discuss their answers in class.

(Refer to worksheet 4 on page 50.)

WHAT IS FOOD PROCESSING?

Food processing is a human activity. For millennia, people have been working out and practising ways to make the raw food provided by nature more edible, longer-lasting, safer, more nutritious, more tasty and lately, more attractive as a product. In today's world, unless you are eating a raw fruit or vegetable with its skin, you are eating a processed food. Even the action of skinning, butchering and cooking a freshly slaughtered animal is a way of processing food.

In the past, certain methods of food processing were common, as they still are today, such as:

- Preserving meat and fish with salt
- Drying and sun-drying meat, fish, fruit and vegetables
- Fermenting fruits, vegetables and grains
- Grinding and milling grains for porridges and baked foods
- Cooking by boiling, baking, roasting, grilling, frying, smoking and steaming

Many of these ways of food processing would happen in people's homes and communities. As human societies became more technology advanced, food processing increasingly took place in factories rather than homes, and new ways of food processing became established such as:

- Freezing raw and cooked meat, fish, fruit, vegetables and baked foods
- Bottling fruit and vegetables in the form of jams, preserves, pickles, condiments and sauces
- Canning fish, meat, fruit and vegetables
- Pasteurising milk

Today, many more technological advances and food science have resulted in even more ways to process food, such as:

- Spray or freeze drying foods such as milk powder, instant coffee, tea, eggs, cereals, instant baby foods, fruits, vegetables, spices, herbs, instant soups and sauces
- Juice concentrating
- Using food additives such as non-nutritive sweeteners (which are sometimes referred to as artificial sweeteners), colourants, flavourants, preservatives, emulsifiers, anti-foaming and anti-caking agents
 All forms of food processing alter the qualities of the raw food in some way or other. Some of these changes to the raw food are beneficial and can improve the safety of the food, such as:

- Cooking raw meat, fish, poultry and eggs can eliminate potentially harmful bacteria, such as Salmonella, that can occur in the raw food and cause serious illnesses in humans
- Fermenting cassava roots, a staple food in West Africa, is essential before cooking. Cassava root contains cyanide which can poison humans and this is neutralised in the fermentation process

However, some methods of food processing may not be that beneficial:

- Vitamins provided by fruit and vegetables, such as Vitamin C, are negatively affected by heat. This means that you get far less vitamins from fruits or vegetables that have been cooked or canned
- Some people prefer to avoid food additives.
- A limited number of people have to avoid certain food additives, for example, a person who suffers from sulphur allergies needs to avoid dried fruits that have been preserved with sulphur dioxide

PROJECT ACTIVITY 3:

INVESTIGATING THE PROCESSING OF A STAPLE FOOD

TEACHER NOTES:

The global food supply is a huge and complex system that involves the agricultural, manufacturing and retail industries, as well as the government, mining, power supply, water supply and transport sectors across the world. One of the most important reasons to process food is to ensure that enough food is available daily for the world's ever-increasing human population.

TO DO: Define a staple food for your learners. A staple food is a food that is eaten as a routine part of population's diet, and in such quantities that it dominates the diet of a population. Different countries, and different populations within a country, have different staple foods. Staple foods are mostly eaten every day, or even at every meal. Because staple foods are eaten so often, they must be readily available at any time and they must be affordable to the majority of people. Staple foods are either processed foods, or they are made daily from processed foods that can be stored for a long time.

Ask your learners to research the processing of a staple food. This may be the staple food they eat, or a staple food eaten by a different population in the country, or it could be a staple food eaten in a different country. Learners must create a graphic, a mind map or another kind of illustration to present the findings of their research. They need to identify the ingredients of this staple food, show how it is processed and how it is made available daily to people. Allow a variety of learners to present their projects in class so that they showcase the food processing of different staple foods.

NOTE: It is highly likely that one or more learners will research maize or mielie meal as their example of a processed staple food. All manufacturers of mielie meal are required by law to fortify their products with vitamins and minerals. Why do they have to do this? Mielie meal is a staple food in South Africa. However, it is naturally low in essential vitamins and minerals, and people who eat lots of mielie meal as their main source of food may suffer from nutritional deficiencies. By adding vitamins and minerals, the manufacturers enhance the nutritional quality of mielie meal. Check that the learner who presents mielie meal has included the fortification of the product. If they have not, be sure to point this out to your class.





CLASSROOM ACTIVITY 3: AN APPLE A DAY

Materials: A fresh apple, a sharp knife, a cutting board and a bowl of water for this activity. (It is not necessary, but it will enhance the learners' experience if you could bring a pack of dried apples to show them.)

Cut the apple in half.

Ask learners to describe the cut apple - It is round in shape, hard/crispy in texture, white in colour.

Ask the learners if they think the apple looks good enough to eat - Yes.

Put one half of the apple cut side down in the bowl of water. Leave the other half cut side up on the board. After a few minutes, ask learners what they observe about the half an apple on the board - It will start turning brown.

Why does a cut apple turn brown? - Apples, and many other fresh fruits, contain an enzyme that reacts with oxygen in the air and iron-containing phenols in the apple. When we cut the apple, we damage the cells in the fruit and allow this enzyme, known as polyphenol oxidase or tyrosinase, to come into contact with oxygen. There is an oxidation reaction that forms a sort of rust on the cut surface of the fruit.

Ask learners if they think this half of the apple still looks good enough to eat - No, the brown colouring is unattractive and shows that the quality of the fruit is spoiling.

Pick up the half an apple that has been cut side down in the water, and show them that this half is less brown because the water is helping to prevent contact with oxygen. Present learners with this situation:

Imagine you have four apple trees growing in your garden. It is Autumn, and all the fruit is ripe and ready to be picked. It is a good harvest and you have twice as many apples as you could eat in one month. You do not have proper storage facilities for keeping the excess apples, but you don't want them to go to waste. You decide that you are going to dry the extra apples, but when you cut one into rings for drying, it turns brown and it doesn't look good enough to eat. Is there anything you can do about this? Have they seen dried apples in packets in the shops? Are they white or brown? (They are white). How do we retain the whiteness of the cut apples we use for drying?

Answer: Food manufacturers preserve the natural white colour of cut apples by using small, regulated amounts of the preservative sulphur dioxide. This is safe for most people to eat. However, people with sulphur allergies may prefer to avoid eating dried apples.

Discuss with your learners that this is an example of how food additives are used to overcome the challenges we face in preserving fresh foods and making them last longer.



READ OUT LOUD: WHAT DO WE THINK ABOUT FOOD ADDITIVES?

TEACHER NOTE:

You can read the following article about Woolworths' food additive policy which highlights the different consumer viewpoints regarding food additives and gives your learners a unique insight into how top global food retailers respond to these perspectives.

THE WOOLWORTHS GOOD FOOD POLICY WHAT DO WE THINK ABOUT FOOD ADDITIVES?

Woolworths recognises that food additives perform a variety of useful functions in processed foods. A wide range of products would not be possible without additives, such as cured meats like polony and salami, and household favourites like bottled mayonnaise. Woolworths also recognises that food additives are tested to establish their safety before they may legally be used and their use is regulated by government agencies.

However, Woolworths is also aware that many consumers have negative perceptions of food additives even though they have been safety tested and are allowed. In addition, some people may have certain sensitivities to some food additives. Because many of our consumers prefer to avoid the use of additives, Woolworths' good food policy includes minimising the use of food additives wherever possible, and using alternative additives wherever possible. We continually assess the use of additives and research alternatives or changing processing procedures so that it is not necessary to use food additives.

There are a number of allowable additives that Woolworths does just not permit in our processed foods, including the flavour enhancer monosodium glutamate (MSG) and the colourant tartrazine. This helps our consumers who wish to avoid these additives have peace of mind about the safety of the food they are feeding to their families. Woolworths does not use preservatives when making yoghurts. None of our fruit juices contain the preservative sulphur dioxide. Woolworths has a range of children's sweets that contain no azo dyes (artificial colourants) including tartrazine.

Use the following guiding questions to expand the discussion:

- 1. Do they think food additives are a good idea? If so, why? If not, why?
- 2. Are there types of food additives they would prefer not to eat? If so, why?
- 3. Would they want to know what additives are included in the processed foods they eat?
- 4. Do they know how to find out what additives are included in processed foods?



CLASSROOM ACTIVITY 4:

UNDERSTANDING FOOD ADDITIVES

To Do: Make a copy of the following worksheet for each learner and lead a class discussion about food additives. Go through the different types of additives and their uses. For each type, ask learners to discuss and record in pencil what processed foods they think would include each type of food additives. They will use this same worksheet for the next classroom activity.

(Refer to worksheet 5 on page 51.) (The worksheet provided can be used as an informal assessment.) (Skills: 5 - Sorting and classifying.)

CLASSROOM ACTIVITY 5: READ THE LABEL

TEACHER NOTE:

Prior to this activity, you will need to have asked learners to collect a variety of processed food packaging with food labels. Most processed food products have the food label on the outer packaging, but if learners bring food containers with food labels, they must please wash the containers well at home to avoid bringing any potentially harmful bacteria into the classroom.

Divide your class into small groups of 3 to 5 learners. Ask them to pool the food labels they have collected. Each group must evaluate the variety of processed food labels to understand why and how this food was processed, and note additives that have been included in the food. In addition, where this is provided on the label, learners must identify the nutritional value of these processed foods and assess their contribution towards a balanced diet according the 11 South African Food-based Dietary Guidelines. Learners must be able to organise this information and summarise it. Each group presents their findings to the class.

(Skills: 5 - Sorting and classifying, 13 - Interpreting information.)



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PROJECT ACTIVITY 4:

Learners must independently research a method of food processing that they can follow to produce a processed food. They may need to use books at the library and the Internet; or they may choose to interview elders in their families and communities who can brief them on the food processing method. Learners need to:

- Document the food processing method
- Give the reasons for its use
- Provide the recipe
- Make the food
- Present all elements of the project to the class



Contact your Woolworths Educational Programme Regional Coordinator to book a **Grade 6 Woolies Store Tour** that takes the form of a project activity focusing on food processing and nutrition, including a worksheet.







ECOSYSTEMS & FOOD WEBS TERM 1

ALL ABOUT ECOSYSTEMS

STRANDS: NATURAL SCIENCES: LIFE & LIVING; TECHNOLOGY: PROCESSING TOPIC: ECOSYSTEMS AND FOOD WEBS CONTENT & CONCEPT: DIFFERENT ECOSYSTEMS; FOOD WEBS TERM 1

INFORMATION FOR EDUCATORS:

As per CAPS, in Term 1, you have to teach learners about Ecosystems and Food Webs (page 50). This resource provides you with content that your learners are required to know about this fascinating topic. It also gives you ideas about how to present the content, a worksheet that you can copy and use, case studies, suggested classroom activities and project activities that your class can participate in to expand and reinforce their learning about Ecosystems and Food Webs.

LESSON 1: ECOSYSTEMS

TO DO: Present the following content to learners:

An ecosystem is a community of interconnected and interdependent living organisms – plants, animals, humans and micro-organisms existing in a particular area that are sustained and affected by the non-living aspects of the system such as water, air, soil and weather. Ecosystems nest within larger and larger ecosystems. An ecosystem can be as small as a pond, which may exist within a larger ecosystem such as a wetland, and the wetland ecosystem may be encompassed by a river ecosystem. An ecosystem is an open system which means that it is connected to other ecosystems and can be affected by the changes that occur in other ecosystems.

- **Terrestrial ecosystems** include mountain ranges, arctic tundras, rainforests, cloud forests, montane forests, woodlands (bushveld), grasslands (savannah), deserts and semi deserts
- Aquatic ecosystems include rivers, lakes, swamps, wetlands, ice shelves, beaches, rocky shores, coral reefs, gulf streams and deep seas

A Delicate Balance

The life-forms in an ecosystem live in a delicate balance which can easily be disrupted. Throughout the history of the earth natural phenomena such as floods, fires, storms and volcanic eruptions have disrupted the balance of ecosystems. Some ecosystems can recover from these disruptions; other ecosystems are forever changed by them. In more modern times, humans have been affecting most of the planet's ecosystems.

Our built environments, and our activities such as introducing alien species, hunting, fishing, mining, forestry, manufacturing and farming have severely disrupted many ecosystems that can never recover. We even impact on wildlife conservation areas, and disrupt those otherwise protected natural ecosystems with fencing, the construction of roads and buildings, as well as water, soil and air pollution. The loss of natural ecosystems results in the extinction of species, the loss of biodiversity, a poorer quality environment and an overall decline in the resilience of the planet.



Different kinds of ecosystems support different species of plants, animals and micro-organisms which are adapted to thrive in their specific ecosystem. Some species are so specifically adapted to a particular ecosystem that they cannot survive anywhere else. Other species may be more adaptable, and are able to survive in a similar ecosystem. Examples of this are the European Pine and Australian Eucalyptus trees that the South African forestry industry grows in the mountainous regions of Mpumalanga, Limpopo and Western Cape provinces. However, there are many problems associated when humans introduce alien species like this. In the case of our forestry practices, the natural mountain ecosystems have been eradicated and replaced with a much poorer quality environment.

A healthy ecosystem is one where there is a stable balance in the numbers of each species that naturally occurs in an ecosystem. It is important that the natural balance in an ecosystem is maintained.

CLASSROOM ACTIVITY 6: THE WEB OF LIFE

Materials: You will need one ball of string or wool, blank white paper and markers

Depending on the size of your class, this activity can be done in one group, or you will need to divide your learners into several groups. As you need space to move around, you may want to do this activity outside or in a hall. Using the following table listing 35 elements of a bushveld ecosystem, assign each item on the list to learners. Make sure that you assign the non-living elements such as soil, water, the air and the sun as well. Do not assign the same item to more than one learner.

Steps:

- Each learner writes their assigned element of the bushveld ecosystem on a piece of paper
- Learners stand in a circle with their labels on the ground in front of them
- Choose one learner to stand in the middle of the circle
- The learner in the centre is given the ball of string and starts the activity by stating the name of the element he or she represents
- Using the following table, the teacher reads out the description of the other elements that the first learner is linked to
- Once the learners representing the 'linked to' elements have been identified, the learner in the middle tosses the ball of string to each of them, and each hold onto a place on the string until they are all connected
- The process is repeated until all the learners are connected to all the elements they are linked to
- Now introduce a disruption caused by humans into the ecosystem such as:
- All the trees are cut down by people for firewood
- A farmer upriver washes pesticides into the river which poisons the water
- A hunter kills all the lions
- A collector removes all the birds for the illegal trade in wild animals
- For each disruption, all the elements connected to the affected element must drop their end of the string

(Refer to worksheet 6 on pages 52 - 54.)

Guiding the class discussion

- Once you have repeated a few disruptions to the ecosystem, ask learners to share what they observed happening to the elements of the ecosystem.
- When was the ecosystem richest and strongest?
- When was it poorest and weakest?
- Discuss with learners that human activity is disrupting most of the planet's ecosystems, and that the planet as a whole gets poorer and weaker as more and more ecosystems are negatively affected.
- Can they think of any solutions to this problem?



TEACHER NOTES:

For this lesson you will need to make copies of the Web of Life Worksheet that details 35 elements of a bushveld ecosystem for your learners.

TO DO: As an introduction to food webs, ask your learners to recall what they learnt about food chains in Grade 5.

(Refer to worksheet 6 on pages 52 - 54.)

Revise the following content with learners:

The plants and animals in an ecosystem are linked by their feeding relationships. A food chain is a simple way to describe the linear relationships between a few plants and animals; while a food web shows that food chains do not exist in isolation; they are interlinked.

When learning about food chains, learners were taught that:

Plants are **producers** – they make their own food

Animals are **consumers** – they cannot make their own food and need to eat plants and other animal to exist Various microscopic plant and animal forms are **decomposers** – they break down dead plant and animal matter and make nutrients available in the ecosystem

There are different kinds of consumers:

A **herbivore** – is an animal that only eats plants

A carnivore – is an animal that only eats other animals

An **omnivore** – is an animal that eats both plants and animals

Ask your learners to use the Web of Life Worksheet to identify a number of different food chains. Write at least 10 examples of food chains in this ecosystem on the board, such as:



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- Grass Field Mouse Mole Snake Brown Snake Eagle
- Grass Field Mouse Brown Snake Eagle
- Grass Dove Caracal
- Acacia karoo Impala Lion
- Acacia karoo Impala Human
- Acacia karoo Warthog Lion
- Acacia karoo Warthog Human
- Syzygium cordatum Butterfly Drongo
- Syzygium cordatum Butterfly Tree Agama Brown Snake Eagle

Work through these food chains, asking learners to identify the different types of feeders, and different types of consumers:

- Grass Locust Honey Badger Producer > Consumer-herbivore > Consumer-omnivore
- Grass Field Mouse Mole Snake Brown Snake Eagle Producer > Consumer-herbivore > Consumer-carnivore > Consumer-carnivore
- Grass Field Mouse Brown Snake Eagle Producer > Consumer-herbivore > Consumer-carnivore
- Grass Dove Caracal
 Producer > Consumer-herbivore > Consumer-carnivore
- Acacia karoo Impala Lion
 Producer > Consumer-herbivore > Consumer-carnivore
- Acacia karoo Impala Human Producer > Consumer-herbivore > Consumer-omnivore
- Acacia karoo Warthog Lion
 Producer > Consumer-omnivore > Consumer-carnivore
- Acacia karoo Warthog Human
 Producer > Consumer-omnivore > Consumer-omnivore
- Syzygium cordatum Butterfly Drongo Producer > Consumer-herbivore > Consumer-carnivore
- Syzygium cordatum Butterfly Tree Agama Brown Snake Eagle Producer > Consumer-herbivore > Consumer-carnivore > Consumer-carnivore



TO DO: Present the following content to learners:

In an ecosystem, plants and animals are connected by their feeding relationships. This is called a food web. The food web is different from a food chain which only shows a simple, linear chain from plant to herbivore to carnivore. Instead a food web recognises that the species in an ecosystem are connected in by their feeding relationships in a much more complex way.

A food web consists of:

PRODUCERS – These are the plants that produce food for themselves and animals. In a terrestrial ecosystem such as the bushveld or woodland producers will include different plants such as grasses, shrubs, bulbs and trees. In an aquatic ecosystem such as the ocean, the producers will include plants such as kelp, sea grasses and algae.

CONSUMERS – These are the animals which may be herbivores, carnivores and omnivores. In a terrestrial ecosystem such as the bushveld or woodland, consumers will include different animals such as the Impala that eats leaves and grasses, the Mole Snake that eats earthworms, moles and field mice, the Grey Go-Away bird that eats fruits, grass seeds and Locusts.

DECOMPOSERS – These are micro-organisms which may include bacteria, nematodes and fungi that break down dead plant and animal matter and return nutrients to the soil.



Materials: For this activity learners need to refer to their copies of the Web of Life worksheet that details 35 elements of a bushveld ecosystem (worksheet 6). It would be ideal if each learner could also complete this activity on a large sheet of paper, such as A3 size. Learners will need pencils, pens, koki pens or other drawing materials.

Learners need to examine the worksheet and then draw and label a food web that includes all the producers, consumers and decomposers that are featured.

(Skill: 12 - Recording information.)



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READ OUT LOUD: FARMING FOR THE FUTURE - WOOLWORTHS CASE STUDY

TEACHER NOTE:

You can use this case study to demonstrate to learners that we can find solutions to the ways that an essential human activity such as farming disrupts natural ecosystems.

WOOLWORTHS CASE STUDY

THE FARM AS AN ECOSYSTEM

Our world faces important environmental challenges such as Global Warming and Climate Change that threaten the sustainability of life on Earth. These threats have arisen because the modern way of life creates too much pollution and waste, destroys natural ecosystems and reduces biodiversity. To live sustainably means that we all need to support ourselves today in ways that do not make it difficult for future generations to support their lives. Just as we need clean air and water, and healthy soil to survive so your children and their grandchildren will need the same.



Modern conventional farming has an enormous impact on natural ecosystems. Land has been cleared of its natural vegetation, and many of the animals that were supported by the ecosystem have been displaced or wiped out from farmlands. In addition, today's farmers rely heavily on artificial fertilisers, chemical pesticides and herbicides that work against nature and create pollution that goes beyond the borders of any one farm. As a host of environmental problems has emerged, more and more farmers are realising that we need a better way of growing food.

Working closely with our suppliers of fresh vegetables and fruits, herbs and salads, Woolworths has helped to find a new way of farming in South Africa, which we call 'Farming for the Future'. Farming for the Future is a holistic approach that combines the best of modern science with the best organic ways to grow good food in a sustainable way. Farming for the Future is about working in harmony with nature to solve the problems of modern food production. It involves viewing the farm as an ecosystem that needs clean water and air, fertile soil and biodiversity. We call it Farming for the Future because we want our farmers to protect soil, water and biodiversity today, so that your children and grandchildren will inherit fertile, healthy environments where good food can grow.

Woolworths Farming for the Future is a way for farmers to produce food sustainably because the farming methods ensure that the soil is healthy, the water quality is protected and the land supports a diverse community of life.

It all starts with the soil. You need good soil to grow healthy plants. Good soil for growing plants is made up of three parts:

- There's the sand and stone part that helps anchor the plant's roots
- There's a mineral part that provides the plant with the essential nutrients it needs to grow well and be naturally pest-resistant
- And then, there's the living part which is made up of many different kinds of tiny organisms known as microbes that provide the community of life that healthy plants need to be part of

Conventional farming uses fertilisers which provide plants with some minerals for growth; but used in large amounts, these artificial sources of minerals can kill off the living component of the soil and reduce the biodiversity that plants need to be truly healthy. Without the microbes in the soil to provide the plants with a great variety of life-sustaining ecosystem services, farmers have to use more and more expensive fertilisers, while getting smaller and smaller yields.

Farming for the Future solves this problem because the Woolworths farmers nurture the community of life in their soils. They drastically reduce the amount of artificial fertilisers they use, and instead make use of natural methods of building soil fertility, such as compost and worm castings.

With rich life in the soil, plants are healthier and more resilient to pests, so the Farming for the Future farmer can also reduce the use of pesticides. Using less chemicals on the farm helps to protect the valuable sources of water from pollution. On a Farming for the Future farm there is a careful, measured system of irrigation so that plants get the correct amount of water that they need, which helps to save water. Compost also retains more water in the soil so that the farmer can further reduce the amount of water needed for the irrigation of crops.

Woolworths works with our fresh produce farmers as well as some of our plant suppliers to help them meet and maintain the Farming for the Future standards. We visit farms regularly and our technologists help them to record and report on soil microbes, soil minerals, plant health, integrated pest management, water usage, waste water management and the overall biodiversity on their land.

As well as caring for the Earth, we also want to make sure that our Farming for the Future farmers can make a good living and that our consumers can buy high quality, good food at no extra costs. Farming for the Future is part of the Woolworths Good Business Journey that uses new and better ways to look after people and the planet.

Informal assessment: Guiding the class discussion

- Do learners think that viewing and treating a farm as an ecosystem is a good idea? If so, why? If not, why?
- What long-term advantages are there to an initiative such as Farming for the Future?
- Do learners think that consumers can play a role in a solution like this? If so, what positive impact can consumers make?







GLOBAL WARMING

The gradual increase in the temperature of the earth's atmosphere that can be caused by natural factors or by human activities that release gases into the air. Human activities such as burning coal and oil release gases that trap the sun's heat in the atmosphere.

CLIMATE CHANGE

Refers to important and lasting change in the world's weather patterns over periods that can range from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions resulting in more or fewer extreme weather events.

SOIL MICROBES

Refers to a microscopic organisms, also known as microorganisms, which may be single cell or multicellular organisms that live in the soil. They play key roles in soil ecosystems.

COMPOST

Organic matter that has decomposed over time, and recycled as a natural soil fertiliser which changes the composition of soil. Compost is a key aspect in organic and other nature-friendly ways of farming.

INTEGRATED PEST MANAGEMENT

Refers to a range of pest control practices that aim to manage pests such as insects, microorganisms that cause plant diseases and weeds in safer ways for human and environmental health. The best Integrated Pest Management techniques can reduce the need for the use of chemical pesticides and herbicides by encouraging natural pest control.

WASTE WATER

Refers to any water that has been changed or contaminated by human activities. We generate waste water in our homes, schools and offices when we flush toilets and run water down our sinks. Farms, factories and mines generate waste water in their production processes.

WASTE WATER MANAGEMENT

Refers to the different ways that we treat waste water to return the water to its natural, clean state. Waste water that is not treated is polluted water that is dangerous to all life forms.



READ OUT LOUD: FISHING FOR THE FUTURE - WOOLWORTHS CASE STUDY

TEACHER NOTE:

You can use this case study so that learners get an insight about how an essential human activity such as fishing disrupts natural ecosystems.

WOOLWORTHS CASE STUDY

FISHING FOR THE FUTURE

Enough Fish to Support Marine Ecosystems

The Woolworth Fishing for the Future initiative ensures that a lot of the wild caught species we sell in our stores meets the standards of the Marine Stewardship Council (MSC) for sustainable fishing. Fishing activities must be well managed to ensure that they do not have a negative effect on marine ecosystems.

The ocean environment consists of many living and non-living components that all work together to form the marine ecosystem. Living components might be fish, plants or shellfish, while non-living things could be rocks, sandy ocean beds or other structures in the sea. Keeping marine ecosystems in balance keeps fish stocks healthy and helps ensure that there will be fish for the future. It is therefore important to manage fishing activities within ecological limits – this means making sure that we don't



take out too many fish and thereby damage the ecosystem that these fish live in. To find out how many fish we can take out we first need to understand and reduce the impacts of fishing on the ecosystem. By doing this we can make sure that we fish in a way that keeps the ecosystem balanced and allows fish stocks to thrive.

We all need to work together, from the fishermen through to the people eating fish, to ensure that we fish sustainably. Fishing sustainably means that our generation must not use up all the marine resources our planet holds. We must use resources carefully so that fish species are able to survive and reproduce and everyone can benefit now and in the future. Taking out too many fish and thereby damaging ecosystems is called overfishing and not sustainable.

All fishing methods have some impact on the environment. This could be something as simple as a seagull becoming entangled by a piece of discarded nylon fishing line from a recreational angler, to the destruction of centuries-old deep sea corals by heavy trawling gear. In order to decide whether a particular fishing method has unacceptable levels of environmental harm we need to consider the following things:

Bycatch – is the term used to describe all fish and marine life, including birds that are caught accidentally when fishing for a specific fish. If a certain type of fishing method catches mostly the type of fish it set out to catch, it can be considered a better fishery than one where a lot of the catch is wasted.



Food Webs – All living things depend on one another to survive. Removing key fish from the food web can cause an imbalance in the entire ocean ecosystem, as it may disrupt other food webs which rely on these fish to survive. Many marine ecosystems are particularly vulnerable to the removal of the dominant predators which occur at the top of the food chain such as sharks, dolphins and seabirds. For example: if there are no sharks left the seal population will increase dramatically. The seals must eat and this will lead to a drastic decline in fish that are caught by the seals. Humans eat from all levels of the food web, which means that we can cause severe damage to a marine ecosystem if we destroy kelp forests, fish and marine predators all at once.

Habitat Damage – Habitats are the places where animals and plants live. The ocean is a habitat for thousands of marine animals and plants. Habitat damage refers to the actual destruction of marine habitats. Some marine habitats are more fragile than others and can be permanently damaged by fishing gear, such as trawling over a coral reef or even by underwater mining activities. Destroying bottom habitats not only reduces the number of refuges or shelters for fish, but disrupts the overall productivity of the system. Another important form of ocean habitat damage is pollution. Pollution is mostly caused by humans and can kill fish or other ocean-living animals. There are many forms of pollution such as oil spillages, plastic refuse dumped in the ocean or polluted rivers running into the ocean.

By supporting less destructive, carefully controlled fishing activities, the Woolworths Fishing for the Future initiative enables consumers to make the choice to only eat fish that has been responsibly sourced.

TO DO: Ask learners the following questions:

Guiding the class discussion:

- Have the learners learnt anything new after hearing this case study? If so, what?
- What do they think about the fact that certain fisheries have already collapsed?
- What do they think about practices such as heavy trawling over coral reefs?
- Do the learners think that consumers can play a role in a solution like Fishing for the Future? If so, what positive impact can consumers make?

CLASSROOM ACTIVITY 8: CLASS LESSON – THE ENVIRONMENT, CARING ABOUT ECOSYSTEMS

You can enhance this lesson by booking a Woolworths Educational Programme Class Lesson for your class. Contact your Woolworths Educational Programme Regional Coordinator to book the Class Lesson – The Environment, Caring About Ecosystems. A professional educational entertainer will come to your school to present a fun and interactive lesson that uses song, movement, storytelling, games and group participation to convey key information about this topic in order to reinforce your teaching about Ecosystems and Food Webs.

(The worksheet provided when booking the lesson, can be used as an informal assessment.)



WORKSHEET 1: UNDERSTANDING THE NUTRITIONAL COMPOSITION OF DIFFERENT FOODS

In the table below you will find the nutritional composition of similar portions of an apple, a roasted chicken breast, baked beans, a baked potato and boiled broccoli. You can see that each food provides nutrients from a number of different food groups.

	CARBOHYDRATE		PROTEIN	FATS	MINERALS		VITAMINS			
	TOTAL	SUGARS	DIETARY FIBRE			SODIUM	CALCIUM	IRON	A	c
125 g apple with skin	17 g	13 g	3 g	0 g	0 g	lmg	1 % NRV	1 % NRV	0.4 % NRV	6 % NRV
140 g roasted chicken breast with skin	0 g	0 g	0 g	42 g	11 g	99 mg	2 % NRV	8 % NRV	4 % NRV	0 % NRV
126 g (½ cup) canned baked beans, no salt added	26 g	10 g	7 g	6 g	0.5 g	lmg	5 % NRV	2 % NRV	1 % NRV	4 % NRV
138 g baked potato with skin	29 g	2 g	3 g	0 g	0 g	14 mg	2 % NRV	8 % NRV	0 % NRV	22 % NRV
78 g (½ cup) broccoli, boiled, without salt	6 g	lg	3 g	2 g	0 g	32 mg	2 % NRV	3 % NRV	7 % NRV	50 % NRV

NRV: Nutrient Reference Values for individuals 4 years and older. These values are based on the Recommended Daily Allowances (RDA's) which meet the needs of nearly all (97 – 98 %) healthy individuals to prevent nutrient deficiencies. RDA's are not necessarily enough to maintain optimum nutritional status and prevent chronic disease. These values are therefore considered to be the minimum amounts needed to prevent disease of lifestyle. NRV's are used for food labelling purposes.



- 1. Which of these foods provides you with most carbohydrate per serving?
- 2. Which food offers you the most protein per serving?
- 3. Which foods are lowest in fat per serving?
- 4. Which foods provide the most iron?
- 5. Which food provides you with the most Vitamin A?
- 6. Which food provides you with the most Vitamin C?
- 7. Which food provides the most variety of vitamins?
- 8. What % of the Nutrient Reference Value of Calcium would you get if you ate the apple,
- chicken breast, butter beans and baked potato as a meal?
- 9. Do you think this would be a balanced meal?

	CARBOHYDRATE	PROTEIN	FATS	VITAMINS & MINERALS
Apple				
Chicken				
Baked beans				
Potato				
Broccoli				

Use a \ast to show the major nutrient group each food provides.

Use a \checkmark to indicate other nutrient groups each food provides.

Answers to WORKSHEET 1: Understanding the nutritional composition of different foods

1. Which food provides you with most carbohydrate per serving?

Baked potato - 29 g of carbohydrates

2. Which food offers you the most protein per serving?

Chicken breast – 42 g of protein

3. Which foods are lowest in fat per serving?

Apple, Broccoli and Potato - 0 g

4. Which foods provide the most iron?

Chicken and Potato – 8 % NRV

5. Which food provides you with the most Vitamin A?

Broccoli – 7 % NRV

6. Which food provides you with the most Vitamin C?

Broccoli – 50 % NRV

7. Which food provides the most variety of vitamins?

Broccoli – Vitamins A and C

8. What % of the Nutrient Reference Value of Calcium would you get if you ate the apple, chicken breast, baked beans, broccoli and baked potato as a meal? 12 %

9. Do you think this would be a balanced meal?

- Energy foods, Growing and Fixing foods and Protection foods are included in this meal, providing carbohydrates, fats, proteins, vitamins and minerals
- As per the SA Food-Based Dietary Guideline, starches are the basis of the meal providing a total carbohydrate of 78 g, which is almost 60 % of the Nutrient Reference Value (NRV) of this food group for children aged 9 13 years
- 53 g of protein provides approximately 95 % of the Nutrient Reference Value for this food
- This meal provides 73 % of the Nutrient Reference Value for Vitamin C; which makes this meal high in Vitamin C
- With 11.5 g of fats, this meal provides acceptable amounts of fat

	CARBOHYDRATE	PROTEIN	FATS	VITAMINS & MINERALS
Apple	*			\checkmark
Chicken		*	 ✓ 	\checkmark
Baked beans	*	 ✓ 	 ✓ 	\checkmark
Potato	\checkmark			\checkmark
Broccoli	\checkmark	\checkmark		\checkmark

WORKSHEET 2: LESSON - A BALANCED DIET

KNOW: The South African Food-based Dietary Guidelines:

- 1. Enjoy a variety of foods
- 2. Be active
- 3. Make starchy foods the basis of most meals
- 4. Eat dry beans, split peas, lentils and soya regularly
- 5. Chicken, fish, milk, meat or eggs can be eaten daily
- 6. Drink lots of clean, safe water
- 7. Eat plenty of vegetables and fruits every day
- 8. Eat fats sparingly
- 9. Use salt sparingly
- 10. Use food and drinks containing sugar sparingly and not between meals
- 11. If you drink alcohol, drink sensibly (only for adults)

ORGANISE the information in this account of Sipho and Ben's typical week day by completing the chart below. Record what they ate and drank throughout the day in the columns headed "diet". Record their physical activity throughout the day in the columns headed "physical activity".

	SIPHO'S TYPICAL	WEEKDAY	BEN'S TYPICAL WEEKDAY	
	Diet	Physical Activity	Diet	Physical Activity
BREAKFAST				
BREAK-TIME SNACK				
LUNCH				
AFTERNOON SNACK				
SUPPER				

Now that you have organised the data, **ANALYSE** whether Sipho and Ben have a balanced diet and a healthy lifestyle by completing the chart.

	SIPHO	BEN
List servings of CARBOHYDRATES i. Note which servings provide starches or sugars. ii. Note which servings also contain high fats.	How many servings?	How many servings?
List servings of PROTEINS i. Note which servings are also high in fats. ii. Note which servings are also high in sugars.	How many servings?	How many servings?
List servings of FATS i. Note whether fats are sparing or high	How many servings?	How many servings?
List servings of fresh fruit and vegetables that provide VITAMINS & MINERALS	How many servings?	How many servings?
List servings of WATER	How many servings?	How many servings?
List sources of FIBRE	How many servings?	How many servings?
Record types of PHYSICAL ACTIVITY		

Based on your analysis, answer these questions

1. Which boy has the more balanced diet? Give reasons for your answers

2. Which boy has a healthier lifestyle? Give reasons for your answers

3. What are the main problems with the diet of the other boy?

4. What are the main problems with the lifestyle of the other boy?

5. What kinds of health conditions or diseases can affect this boy if he doesn't balance his diet and improve his lifestyle?

Answers to WORKSHEET 2: Achieving a healthy, balanced diet

	SIPHO'S TYPICAL WEEK DAY		BEN'S TYPICAL WEEK DAY		
	Diet	Physical Activity	Diet	Physical Activity	
BREAKFAST	Glass of water. He eats a bowl of oats and banana slices with a glass of low fat milk	Walks to school	He eats a white bread and jam sandwich with a fruit juice	Sits in a taxi on the way to school	
BREAK-TIME SNACK	He eats an apple and a glass of water	Plays soccer with his friends	He eats a packet of chips	Sits and watches his friends play soccer	
LUNCH	He eats a whole- wheat cheese and tomato sandwich with carrot sticks and drinks low fat milk	Goes to athletic practice	He eats 3 slices of cheese and tomato pizza with a fizzy cold drink	Catches a taxi and then sits and watches TV	
AFTERNOON SNACK	He eats a bunch of grapes and has two glasses of water	Walks home from athletic practice	He eats a bowl of ice cream and 2 sweet biscuits with a fizzy cold drink	Sits and plays computer games	
SUPPER TIME	He eats roast chicken, samp with tomato and onion gravy, butter beans, baby marrows, marog, butternut and avocado pear with a glass of water. He has another glass of water before bed		He eats take-away fried chicken, fried chips and a white bread roll with a fruit juice		



	SIPHO	BEN
List servings of CARBOHYDRATES i. Note which servings provide starches or sugars. ii. Note which servings also contain high fats.	8 Servings Oats (starches) Whole-wheat bread (starches) Samp (starches) Apple (sugars) Banana (sugars) Grapes (sugars)	12 Servings White bread (starches) Jam (sugars) 2 X fruit juices (sugars) Chips (starches and salt) Pizza (starches and fats) Ice cream (sugars and fats) 2 X fizzy cold drinks (sugars) Fried chips (starches and fats) White bread roll (starches)
List servings of PROTEINS i. Note which servings are also high in fats. ii. Note which servings are also high in sugars.	5 Servings 2 X low fat milk Cheese Roast Chicken Butter beans	3 Servings Cheese topping on pizza (high fat) Ice cream (high sugar and fat) Fried chicken (high fat)
List servings of FATS i. Note whether fats are sparing or high	4 Servings 2 X low fat milk (sparing) Roast chicken (sparing) Avocado pear (sparing)	5 Servings Butter on sandwich (sparing) Cheese topping on pizza (high fat) Ice cream (high fat) Fried chicken (high fat) Fried chips (high fat)
List servings of fresh fruit and vegetables that provide VITAMINS & MINERALS	8 Servings Banana, Apple, Tomato, Grapes, Baby marrows, Butter beans, Marog, Butternut	0 Servings
List servings of WATER	5 Servings	0 Servings
List sources of FIBRE	9 Sources Oats, Whole-wheat bread 7 X servings of fresh fruit & vegetables Butter beans	0 Sources
Record types of PHYSICAL ACTIVITY	Walking Soccer Athletics	Sitting



Answers to QUESTIONS: Achieving a healthy, balanced diet

1. Which boy has the more balanced diet? Give reasons for your answers

Sipho has the more balanced diet:

a. He eats a variety of foods from all major food groups

- b. He eats more sources of starchy carbohydrates than sugary ones
- c. He eats plenty of fresh fruit and vegetables
- d. He eats foods that are rich in fibre
- e. He eats fats sparingly
- f. He doesn't add salt to his food
- g. He drinks plenty of water

2. Which boy has a healthier lifestyle? Give reasons for your answers

Sipho has a healthier lifestyle: a. His diet includes a variety of foods from all major food groups b. His diet is rich in fibre

- c. His diet is lower in fats
- d. His diet is low in salt
- e. He drinks plenty of water
- f. He is physically active in different ways

3. What are the main problems with diet of the other boy?

- a. Ben eats and drinks too many sugary foods
- b. Ben eats too many fatty foods
- c. Ben doesn't eat fresh fruit and vegetables
- d. Ben's diet is low in fibre
- e. Ben uses too much salt
- f. Ben eats many processed foods

4. What are the main problems with the lifestyle of the other boy?

- a. Ben doesn't have a healthy, balanced diet
- b. Ben doesn't do enough physical activity
- c. Ben doesn't drink enough water

5. What kinds of health conditions or diseases can affect this boy if he doesn't balance his diet and improve his lifestyle?

Ben may be vulnerable to a number of health issues including:

- a. Overweight
- b. Tooth decay
- c. Diabetes
- d. Constipation
- e. Conditions caused by vitamin and mineral deficiencies such as anaemia or rickets



WORKSHEET 3: PROJECT ACTIVITY 2 - HEALTHY EATING IN MY COMMUNITY

1. Ask a member of your community, who is not of the same age group as you to be your interviewee

2. Ask them to recall everything they ate and drank the day before, and write down their answers

3. Ask this person if they know if they suffer from any diet-related illnesses or diseases

4. Using their answers about their food choices, complete the table below

YESTERDAY	Sources of CARBOHYDRATES	Sources of PROTEINS	Sources of FATS	Sources of VITAMINS & MINERALS
Breakfast				
Snacks				
Lunch				
Snacks				
Supper				

1. Do you think this person made healthy food choices?

2. Do you think there are outside factors that influence this person's ability to make healthy eating choices each day? If so, what are they?

3. Are there any South African Food-based Dietary Guidelines that this person needs to follow more closely?



WORKSHEET 4:

LESSON – WHAT IS FOOD PROCESSING?



1. Illustrate a food that you like that is processed in your home

- **a** What ingredients are used to make this food?
- **b** Are these ingredients processed?
- c What methods of food processing are used?
- **d** What are the benefits of processing this food?
- e Do you think there are any disadvantages from processing this food?

2. Illustrate a processed food that you like that your family buys

- **a** What ingredients are used to make this food?
- **b** Are these ingredients processed?
- c What methods of food processing do you think could be used to make this food?
- d What are the benefits of processing this food?
- e Do you think there are any disadvantages from processing this food?

3. Write a list of 5 unprocessed foods that you eat regularly

4. Why do you think it is important to include plenty of unprocessed foods in your diet?



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WORKSHEET 5: CLASSROOM ACTIVITY 4 – UNDERSTANDING FOOD ADDITIVES

- Around the world, government agencies regulate the types and amounts of food additives that manufacturers are allowed to include in their processed food products
- The testing protocols for new food additives are also subject to government regulations
- In South Africa, food manufacturers are required to list any food additives in the Ingredient List on the packaging label

TYPE OF ADDITIVE	FUNCTION OF ADDITIVE	EXAMPLES OF USE IN PROCESSED FOODS
Preservatives	These are substances that are used to stop or to slow down the deterioration of food. Examples are sulphur dioxide, benzoic acid, salt and vinegar.	
Colourants	These are substances that are used to add or restore colour that can be lost through processing, to make the food look more appealing. There are natural colourants such as a red that is extracted from beetroot. There are also artificial colourants known as azo dyes. Tartrazine is an example of an azo dye and some consumers choose not to eat foods that contain this colourant.	
Flavourings	 These are substances that are used to enhance the flavour of products. Flavourings can be either: Synthetic (chemically made) Nature identical (chemically made to be chemically equivalent to the natural flavourings) Natural (extracted from the actual product) 	
Non-nutritive Sweeteners (also sometimes referred to as Artificial Sweeteners)	Some of these are chemically produced substances such as aspartame and sorbitol that are lower in energy or kilojoules than sugar and are used as an alternative to sweeten foods.	
Emulsifiers and stabilisers	These are substances that help prevent the ingredients in a processed food from separating, and are used in many recipes that require the mixing of ingredients that don't usually mix, such as oil and water. Bottled mayonnaise would not be possible without an emulsifier.	



WORKSHEET 6: CLASSROOM ACTIVITY 6 - THE WEB OF LIFE

You can use this example of a bushveld ecosystem used for both classroom activities 6 and 7.

NO.	ELEMENTS OF THE ECOSYSTEM	LINKED TO
1	Sun	All living organisms – plants and animals
2	Soil	All living organisms – plants and animals
3	Air	• All living organisms – plants and animals
4	Water	All living organisms – plants and animals
5	Acacia karoo, a seed- bearing Sweet Thorn tree	 Feeds the soil with nitrogen through its roots Fallen branches, leaves, flowers and seed pods mulch and feed the soil Takes in carbon dioxide and releases oxygen into the air Bees pollinate the flowers while feeding on nectar Weaver birds nest in it A Drongo (bird) hunts the bees visiting the tree Elephant eats the leaves and branches Giraffe eats the topmost leaves and shoots Impala eat the lower leaves and seed pods Warthog eats fallen leaves and seed pods
6	Bees	 Pollinate flowers Have their hive in a tree Make honey that Honey Badgers and Humans eat
7	Weaver bird	 Make their nests of grass in trees Eat grass seeds
8	Drongo (bird)	 Roosts and hunts in trees Eats insects, such as bees and butterflies, and nectar
9	Elephant	 Eats grass, leaves and branches Feeds the soil with its droppings
10	Giraffe	 Eats leaves, pods and twigs Feeds the soil with its droppings
]]	Impala	 Easts grasses and leaves Feeds the soil with its droppings Eaten by Lions and Humans
12	Warthog	 Eats seeds, fruits, leaves, roots and bulbs Feeds the soil with its droppings Eaten by Lions and Humans



NO.	ELEMENTS OF THE ECOSYSTEM	LINKED TO
13	Carissa edulis, the Num-num shrub	 Fruit eaten by Bulbuls (birds) Fruit eaten by humans Humans use its roots as medicine Fallen leaves and fruits mulch and feed the soil Earthworms live in the soil around it
14	Blackeyed Bulbul (bird)	 Roost and nest in trees Eats fruits
15	Earthworms	Aerate the soil with their burrowingFeed the soil with their droppings
16	Mole	 Aerates the soil with it burrowing Feeds the soil with its droppings Eats Earthworms Eaten by Mole Snakes
17	Syzygium cordatum, a fruit-bearing Water Berry Tree	 Fallen branches, leaves, flowers and seed pods mulch and feed the soil Takes in carbon dioxide and releases oxygen into the air Butterflies pollinate its flowers while feeding on nectar Wood Lice live and feed under its bark A Tree Agama (lizard) lives in the tree and feeds on the insects that live and feed there Grey Go-Away birds visit and feed on it fruits Laughing Doves roost in its branches at night A Mole Snake lives in a burrow amongst the trees roots A pair of Brown Snake Eagles nest at the top of the tree and hunt for the Mole Snakes Thicktailed Bushbabies live in a hole in the tree's trunk and feed on its fruit and Wood Lice Porcupine eat the fallen leaves and fruits Lions lie in the tree's shade Humans collect the trees fruit to brew a drink and use its wood
18	Butterfly	 Feeds on the nectar of flowers and pollinates flowers Eaten by insectivorous birds such as Drongo and insectivorous animals such as Tree Agama
19	Wood Lice	Live under the bark of treesEaten by Thicktailed Bushbabies
20	Tree Agama (lizard)	 Lives in trees Eats insects Eaten by Brown Snake Eagle
21	Grey Go-Away bird	 Roost and nest in trees Eats fruits, grass seeds and locusts Germinates seeds from fruit trees in its droppings



NO.	ELEMENTS OF THE ECOSYSTEM	LINKED TO
22	Laughing Dove	Roost and nest in treesEats seedsEaten by Caracal and Humans
23	Mole Snake	 Lives in the soil Eats Earthworms, Moles and Field Mice Eaten by Brown Snake Eagle
24	Brown Snake Eagle	 Roost and nest in trees Eats Mole Snake, Lizards, Field Mice and Locusts
25	Thicktailed Bushbaby	 Live in holes in trees Eats fruit and insects Feeds the soil with its droppings
26	Porcupine	Eats fallen leaves and fruitsEaten by Lions
27	Lion	Eats Impala, Warthogs and PorcupinesFeeds soil with its droppings
28	Humans	 Use wood for warmth, cooking, tools, housing and furniture Use grass for housing and mats Use many plants for medicine Eat fruits, honey and meat
29	Grass	 Protects topsoil Food for Locusts, Weavers, Doves, Field Mice, Elephant and Impala Used by humans for housing and mats
30	Locust	Lives in grassesEats grassesEaten by Honey Badgers and Eagles
31	Field Mouse	Lives in grassesEats grass seedsEaten by Mole Snakes
32	Artemsia afra, Wild Wormwood or Umhloyane or Lengana	• Leaves and stems used by humans to treat many ailments such as coughs, colds, fevers, rashes, wounds, bites and stings
33	Dung Beetle	Breaks down the droppings of large mammals and helps feeds the soil
34	Honey Badger	• Eats fruits, Locusts and honey
35	Caracal	Eats Laughing Doves











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