

# Conservation Lessons

Grades 6/7, Eswatini

In collaboration with:



LESSONS IN CONSERVATION  
SERVING TO SAVE

The Dombeya Conservation and Development Association facilitated the development of these conservation lesson plans, thanks to a generous grant from the UNDP GEF Small Grants Programme.

Lessons in Conservation is an existing non-profit organization, which is developing hands-on conservation lessons for primary school children across the continent.

Thank you to the core collaborators: Lessons in Conservation, as well as RES' Thembelisha Preparatory School, Donna Marucchi and Mbuluzi Game Reserve.

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**Purpose/Aim of these lessons:**

The purpose of these lessons is to excite and encourage learners to embody an eco-friendly and conscious mindset and lifestyle and to create a connection between people, wildlife and the environment.

**How to use this guide:**

This teaching guide was designed to be used as a reference guide to accompany the presentation PDFs. The aim of this guide is to provide context, extra information, and background knowledge to you as the teacher and enable you to teach the lesson to the best of your ability. Extra resource links have also been provided, should further information on a topic be required.

These lessons were designed to be as flexible as possible and fit into your school and schedule. This gives you the option to determine the length of the lessons, these lessons can be half an hour long or an hour long. This teaching guide provides a framework for you to work from. As the teacher, you can pick and choose which activities or examples you would like to focus on within the lessons, and which you would prefer to exclude. The length of the lesson is greatly dependent on how in depth the content is explained and the extent to which you discuss the content with the students. To manage time constraints, certain topics or points can be focussed on while other examples can be worked through quickly or even skipped over. This guide does not include time frames per slide, you as the teacher can decide what works best within the school's schedule/timetable.

These lessons were also designed so that the content can be as simple or in depth/complex as you make it. If your learners have been taught certain topics previously, then you do not have to reteach it in depth. Rather teach new topics in depth and revise content they have been previously taught. The aim behind the lessons is to foster an eco-friendly lifestyle and conservation conscious mindset. Therefore, try not to focus on the theory content of each lesson, but rather on how it applies to conservation as a whole. Learners do not have to remember this content to be able to regurgitate for a test, but rather to help create a love and excitement for conservation and passion for wanting to make the world a better place. You will see in the teaching guide that there are explanations and extra information allocated to a slide for every lesson. The information and explanations are there as a guide to assist you when teaching the lesson to ensure the objectives of every lesson are met. You do not have to use all the information as the information is also there to assist with your background knowledge and understanding before you teach the topics/lessons.

**Lesson delivery:**

It is important to note that the approach to teaching these lessons is not to ensure that students retain facts, but more so that they understand the fundamental importance of conservation and the role they play within the bigger picture. Approaching lessons as if you are simply sharing your passion for conservation and ecology, rather than "teaching" in a classroom, proves to be highly effective in keeping students engaged while promoting an interest in, and deeper understanding of, the content taught.

Preparation, energy and enthusiasm form the cornerstones for effective and impactful lessons. Due to the way we have set up these lessons, lessons tend to be quite chaotic. In order to teach effectively, preparation and detailed planning is fundamentally important. These lessons are tailored to various geographic areas and cultural contexts where possible. Thorough preparation ensures that you are comfortable and confident with the content of the lessons. Confidence in turn promotes adaptability, which is arguably the most necessary teaching competency for these types of lessons. Confidence allows you to be more adaptable to the needs of the students and allows you to think on your feet in terms of examples/demonstrations, etc. This, in turn, also encourages participation from the students.



The biggest factor in these lessons is energy and enthusiasm. These lessons should not feel like normal school lessons, but rather a fun, more informal and engaging feel. In order to keep the energy levels high during lessons, the lessons make use of many activities and demonstrations, where we try to get them out of the classroom as much as possible. The goal with these activities and demonstrations are to practically explain the content taught and form connections/associations in the learners' minds so that they better understand the content. This may seem disruptive, but we have found that it successfully allows the learners to focus more intently on the message being relayed, as well as meaningfully engage in the lesson itself.

This guide was designed to serve as a reference and allow for creative freedom. Please do not feel limited to the content of this guide. If you think of new activities or explanations that the students will love and will better their understanding, please feel free to use those instead. Again, the goal is to spark a love for conservation within the hearts of the students you teach, how you do that is entirely up to you as the teacher.

If you have any questions, concerns or feedback on this guide, any of the content, demonstrations or activities, or ideas to improve our lessons, please do not hesitate to contact us. Educating the youth of Africa should be a collaborative effort, and we cannot do it on our own. Please feel free to contact us at:

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We hope you enjoy teaching these lessons as much as we do, and wish you all the best.

The LiC Team.

# Lesson 1: Continuing your conservation journey

## Lesson Summary:

This lesson introduces the concept of conservation, its importance, and how it is being threatened at the moment. It focuses on ways that we can effectively be more involved in saving our planet. It also includes how conservation affects each individual.

## Lesson Objectives:

- Learners have an appreciable understanding of what conservation is and why it is important.
- The three pillars of conservation are identified (people, animals, environment), and solidified with practical examples.
- Learners gain an understanding of what threats there are to our Earth and ways that we can work towards conserving Earth.

## Core Competencies Grade 6-7

### Natural Sciences:

- Ecosystems and food webs.

### Life Skills:

- Caring for animals.
- Caring for people.
- Nation-building and cultural heritage.

### Social Sciences:

- Climate and vegetation around the world.
- Population – why people live where they do.

## Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

## Lesson Materials:

1. Pre-surveys
2. Pens
3. Knife
4. Apple
5. LiC branded shopping bags
6. Fabric paint
7. Water cups
8. Paint brushes
9. Paint holders

### ***Introduction:***

Slide 2	<p>Hand out and complete pre-surveys.</p> <ul style="list-style-type: none"><li>● The pre-surveys are not a test. It is important to create a relaxed environment before they start the pre-surveys. The aim of the surveys is to measure how helpful and impactful the lessons are.</li><li>● If learners do not know the answers to questions it is fine. They must not be made to feel as though it is a test and they have to know the answers.</li><li>● A good initial ice-breaker before pre-surveys is to go around the class asking what each learner's favourite animal is and to make the sound of that animal.</li></ul>
Slide 3	<p>Show Black Bean video and discuss who Lessons in Conservation is and what the organisation does.</p> <ul style="list-style-type: none"><li>● This video highlights that anyone can be a conservation hero and the impact a local hero can have.</li><li>● Video length: 5 minutes 6 seconds.</li></ul>
Slide 4	<p>Introduce new lesson topic – continuing your conservation journey.</p> <ul style="list-style-type: none"><li>● Ask learners what they think of when they hear the term “conservation” and what it means to them.</li><li>● Ask learners what they think the “natural world” is?</li></ul>

### ***Demonstration:***

Slide 5	<p>Where can we live?</p> <ul style="list-style-type: none"><li>● Ask students if they can recall what percentage of the earth is water? (about 75% is water, 25% is land).<ul style="list-style-type: none"><li>○ About 71% is water and 29% land is more accurate, but for the purpose of the demonstration to match the quarters of the apple cut, 75% and 25% is the most accurate.</li></ul></li><li>● Ask students how much of the land they think we can live on?</li></ul> <p><i>Apple demonstration</i></p> <ul style="list-style-type: none"><li>● Show the apple as a whole, representing Earth.</li><li>● Cut the apple into quarters and show them that three quarters are water (we can't live there), and one quarter is land.</li><li>● Cut the remaining quarter in half again.<ul style="list-style-type: none"><li>○ Show the students that one eighth is made up of mountains and ice – temperatures and land that we cannot live on.</li><li>○ The remaining eighth is for us to live on – one eighth out of the whole apple.</li><li>○ Ask learners why they think this is important and what impact it has?<ul style="list-style-type: none"><li>▪ Not a lot of space left, have to take care of the space we have left.</li></ul></li></ul></li></ul>
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### ***Content:***

Slide 6	<p>What is conservation?</p> <ul style="list-style-type: none"><li>● Use probing questions to guide the learners to answer based on all three pillars of conservation (people, animals, environment).</li><li>● Conservation is the act of protecting Earth's natural resources for current and</li></ul>
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	<p>future generations.</p> <ul style="list-style-type: none"> <li>● Or simply, protecting our world so that our children can enjoy it too.</li> <li>● Conservation is the sustainable use of nature by humans.</li> </ul>
Slide 7-8	<p>Why do we need to protect the earth?</p> <ul style="list-style-type: none"> <li>● The earth provides for us in many ways.</li> <li>● Ask the learners if they can think of ways that the earth provides for us?</li> <li>● Have a discussion based on the learners' responses.</li> </ul> <p>What resources does the Earth give us? What do we need to conserve?</p> <ul style="list-style-type: none"> <li>● Air <ul style="list-style-type: none"> <li>○ From plants and trees that we breathe.</li> </ul> </li> <li>● Water <ul style="list-style-type: none"> <li>○ Oceans, rivers, rain.</li> </ul> </li> <li>● Food <ul style="list-style-type: none"> <li>○ Plants and livestock that we eat.</li> </ul> </li> <li>● Ecosystems <ul style="list-style-type: none"> <li>○ How living and nonliving things work together to survive on earth.</li> </ul> </li> <li>● Earth's natural resources include air, minerals, plants, soil, water and animals. Conservation is the care and protection of these resources so that they can persist for future generations. It includes maintaining diversity of species, genes and ecosystems, as well as functions of the environment, such as nutrient cycling.</li> </ul>
Slide 9	<p>Why is conservation important?</p> <ul style="list-style-type: none"> <li>● Protects animals and plants</li> <li>● Job creation</li> <li>● Tourism</li> <li>● Money</li> </ul>

**Video:**

Slide 10-11	<p>Show video on Earth's time running out</p> <ul style="list-style-type: none"> <li>● Discuss with learners what they think the video means? What is it trying to tell them? How does it make them feel?</li> <li>● Takeaway message from the video: we are damaging our earth. <ul style="list-style-type: none"> <li>○ The Earth's resources are running out fast and nature is suffering because of it.</li> <li>○ We need to treat our Earth with respect. <ul style="list-style-type: none"> <li>▪ Think of how you treat your home – you clean it, make sure it's neat and tidy and functioning correctly.</li> </ul> </li> </ul> </li> <li>● Video length: 4 minutes 23 seconds</li> </ul>
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**Content continued:**

Slide 12-13	<p>Ways you can conserve:</p> <ul style="list-style-type: none"> <li>● Planting indigenous species in your garden or area.</li> <li>● Don't litter <ul style="list-style-type: none"> <li>○ Pick up litter</li> <li>○ Throw your trash away in the bin</li> <li>○ Tell others</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>● Reduce plastic use <ul style="list-style-type: none"> <li>○ Use reusable shopping bags</li> </ul> </li> <li>● Turn off lights and water when you are not using them</li> </ul>
Slide 14	<p>How does this affect me?</p> <ul style="list-style-type: none"> <li>● We are all connected. Small actions done every day by millions of people add up. <ul style="list-style-type: none"> <li>○ If one person drops their paper on the floor, it's just one paper, but if a million people do it, can you imagine how many papers would be on the floor? Who would clean it? If everyone threw their paper in the bin, there would be no litter.</li> </ul> </li> <li>● Certain actions can be very harmful to plants and animals, which can then become harmful to us. <ul style="list-style-type: none"> <li>○ Recap with learners how plants and animals help us, and how we would be affected if they had to disappear.</li> </ul> </li> <li>● Your habits and actions affect everything either negatively or positively. <ul style="list-style-type: none"> <li>○ Ask learners what are some things that we can do that will have a positive and lasting influence on Earth.</li> </ul> </li> </ul>

***Conclusion:***

Slide 15	<p>Take home messages</p> <ul style="list-style-type: none"> <li>● Recap what conservation is, including the three pillars.</li> <li>● Recap how much space we have to live on Earth and what threats there are reducing that space.</li> <li>● Ask learners what the Earth provides for us and what we provide for the Earth.</li> <li>● Recap how we can help to conserve the Earth and its future.</li> <li>● “Small acts, when multiplied by millions of people, can transform the world” – Howard Zinn</li> </ul>
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***Closing activity: Paint a bag***

Slide 16	<p>Each learner receives a tote bag and some paint to paint their own reusable bag.</p> <ul style="list-style-type: none"> <li>● Some stencils provided to trace or learners may create their own design, trace their hand, etc.</li> </ul>
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*Image: Learner painting her tote bag.*

**Workbook explanation:**

The workbook has 3 questions for the learners to answer based on the first lesson as well as a colouring page.

**Worksheet answers:**

1. *Why do we need to protect the Earth's resources?*

Possible Answers	
<ul style="list-style-type: none"> <li>● To have food to eat (crops, fruit, animals)</li> </ul>	<ul style="list-style-type: none"> <li>● To have water to drink and clean with</li> </ul>
<ul style="list-style-type: none"> <li>● To have clean air to breathe</li> </ul>	<ul style="list-style-type: none"> <li>● To have raw materials (wood) to build</li> </ul>
<ul style="list-style-type: none"> <li>● To have plants for medicine</li> </ul>	<ul style="list-style-type: none"> <li>● To have wildlife</li> </ul>
<ul style="list-style-type: none"> <li>● To have a place to live</li> </ul>	<ul style="list-style-type: none"> <li>● To have resources like oil and coal</li> </ul>

2. *How do you think you can conserve more at school and at home?*

Possible Answers	
<ul style="list-style-type: none"> <li>● Do not litter</li> </ul>	<ul style="list-style-type: none"> <li>● Plant indigenous species</li> </ul>
<ul style="list-style-type: none"> <li>● Reduce plastic use</li> </ul>	<ul style="list-style-type: none"> <li>● Recycle when you can</li> </ul>



<ul style="list-style-type: none"> <li>● Turn off water when you don't need it</li> </ul>	<ul style="list-style-type: none"> <li>● Turn off lights when you don't need them</li> </ul>
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3. *What do you think will happen if we don't look after the Earth?*

Possible Answers	
<ul style="list-style-type: none"> <li>● We won't have food (fruit, crops, animals)</li> </ul>	<ul style="list-style-type: none"> <li>● We won't have clean water to drink</li> </ul>
<ul style="list-style-type: none"> <li>● We won't have clean air to breathe</li> </ul>	<ul style="list-style-type: none"> <li>● We won't have raw materials (wood) to build</li> </ul>
<ul style="list-style-type: none"> <li>● We won't have plants for medicine</li> </ul>	<ul style="list-style-type: none"> <li>● We won't have wildlife</li> </ul>
<ul style="list-style-type: none"> <li>● We won't have a safe place to live</li> </ul>	<ul style="list-style-type: none"> <li>● We won't have resources like oil and coal</li> </ul>

**Extra Resources:**

- *Conservation:* <https://education.nationalgeographic.org/resource/conservation/>
- *Conservation:* <https://www.britannica.com/science/conservation-ecology>
- *Understanding conservation and its importance:* <https://www.nwf.org/Educational-Resources/Wildlife-Guide/Understanding-Conservation#:~:text=By%20conserving%20wildlife%2C%20we're,by%20environmental%20and%20human%20influences.>
- *Why conserve:* <https://www.conservationhandbooks.com/why-conserve/>
- *Wildlife Conservation:* <https://www.awf.org/wildlife-conservation>
- *How to conserve:* <https://kids.frontiersin.org/articles/10.3389/frym.2019.00084>
- *Daily ways to conserve:* <https://www.masterclass.com/articles/how-to-conserve-natural-resources>

## Lesson 2: Be part of the circle of life

### Lesson Summary:

This lesson introduces the concept of teamwork, how elements in nature work together and the reasons why they do. Symbiosis, as well as the five types of symbiotic relationships are discussed. The lesson then discusses food chains and the ecosystem, including what they are, why they are important and how they could be negatively affected. The topics of endangered species and extinction are then discussed further, as well as the consequences thereof.

### Lesson Objectives:

- Learners understand the concept of teamwork within nature and can give examples of how animals work together for a purpose.
- Learners can explain the concept of symbiosis and give examples of how different organisms work together in different ways.
- Learners can describe and give an example of a food chain, as well as discuss the importance of each component and the devastating ripple effects of one component being removed from the food chain..
- Learners understand the concept of an ecosystem and that it is made up of biotic and abiotic components, and how each is equally important for the survival of Earth.

### Core Competencies Grade 6-7

Natural Sciences:

- Nutrients in food
- Ecosystems and food web

Life Skills:

- Caring for animals
- Caring for people

Social Sciences:

- Climate and vegetation around the world

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. String

### Introduction:

Slide 1	<p>Recap previous lesson.</p> <ul style="list-style-type: none"><li>● What is conservation?<ul style="list-style-type: none"><li>○ Protecting the world so that our children can enjoy it too.</li><li>○ People, animals, environment</li></ul></li><li>● Ways that we can conserve?<ul style="list-style-type: none"><li>○ Plant indigenous plants, recycle, use reusable bags and less plastic, etc.</li></ul></li></ul>
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**Content:**

Slide 2	<p>Introduce topic – how we can work together with nature around us</p> <ul style="list-style-type: none"> <li>● Discuss how things work together in nature to help each other, survive and thrive. <ul style="list-style-type: none"> <li>○ Use the example of bees: the queen bee lays lots of eggs to ensure a growing colony, the drones mate with the queen, the worker bees do everything else (guard the hive and honey, collect nectar, produce honey, etc.). They need each other and help each other.</li> <li>○ Ask learners to think of other things in nature that work together.</li> </ul> </li> <li>● Introduce the concept of teamwork and ask the learners what they think of when they hear the word “teamwork”.</li> </ul>
Slide 3	<p>Why do you think animals work together?</p> <ul style="list-style-type: none"> <li>● Ask the learners this question and discuss some responses.</li> <li>● <i>Demonstration:</i> Ant carrying (if time permits). <ul style="list-style-type: none"> <li>○ <u>Step 1:</u> all learners must stand in a big circle.</li> <li>○ <u>Step 2:</u> select one individual to be the “food” the ants will carry, and they must lay down on their back on the floor.</li> <li>○ <u>Step 3:</u> select one individual to pick up the “food” with only 1 finger on each hand.</li> <li>○ <u>Step 4:</u> Select one more individual to help (still only use one finger on each hand).</li> <li>○ <u>Step 5:</u> All learners must help pick up using only one finger on each hand, and they will manage to lift the “food”.</li> <li>○ This demonstrates how teamwork makes life easier, and we need help from one another.</li> </ul> </li> </ul>
Slide 4	<ul style="list-style-type: none"> <li>● Food <ul style="list-style-type: none"> <li>○ Some animals hunt in packs (e.g. cheetahs, lions). They work together to stalk, chase and tire out their prey.</li> </ul> </li> <li>● Protection <ul style="list-style-type: none"> <li>○ “Safety in numbers” animals within a pack are less likely to be targeted than animals that are alone. Ask the learners why they think that is the case and discuss their responses.</li> </ul> </li> </ul>
Slide 5	<p>Symbiosis</p> <ul style="list-style-type: none"> <li>● Any type of close and long-term biological interaction between two different biological organisms.</li> <li>● There are 5 types of symbiotic relationships: <ul style="list-style-type: none"> <li>○ Mutualism <ul style="list-style-type: none"> <li>▪ Both organisms benefit.</li> </ul> </li> <li>○ Commensalism <ul style="list-style-type: none"> <li>▪ One organism benefits while the other is neither helped nor harmed.</li> </ul> </li> <li>○ Predation <ul style="list-style-type: none"> <li>▪ Members of one species (predator) consume members of another species (prey)</li> </ul> </li> <li>○ Parasitism <ul style="list-style-type: none"> <li>▪ The parasitic organism benefits at the expense of the host.</li> </ul> </li> <li>○ Competition <ul style="list-style-type: none"> <li>▪ Neither organism benefits.</li> </ul> </li> </ul> </li> <li>● For each type, ask the learners what they think it means before each one is discussed in the following slides.</li> </ul>
Slide 6	<ul style="list-style-type: none"> <li>● Mutualism</li> </ul>



	<ul style="list-style-type: none"> <li>○ Both organisms (living things) benefit from the relationship.</li> <li>○ E.g. Oxpeckers and Rhino – the rhino carries ticks and other parasites on their bodies that the oxpeckers eat off the rhino.</li> <li>● Commensalism <ul style="list-style-type: none"> <li>○ One organism benefits and the other is unaffected.</li> <li>○ E.g. Cattle and Cattle egret – the cows walk through the grass and cause the insects to jump up so that the egrets can eat them.</li> </ul> </li> <li>● Parasitism <ul style="list-style-type: none"> <li>○ One organism benefits and the other is harmed.</li> <li>○ E.g. Ticks on dogs – the tick feeds off the dog’s blood, while the dog loses blood and may gain diseases from the ticks.</li> </ul> </li> </ul>
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**Video:**

Slide 7	Show video explaining food chains. <ul style="list-style-type: none"> <li>● Video length: 3 minutes 3 seconds</li> </ul>
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**Content continued:**

Slide 8	<p>The food chain</p> <ul style="list-style-type: none"> <li>● Ask learners what they think a food chain is. <ul style="list-style-type: none"> <li>○ A series of organisms where each depends on the next as a source of food.</li> <li>○ Each organism gains energy from what it consumes, and transfers the energy to the next organism.</li> <li>○ All food chains begin with the sun as the source of energy because all plants need the sun to grow.</li> <li>○ Sun provides energy for the plant (producer) to grow.</li> <li>○ Primary consumers eat the plants and gain energy from them.</li> <li>○ Secondary consumers eat the primary consumers and gain energy from them.</li> </ul> </li> <li>● Ask learners what they think will happen if one of the components of a food chain was removed? What would happen to the following organism? <ul style="list-style-type: none"> <li>○ E.g. If the Impala was removed, there would be no food for the lions so the lions would starve and die off, the grass would also be overgrown causing an imbalance in the environmental area.</li> </ul> </li> </ul>
Slide 9	<p>What is an ecosystem?</p> <ul style="list-style-type: none"> <li>● A geographic area where plants, animals and other organisms, as well as weather and landscape, work together to form a bubble of life.</li> <li>● Ask the learners to think of what components could be found in an organism. <ul style="list-style-type: none"> <li>○ Accept all answers at this stage, allow the learners to think and explore their ideas before the content is covered on the next slide.</li> </ul> </li> </ul>
Slide 10	<p>Different parts of an ecosystem that fit together</p> <ul style="list-style-type: none"> <li>● Abiotic – things that are non-living <ul style="list-style-type: none"> <li>○ E.g. rocks, water, air, wood</li> </ul> </li> <li>● Biotic – things that are living <ul style="list-style-type: none"> <li>○ E.g. animals, insects, trees, plants</li> </ul> </li> <li>● Ask the learners to give examples of abiotic and biotic components based on their previous answers for slide 9.</li> </ul>

**Activity:**

Slide 11	<p>Making a food web activity with string.</p> <ul style="list-style-type: none"> <li>- Step 1: Learners need to all find a living organism (leaf, insect, etc.)</li> </ul>
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- Step 2: Then they all line up holding their item.
- Step 3: The teacher will roll out the string. Learners all need to hold onto the same strand of string.
- Step 4: The string should be loose between each learner.
- Step 5: The learners must then get mixed around so the string forms a web-like pattern.
- Step 6: Move one learner and if the others feel the string pulling they have to move with the string. Repeat this with different learners so they can see how everything is interconnected.



*Image: Learners standing in a line with the string before making the food web.*



*Image: Everyone jumbling up to make the food web.*

**Content continued:**

Slide 12	<ul style="list-style-type: none"><li>● All the components in the ecosystem have to interact in order to survive – they all need each other and cannot survive on their own. They depend on each other.</li><li>● Every organism forms a link in a chain. If one species goes extinct, the system cannot function.<ul style="list-style-type: none"><li>○ This is why conservation is so important.</li><li>○ Ask the learners what extinct means to ensure their understanding.</li></ul></li></ul>
Slide 13	<p>Endangered species</p> <ul style="list-style-type: none"><li>● What is a species?<ul style="list-style-type: none"><li>○ A species can be an animal, a tree, a coral, a fungus, a human, an insect, or any form of life on this planet.</li></ul></li><li>● What is an endangered species?<ul style="list-style-type: none"><li>○ A species at risk of extinction.</li></ul></li><li>● How to decide if a species is endangered or not?<ul style="list-style-type: none"><li>○ Experts decide when a species is endangered or not. They assess if the species habitat is disappearing, how many of the species are left, and how quickly the number of species is decreasing.</li></ul></li><li>● There are three categories of endangered species:<ul style="list-style-type: none"><li>○ Critically endangered – a species considered to be facing an extremely high risk of extinction in the wild.</li><li>○ Endangered – a species considered to be facing a very high risk of extinction in the wild.</li><li>○ Vulnerable – a species considered to be facing a high risk of extinction in the wild.</li></ul></li></ul>
Slide 14	<p>Extinction</p> <ul style="list-style-type: none"><li>● Ask the learners what extinction means?<ul style="list-style-type: none"><li>○ Discuss some of their answers.</li><li>○ Extinction is the complete disappearance of a species from Earth.</li></ul></li><li>● If species are endangered and they keep disappearing due to habitat loss or poaching, then they could become extinct.</li><li>● Some animals are considered extinct in the wild. This means that the only surviving members of the species live in captivity, like in a zoo.</li></ul>

**Conclusion:**

Slide 15	<p>Take home messages</p> <ul style="list-style-type: none"><li>● Recap what conservation is, including the three pillars.</li><li>● Recap what an ecosystem is, including biotic and abiotic elements.</li><li>● The earth is important and provides us with many useful benefits.<ul style="list-style-type: none"><li>○ Recap what earth provides for us<ul style="list-style-type: none"><li>▪ Land to grow plants and food, water to drink, air to breathe, animals, etc.</li></ul></li></ul></li><li>● Just like in nature, we need to work together to save our earth.<ul style="list-style-type: none"><li>○ Teamwork!</li></ul></li></ul>
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**Workbook explanation:**

The workbook has a “Letter to Humanity” activity. Within this activity the learners need to imagine they are Earth and write down what they want to say to humans.

**Worksheet answers:**



Possible Topics:

- Why we need to protect the Earth
- How to protect the Earth
- Why the Earth could be sad
- What will happen if we don't look after the Earth

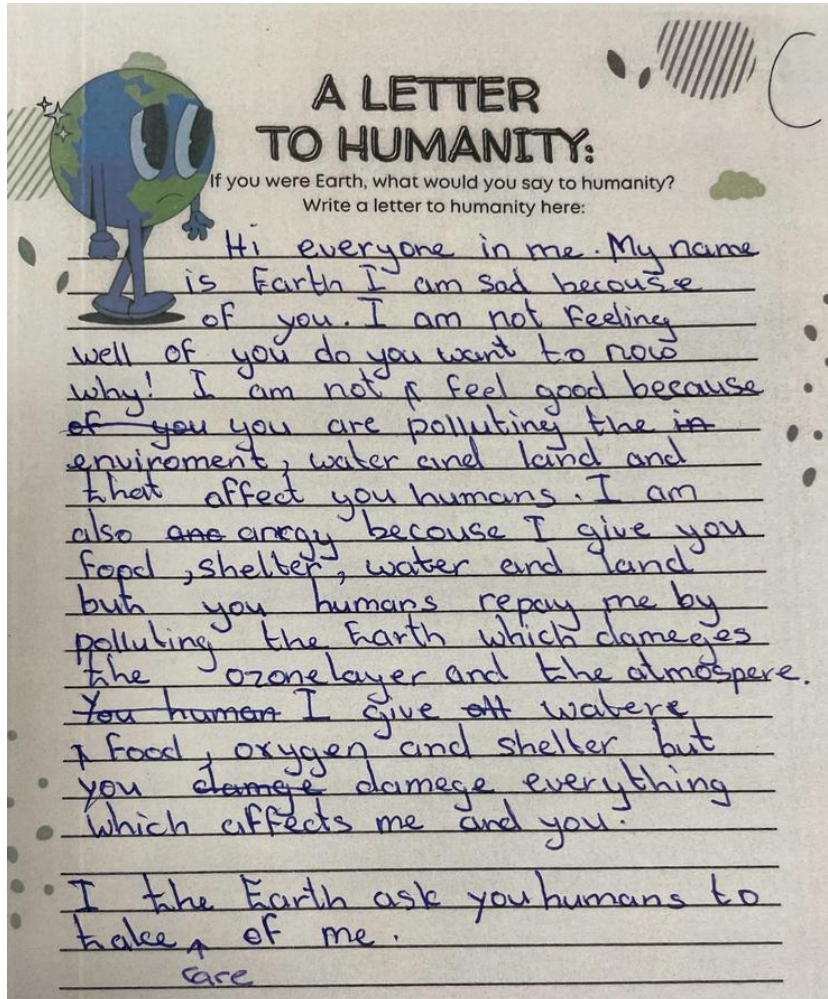


Image: Photograph of a learner's letter to humanity.

#### Extra Resources:

- *Symbiotic Relationships:* <https://education.nationalgeographic.org/resource/symbiosis-art-living-together/>
- *Food chains:* [https://wwf.panda.org/discover/knowledge\\_hub/teacher\\_resources/webfieldtrips/food\\_chains/](https://wwf.panda.org/discover/knowledge_hub/teacher_resources/webfieldtrips/food_chains/)
- *Food Chain: Definition, Types, Importance & Examples:* <https://sciencing.com/food-chain-definition-types-importance-examples-with-diagram-13719239.html>
- *Importance of food chains in an ecosystem:* <https://byjusexamprep.com/upsc-exam/what-is-the-importance-of-food-chain-in-ecosystem>

#### References:

- <https://www.worldwildlife.org/pages/what-does-endangered-species-mean>



## Lesson 3: Soaring to new heights

### Lesson Summary:

This lesson introduces the topic of birds, how they differ from mammals and the mechanisms that enable them to fly. How birds aid us is also discussed. The concept of migration is introduced, as well as some of the challenges and outcomes of migration. The migration pattern of two species, the Amur falcon and Bar-tailed godwit, are discussed in more detail.

### Lesson Objectives:

- Learners are able to explain the mechanisms that birds have that allow them to fly, and how this is important for their ecological function.
- Learners can describe what migration is, discuss migration patterns and some of the challenges faced with migration due to human intervention.
- Learners are able to identify how birds help us and how we can protect and preserve them.

### Core Competencies Grade 6-7

Social Sciences:

- Map skills

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Bird identification books
2. 2 x 500ml water bottles (one filled with water and one empty)

### Introduction:

Slide 1	<p>Recap from previous lesson</p> <ul style="list-style-type: none"><li>• Ask learners how things work together in nature, can they recall examples?<ul style="list-style-type: none"><li>○ e.g. Oxpecker and Rhino, Cattle and Cattle egret.</li></ul></li><li>• What is a food chain?<ul style="list-style-type: none"><li>○ A series of organisms where each depends on the next as a source of food. Each organism gains energy from what it consumes, and transfers the energy to the next organism.</li></ul></li><li>• What is an ecosystem?<ul style="list-style-type: none"><li>○ A geographic area where plants, animals and other organisms, as well as weather and landscape, work together to form a bubble of life.</li></ul></li></ul>
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### Content:

Slide 2	<p>Introduce new lesson topic – birds</p> <ul style="list-style-type: none"><li>• Ask learners how they think birds are able to fly – let them lead the discussion.<ul style="list-style-type: none"><li>○ Ask how birds are different from mammals to give the learners some</li></ul></li></ul>
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	<p>ideas.</p> <ul style="list-style-type: none"> <li>● Birds have feathers that join together to form wings.</li> <li>● Birds have very strong muscles to flap their wings <ul style="list-style-type: none"> <li>○ The harder they are able to flap their wings, the more power they will have and the easier they can fly.</li> </ul> </li> </ul>
Slide 3	<ul style="list-style-type: none"> <li>● Birds have tail feathers that provide stability and direction while they are in the air. <ul style="list-style-type: none"> <li>○ Ask the learners if they can think of something that humans have made that is modelled after birds. <ul style="list-style-type: none"> <li>▪ Aeroplanes, helicopters, paper planes</li> </ul> </li> </ul> </li> </ul>
Slide 4	<ul style="list-style-type: none"> <li>● Birds have hollow bones so that their skeletons are lighter so that they can fly more easily. <ul style="list-style-type: none"> <li>○ Ask the learners what hollow means to ensure their understanding.</li> <li>○ Explain the term “pneumatic avian bone” <ul style="list-style-type: none"> <li>▪ Pneumatic = full of air</li> <li>▪ Avian = bird</li> </ul> </li> </ul> </li> <li>● <i>Demonstration: Weight of bones</i> <ul style="list-style-type: none"> <li>○ <u>Step 1:</u> Call a volunteer learner up to the front of the class.</li> <li>○ <u>Step 2:</u> Learner holds one water bottle in each hand (one empty and one filled with water).</li> <li>○ <u>Step 3:</u> Learner moves their arms up and down, imitating the flapping of birds wings, for as long as they can until they get tired.</li> <li>○ <u>Step 4:</u> Call another learner up and repeat the activity.</li> <li>○ Can repeat with a few more learner’s, depending on time available.</li> <li>○ Aim of the demonstration is for the learners to visualise how the arm holding the filled water bottle moves slower than the arm holding the empty one. The learner who is moving their arms also feels the difference in weight and struggles to move the arm holding the filled bottle compared to the empty one.</li> <li>○ The empty bottle represents the hollow bones of birds and how they are adapted to make flying easier.</li> </ul> </li> </ul>
Slide 5-6	<p>Birds can fly far</p> <ul style="list-style-type: none"> <li>● Ask the learners what they think migration is. <ul style="list-style-type: none"> <li>○ Seasonal movement between breeding grounds and feeding grounds.</li> <li>○ This means that during different seasons, birds will fly to different areas for different purposes.</li> </ul> </li> <li>● Ask the learners what the collective noun for a group of birds is called. <ul style="list-style-type: none"> <li>○ A flock of birds.</li> </ul> </li> <li>● Explain that most birds migrate in big groups or flocks.</li> <li>● Ask the learners if they have ever seen a flock of birds flying in the sky and what shape / pattern they fly in when in a group <ul style="list-style-type: none"> <li>○ A “V” formation so that they can follow the leader more easily.</li> </ul> </li> </ul>

**Video:**

Slide 7	<p>Show video on migration and how humans are negatively affecting migrations.</p> <ul style="list-style-type: none"> <li>● Ask the learners what they learnt from the video.</li> <li>● Ask the learners to identify challenges from the videos that birds have to face during migration.</li> <li>● Video length: 3 minutes 49 seconds.</li> </ul>
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**Content continued:**

Slide 8	What are some of the challenges for migration of birds? Discuss each of the following
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	<p>points with the learners</p> <ul style="list-style-type: none"> <li>● Landscape change - changes the environment that the bird is used to (e.g. if a bird likes to live in tall trees but those trees are removed, then where will the bird live).</li> <li>● Pesticides - dangerous / toxic for the birds, especially the fruit they eat off plants.</li> <li>● Habitat loss - less space for the birds to live.</li> <li>● Disorientation from light pollution - birds can't see properly and can therefore get hurt while flying.</li> <li>● Structure collision - birds can get hurt.</li> </ul> <p>How do birds help us? Discuss how each of these are done.</p> <ul style="list-style-type: none"> <li>● Insect control - birds eat insects.</li> <li>● Pollination - birds transfer pollen from one flower to another as they sit on different plants to eat or relax.</li> <li>● Seed dispersal - birds knock off the seeds from the branches while they eat, where they land in the soil below and begin to germinate; seeds get stuck on their feathers then fall off at another location; birds eat delicious fruits but don't digest the seeds so they come out in their droppings at a different location.</li> </ul> <p>How can we help birds?</p> <ul style="list-style-type: none"> <li>● Go through the activity on page 15-16 of the workbook on how to make a bird feeder.</li> <li>● Discuss with the class how making/having a bird feeder can help birds.</li> </ul>
Slide 9	<p>Amur falcon</p> <ul style="list-style-type: none"> <li>● Discuss the migration pattern of the Amur falcon <ul style="list-style-type: none"> <li>○ Migrate from breeding grounds in eastern Asia (Russia and China), travels west through India and crosses the Arabian Sea to wintering grounds in southern Africa.</li> <li>○ They travel about 22 000 km, which is the longest sea crossing of any raptor (a carnivorous bird).</li> <li>○ They need to keep up their energy along the way of this long journey, so they feed dragonflies that follow a similar migration pattern over the Arabian Sea.</li> </ul> </li> </ul>
Slide 10	<p>Bar-tailed godwit</p> <ul style="list-style-type: none"> <li>● Discuss the migration pattern of the Bar-tailed godwit <ul style="list-style-type: none"> <li>○ They migrate from New Zealand northwards for about 10 000 km to the Yellow Sea, which is situated between China and Korea. This takes about 6-8 days!</li> <li>○ They then travel to their breeding grounds in Alaska, where they remain for about two months.</li> <li>○ They then leave Alaska and travel about 11 000 km across the Pacific Ocean back to New Zealand, where they settle in their non-breeding grounds. This is the longest flight stretch recorded for a land bird!</li> <li>○ The total trip covers about 29 000 km!</li> </ul> </li> </ul>

**Activity:**

Slide 11	Let's identify some birds.
Slide 12	<ul style="list-style-type: none"> <li>● Page 13 from the learners' workbook to show how to identify birds. <ul style="list-style-type: none"> <li>○ Explain different ways to identify a bird.</li> <li>○ e.g. habitat, size, colour.</li> <li>○ Explain the different physical features to help identify</li> <li>○ e.g. shape of the beak shows what they eat, how their legs look can show land or water birds.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>● <i>Bird Identification Activity:</i> <ul style="list-style-type: none"> <li>○ <u>NOTE:</u> This activity takes a long time! Allocate at least 30 mins for this activity. Do not have to go through all the bird pictures if time is too limited, can pick a few and leave the rest.</li> <li>○ Learners need to break into groups to identify the bird together.</li> <li>○ You can give them some clues if they are struggling.</li> <li>○ Once they have the answer they must put up their hands so you can tell them if they are correct or not.</li> <li>○ When they tell you which bird it is they must be able to explain how they were able to identify the bird e.g. the bird has green wings and a red eye so we know it is this bird.</li> </ul> </li> </ul>
Slide 13	Dideric Cuckoo
Slide 14	African Jacana
Slide 15	Egyptian Goose
Slide 16	Red-Winged Starling
Slide 17	Malachite kingfisher
Slide 18	African Fish Eagle
Slide 19	Barn Owl
Slide 20	Hadada ibis
Slide 21	Pied Crow
Slide 22	African Paradise Flycatcher
Slide 23	Lilac-breasted roller



*Image: Learner pointing out how he identified the bird.*



*Image: Learners using a bird book to identify birds.*

### Conclusion:

Slide 23	<p>Take home message</p> <ul style="list-style-type: none"><li>● Recap how birds are able to fly<ul style="list-style-type: none"><li>○ Feathers, wings, tail, hollow bones</li></ul></li><li>● Recap what migration is<ul style="list-style-type: none"><li>○ Seasonal movement between breeding and feeding grounds.</li></ul></li><li>● Birds help us with insect control, pollination and seed dispersal.</li></ul>
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### Workbook explanation:

The workbook has a “how to” for the learners to make their own bird feeder.

### Extra Resources:

- *Why learn about birds?:* <https://www.birdpop.org/pages/whyStudyBirds.php#:~:text=But%20perhaps%20the%20most%20important,on%20which%20we%20depend%20function>
- *Migratory Birds:* <https://www.birdlife.org.za/old-navigation/conservation/migratory-birds/#:~:text=Migratory%20birds%20travel%20very%20long,used%20by%20birds%20for%20refuelling>.
- *General bird facts:* <https://www.funkidslive.com/learn/top-10-facts/top-10-facts-about-birds/>

### References:

- Slide 9: <https://www.worldmigratorybirdday.org/2017/species/amur-falcon>
- Slide 10: <http://datazone.birdlife.org/sowb/casestudy/the-bar-tailed-godwit-undertakes-one-of-the-avian-worlds-most-extraordinary-migratory-journeys->

## Lesson 4: Inspect the insects

### Lesson Summary:

This lesson is about the variety of insects that we have on Earth and why they are so important. The differences of how insects breathe and function are discussed, followed by how the large biodiversity of insects is so important for our ecosystems and food webs. Specific insects, their functions and importance are discussed, such as bees and dung beetles.

### Lesson Objectives:

- Learners demonstrate an understanding of the term “diversity”.
- Learners are able to describe how insects breathe and are helpful to us and other animals, as well as their importance within the food chain/web and ecosystem.
- Learners demonstrate a good understanding of bees, their role in the environment and how they are helpful to us and other animals.
- Learners demonstrate a good understanding of dung beetles, their role in the environment and how they are helpful to us and other animals..

### Core Competencies Grade 6-7

Life Skills:

- Caring for animals

Natural Sciences:

- Ecosystems and food webs

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. A3 cardboard for poster
2. Stationery for poster

### Introduction:

Slide 1	Recap previous lesson <ul style="list-style-type: none"><li>● How are birds able to fly?<ul style="list-style-type: none"><li>○ Feathers, wings, tail, hollow bones.</li></ul></li><li>● What is migration?<ul style="list-style-type: none"><li>○ Seasonal movement between breeding and feeding grounds.</li></ul></li><li>● How can birds help us?<ul style="list-style-type: none"><li>○ Birds help us with insect control, pollination and seed dispersal.</li></ul></li></ul>
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### Content:

Slide 2	Diversity <ul style="list-style-type: none"><li>● Ask learners what they think diversity is.</li></ul>
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	<ul style="list-style-type: none"> <li>○ Including or involving many different things.</li> <li>○ On planet earth, there are lots of different types of plants and animals.</li> <li>○ Even small things, like insects and plants, are very important for our environment.</li> <li>○ Biodiversity is so important as each species has a role to play in the food chain and ecosystem. Without different species of plants, animals and insects, the system would not be productive.</li> <li>○ Everything depends on one another and diversity creates a stronger food chain and system.</li> </ul>
Slide 3	<p><b>Insects</b></p> <ul style="list-style-type: none"> <li>● There are lots of different species of insects. <ul style="list-style-type: none"> <li>○ Ask the learners what percentage of living things is made up of insects.</li> </ul> </li> <li>● Even though they are so small, insects are the most abundant living things on earth. <ul style="list-style-type: none"> <li>○ Insects make up 52% of all living things on Earth.</li> <li>○ Explain to the learners that 52% is more than half a cake and then show how much smaller all the other “slices” of the cake are.</li> <li>○ Us humans are part of the chordate group (animals with spines), only making up 3% of all living things, therefore we need to look after all the other living things on Earth.</li> <li>○ This explanation can be extremely simple. The aim is for the learners to understand that there are many insects on the planet and they are just as important as any other animal/species.</li> </ul> </li> </ul>
Slide 4	<p><b>Some interesting facts about insects</b></p> <ul style="list-style-type: none"> <li>● Dragonflies have been seen on earth for 300 million years.</li> <li>● They also eat on average 30 mosquitoes a day for us.</li> <li>● Ladybirds sometimes play dead to avoid predators</li> </ul>
Slide 5-6	<p><b>The body of insects</b></p> <ul style="list-style-type: none"> <li>● Insects have a head, thorax (chest) and abdomen (stomach).</li> <li>● Insects have an exoskeleton. <ul style="list-style-type: none"> <li>○ Ask the learners what an exoskeleton is. <ul style="list-style-type: none"> <li>■ An external skeleton that protects all the soft internal structures inside the insect's body.</li> </ul> </li> </ul> </li> </ul>
Slide 7	<p><b>How do insects breathe?</b></p> <ul style="list-style-type: none"> <li>● Insects have spiracles, which are holes on the outside of their bodies.</li> <li>● They take in air from outside through their spiracles.</li> </ul>
Slide 8	<p><b>Helpful insects</b></p> <ul style="list-style-type: none"> <li>● Ask learners how they think insects can be / are helpful for us. <ul style="list-style-type: none"> <li>○ Insects play a large role in the food chain as they are food for many reptiles, birds and mammals.</li> <li>○ Insects also serve as a source of food for people.</li> <li>○ Most of the fruits and vegetables that we eat, and also things like coffee and chocolate, wouldn't exist without insects. <ul style="list-style-type: none"> <li>▪ Pollination – ask the learners what it means. <ul style="list-style-type: none"> <li>● Insects deposit pollen to fertilise the plants.</li> </ul> </li> </ul> </li> <li>○ Insects help to break down leaves, dead trees and the bodies of dead animals. <ul style="list-style-type: none"> <li>▪ Decomposition – breaking down.</li> </ul> </li> </ul> </li> </ul>
Slide 9	<p><b>Bees</b></p>



	<ul style="list-style-type: none"> <li>● Bees are some of the best pollinators around.</li> <li>● Ask the learners what bees make that we eat – honey.</li> <li>● One out of every three bites of food that you put in your mouth was pollinated by honeybees.</li> <li>● There are many bee products, including honey, bee venom and royal jelly, that are effective in reducing the growth and spread of cancerous tumours.</li> <li>● Bees give us honey to eat, which is not only delicious, but also has medicinal and antibacterial uses.</li> <li>● Ask the learners how many kilograms of honey they think a honeybee colony can produce per year. <ul style="list-style-type: none"> <li>○ A single honeybee colony can produce around 100 kg of honey each year.</li> <li>○ Relate that to the weight of the learners – roughly 3 of them together.</li> </ul> </li> </ul>
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**Video:**

Slide 10	<p>Show video on bees and pollination.</p> <ul style="list-style-type: none"> <li>● Ask the learners how many bees they think are in a honeybee colony. <ul style="list-style-type: none"> <li>○ 60 000 – 80 000 bees</li> </ul> </li> <li>● Recap what a queen bee, drone and worker bee is. <ul style="list-style-type: none"> <li>○ The queen bee lays lots of eggs to ensure a growing colony, the drones mate with the queen, the worker bees do everything else (guard the hive and honey, collect nectar, produce honey, etc.).</li> </ul> </li> <li>● Video length: 3 minutes 20 seconds.</li> </ul>
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**Content continued:**

Slide 11	<p>What would happen if all the bees disappeared?</p> <ul style="list-style-type: none"> <li>● Bees themselves are also a part of the food chain, as many birds, spiders and insects eat bees.</li> <li>● Bees support the growth of trees, flowers and other plants, which serve as food and shelter for creatures large and small.</li> <li>● Without bees, many plants would have no way to reproduce and would die out. Bees play an important role in the life cycle of most plants and flowers.</li> </ul>
Slide 12	<p>Dung beetles</p> <ul style="list-style-type: none"> <li>● What is a dung beetle? <ul style="list-style-type: none"> <li>○ A beetle that feeds on faeces.</li> </ul> </li> <li>● One dung beetle can drag 1 141 times its weight – that’s like human pulling six double-decker buses.</li> <li>● Dung beetles are found on all continents, except Antarctica.</li> <li>● Dungs beetles are either rollers, burrowers or dwellers. <ul style="list-style-type: none"> <li>○ Rollers: roll the dung into balls and bury the balls in soft soil.</li> <li>○ Burrowers: take the dung into tunnels directly under the main heap.</li> <li>○ Dwellers: live in the dung.</li> </ul> </li> </ul>

**Video:**

Slide 13	<p>Show video on dung beetles.</p> <ul style="list-style-type: none"> <li>● Video length: 4 minutes 25 seconds.</li> </ul>
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**Content continued:**

Slide 14	<ul style="list-style-type: none"> <li>● Dwellers: burrow and nest within, or just below the dung piles.</li> <li>● Tunnelers: dig tunnels below the dung pile, move dung into the tunnels and</li> </ul>
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	<ul style="list-style-type: none"> <li>lay their eggs.</li> <li>● Rollers: remove a ball of dung and roll it to a tunnel away from the dung pile.</li> </ul>
Slide 15	<p>Dung beetles help the environment and animals.</p> <ul style="list-style-type: none"> <li>● Dung beetles keep the earth clean from dung. They are the clean-up crew of the bush and carry off and scatter a pile of dung in an amazingly short time.</li> <li>● The removal of dung also minimises the number of flies, so these beetles are extremely useful in maintaining a healthy environment.</li> <li>● Dung beetles help plant trees and plants, which creates food and shelter within the environment. The dung is buried in the ground where it decomposes, which fertilises the soil.</li> </ul>

**Closing activity: Make a poster**

Slide 16	<p>Make a poster explaining / describing / drawing what our world would look like without insects.</p> <ul style="list-style-type: none"> <li>● How would the world be different if all insects were to vanish overnight?</li> <li>● Discuss some ideas with the class.</li> <li>● Learners may work in groups.</li> <li>● Present the posters to the class and display them in the classroom.</li> <li>● <b>NOTE:</b> This activity takes a long time! Need to leave an adequate amount of time for the learners to discuss ideas and make their posters (30 mins).</li> </ul>
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*Image: Example of a group's poster.*

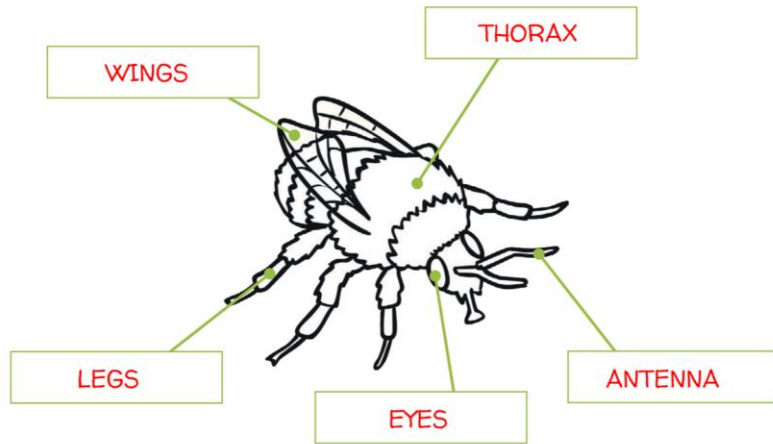
**Workbook explanation:**

The workbook has a “fill in the blank” worksheet where the learners need to match the phrase to the term as well as label the bee. There is also a colouring-in page.

**Worksheet answers:**

# ALL ABOUT BEES:

Match the phrase to the term and then label the bee accordingly.



Bees collect the pollen in flowers using these. They also use them to stand.	ANTENNA
These help the bees to smell but also help them measure how fast they are flying!	THORAX
These help the bee to fly.	LEGS
This is the main body of the bee.	WINGS
These help the bee know if danger is coming from any direction.	EYES

## Extra resources:

- *Importance of insects:* <https://onlinelibrary.wiley.com/doi/10.1002/9781118945568.ch2#:~:text=Insects%20create%20the%20biological%20foundation,food%20source%20for%20other%20taxa.>
- *Importance of Insects Summary:* [https://extension.entm.purdue.edu/radicalbugs/index.php?page=importance\\_of\\_insects](https://extension.entm.purdue.edu/radicalbugs/index.php?page=importance_of_insects)
- *Benefits of Insects to Humans:* <https://www.si.edu/spotlight/buginfo/benefits>
- *Why do we need bugs?:* <https://www.almanac.com/why-do-we-need-bugs>

## References:

- <https://bigislandbees.com/blogs/bee-blog/14137353-bee-hive-hierarchy-and-activities#:~:text=The%20queen's%20only%20job%20is,hive%20clean%2C%20and%20producing%20honey.>
- <https://www.sabisabi.com/discover/wild-facts/dung-beetles>
- <https://kids.nationalgeographic.com/animals/invertebrates/facts/dung-beetle>



# Lesson 5: Find your flow

### Lesson Summary:

This lesson focuses on rivers and waterfalls, what they are and how they are important for our ecosystems. The preservation and importance of rivers is discussed as well as what threats there are to our rivers. Pollution and litter are specifically discussed in more detail, focusing on the threat they pose to our rivers and other bodies of water, and how to overcome and prevent these threats.

### Lesson Objectives:

- Learners can describe what a river is and how it is important and useful to humans, animals and the environment.
- Learners can demonstrate an understanding of threats to rivers, including pollution and litter, and the devastating effects that this has on the ecosystems, as well as ways to mitigate this problem.
- Learners can describe the concept of overfishing and the impacts this has on the ecosystem and food chain.
- Learners can discuss what sustainable fishing is and how it can contribute towards conserving our planet and future.

### Core Competencies Grade 6-7

Social Sciences:

- Map skills

Natural Sciences:

- Ecosystems and food webs

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Fishing rods with magnets
2. Laminated fish with magnets
3. Laminated different species
4. Pond

### Introduction:

Slide 1	<p>Recap previous lesson</p> <ul style="list-style-type: none"><li>● What is diversity?<ul style="list-style-type: none"><li>○ Including or involving many different things. On planet earth, there are lots of different types of plants and animals</li></ul></li><li>● How do insects breathe?<ul style="list-style-type: none"><li>○ Insects have spiracles, which are holes on the outside of their bodies. They take in air from outside through their spiracles.</li></ul></li><li>● What do you remember about bees?</li></ul>
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	<ul style="list-style-type: none"> <li>○ Bees are great pollinators, they produce honey, bee venom and royal jelly, there are queen bees, drone bees and worker bees.</li> <li>● What do you remember about dung beetles? <ul style="list-style-type: none"> <li>○ Dung beetles are the clean up crew of the bush, they are super strong, they feed on faeces, and there are rollers, burrowers and dwellers.</li> </ul> </li> </ul>
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**Content:**

Slide 2	<p>Introduce new lesson topic – rivers</p> <ul style="list-style-type: none"> <li>● What is a river? <ul style="list-style-type: none"> <li>○ A flowing stream of water heading towards an ocean, lake or another river.</li> </ul> </li> </ul>
Slide 3	<p>How rivers are formed</p> <ul style="list-style-type: none"> <li>● All rivers have a starting point where the water begins its flow. This is called headwater or the source.</li> <li>● Rivers start in upland areas, where rain water or snow collects on high ground and forms little streams.</li> <li>● These streams flow downhill and become larger, forming rivers.</li> <li>● Ask the learners if they can remember what the part of a river that enters the sea is called? <ul style="list-style-type: none"> <li>○ A river mouth.</li> </ul> </li> <li>● Ask the learners how they think rivers get their curved shapes. <ul style="list-style-type: none"> <li>○ Let learners give their opinions, the answer will be shown in the following video.</li> </ul> </li> </ul>

**Video:**

Slide 4	<p>Show video on how rivers and their shapes are formed.</p> <ul style="list-style-type: none"> <li>● Video length: 2 minutes 56 seconds.</li> </ul>
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**Content continued:**

Slide 5	<p>Rivers in Eswatini.</p> <ul style="list-style-type: none"> <li>● Ask the learners if they can name any major rivers in Eswatini? <ul style="list-style-type: none"> <li>○ Komati River, Lomati River, Umbuluzi River, Tembe River, Great Usutu River, Ngwavuma River; plus all their tributaries.</li> </ul> </li> <li>● Ask the learners what they think a river system is? <ul style="list-style-type: none"> <li>○ A river and its tributaries together make up a river system. A river system is also called a drainage basin or watershed, which includes any groundwater sources as well.</li> </ul> </li> </ul>
Slide 6	<p>Eswatini has five main river systems:</p> <ul style="list-style-type: none"> <li>● The Lomati</li> <li>● The Komati</li> <li>● The Umbuluzi</li> <li>● The Usutu</li> <li>● The Ngwavuma</li> </ul>
Slide 7	<p>Waterfalls</p> <ul style="list-style-type: none"> <li>● What is a waterfall? <ul style="list-style-type: none"> <li>○ Water falling from a height.</li> </ul> </li> <li>● There are also waterfalls in Eswatini, can you name them? <ul style="list-style-type: none"> <li>○ Phophonyane waterfall</li> <li>○ Mantenga waterfall</li> </ul> </li> </ul>
Slide 8	<p>Mbuluzi River</p> <ul style="list-style-type: none"> <li>● Has a unique ecosystem.</li> </ul>

	<ul style="list-style-type: none"> <li>● It supports many different animals and us as well.</li> <li>● It contributes to the land food web with land animals who drink the water as well. There are also plants that use the water to grow.</li> <li>● It also has an aquatic food web with plankton in the water for smaller fish to eat, and crocodiles who eat the fish.</li> <li>● People and animals depend on the river for food, it is a resource for all.</li> </ul>
Slide 9	<p>Why rivers are important</p> <ul style="list-style-type: none"> <li>● Rivers provide us with many resources. Ask the learners if they can think of any? <ul style="list-style-type: none"> <li>○ Fish for food, water to drink (when cleaned), it is also a home for animals to live.</li> </ul> </li> <li>● Rivers are a home for many animals.</li> </ul>
Slide 10	<p>Resources for all</p> <ul style="list-style-type: none"> <li>● People and animals depend on the river for food.</li> </ul>
Slide 11	<p>There are many animals that live in the river</p> <ul style="list-style-type: none"> <li>● Hippopotamus</li> <li>● Frogs</li> <li>● African jacana</li> </ul>
Slide 12	<p>Some animals that live in the river are very dangerous</p> <ul style="list-style-type: none"> <li>● Hippopotamus <ul style="list-style-type: none"> <li>○ Hippos are very aggressive, have very sharp teeth and are extremely big and heavy.</li> <li>○ Fun fact: Hippos can't swim! They sink in water. They run along the bottom of the river instead of swimming.</li> </ul> </li> <li>● Crocodile (Nile crocodile) <ul style="list-style-type: none"> <li>○ Crocodiles are very large but extremely fast, especially when catching their prey. They have a very strong bite force - the strength of their bite is five times stronger than an adult lion.</li> <li>○ Fun fact: Crocodiles cannot open their mouth if it is held close! All their strength is in closing their jaws.</li> </ul> </li> </ul>
Slide 13	<p>River food chain</p> <ul style="list-style-type: none"> <li>● Ask the learners if they can remember the components of a food chain. <ul style="list-style-type: none"> <li>○ Producer - water plants or algae.</li> <li>○ Primary consumer - smaller fish eat the water plants.</li> <li>○ Secondary consumer - bigger fish eat the smaller fish.</li> <li>○ Tertiary consumer - bird eats the bigger fish.</li> </ul> </li> </ul>
Slide 14	<p>River food web in Eswatini</p> <ul style="list-style-type: none"> <li>● Ask the learners what a food web is. <ul style="list-style-type: none"> <li>○ All the different food chains that are linked within an ecosystem.</li> </ul> </li> <li>● Ask one of the learners to come up and explain the food web shown on the slide. Other learners can assist from the class.</li> <li>● Food chains within the food web include: <ul style="list-style-type: none"> <li>○ Algae → Small Fish → Otter → Crocodile</li> <li>○ Algae → Small Fish → Bigger fish → Crocodile</li> <li>○ Algae → Crab → Otter → Crocodile</li> <li>○ Algae → Crab → Big Fish → Crocodile</li> <li>○ Algae → Crab → Crocodile</li> <li>○ Algae → Tadpole → Big Fish → Crocodile</li> </ul> </li> </ul>
Slide 15	<p>Mbuluzi river land food chain</p> <ul style="list-style-type: none"> <li>● There are not only food chains within the river, but also food chains on the land near the river. <ul style="list-style-type: none"> <li>○ Producer - grass.</li> <li>○ Primary consumer - Impala eating the grass.</li> <li>○ Secondary consumer - Leopard eating the Impala.</li> </ul> </li> </ul>



Slide 16-17	<p>Threats to rivers</p> <ul style="list-style-type: none"> <li>● Ask the learners what they think “threat” means. Can they think of any threats to our rivers? <ul style="list-style-type: none"> <li>○ Climate change <ul style="list-style-type: none"> <li>▪ Changes in temperature and rainfall cause changes to the river levels.</li> </ul> </li> <li>○ Overfishing <ul style="list-style-type: none"> <li>▪ As the human population grows, more people are dependent on the river for food.</li> <li>▪ Ask the learners what impact they think this will have. <ul style="list-style-type: none"> <li>● This decreases the amount of fish in the river.</li> </ul> </li> </ul> </li> </ul> </li> </ul>
Slide 18-19	<p>Overfishing</p> <ul style="list-style-type: none"> <li>● Overfishing decreases the number of fish in the river.</li> <li>● This can lead to a breakdown in the food chain and eventual ecosystem decline. <ul style="list-style-type: none"> <li>○ Ask the learners how they think this can happen. <ul style="list-style-type: none"> <li>■ Lack of fish in the river leads to an increase of water plants / smaller fish that were eaten by the fish, as well as a decrease in food available for bigger fish or birds who ate that fish as food.</li> <li>■ Bigger fish species who rely on smaller fish for food now die out.</li> <li>■ Lack of food availability.</li> </ul> </li> </ul> </li> <li>● Ask the learners how we can stop overfishing. <ul style="list-style-type: none"> <li>○ Ensure fish have good habitats to grow.</li> <li>○ Fish less.</li> <li>○ Do more recreational fishing - catch and release.</li> </ul> </li> </ul>

**Video:**

Slide 20	<p>Show video on overfishing.</p> <ul style="list-style-type: none"> <li>● Ask the learners what they think sustainable fishing is? <ul style="list-style-type: none"> <li>○ Discuss answers, learners opinions.</li> <li>○ Should include fishing in a way that provides enough for the human population but does not harm the natural fish population and river ecosystem. Supporting local fishing communities rather than large commercial fisheries.</li> </ul> </li> <li>● Ask the learners what a fishing subsidy is. <ul style="list-style-type: none"> <li>○ Governments give money to allow companies to fish for much cheaper or make more profit on selling fish. This encourages overfishing, as the companies will be more incentivised to catch larger amounts of fish more often to gain more profits.</li> </ul> </li> <li>● Ask the learners what we can do to make fishing more sustainable. <ul style="list-style-type: none"> <li>○ Only take what you need.</li> <li>○ Support local smaller fisheries rather than larger commercial fisheries.</li> </ul> </li> <li>● Video length: 3 minutes 14 seconds.</li> </ul>
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**Content continued:**

Slide 21	<p>What does pollution and litter mean to you?</p> <ul style="list-style-type: none"> <li>● Let the learners give their input without any guidance from the teacher.</li> <li>● Discuss the answers with the class.</li> </ul>
Slide 22	<p>Pollution</p> <ul style="list-style-type: none"> <li>● When humans put substances or materials into the environment that are</li> </ul>

	harmful or poisonous to all living things.
Slide 23	Litter <ul style="list-style-type: none"> <li>● Litter is when rubbish and trash is discarded where it is not meant to be.</li> </ul>
Slide 24	Threats to rivers <ul style="list-style-type: none"> <li>● Pollution <ul style="list-style-type: none"> <li>○ Pollution kills fish and other animals, prevents fish from breeding well and allows invasive weeds to grow.</li> </ul> </li> </ul>

**Activity:**

Slide 25	<p><i>Fishing for food</i></p> <ul style="list-style-type: none"> <li>● This activity aims to show how dependent humans are on rivers for resources, and how pollution diminishes these resources and destroys habitats. It will also highlight how litter prevents natural resources from growing and kills animals.</li> <li>- <u>Step 1:</u> Learners will fish for food (fish) with all the fish and different species in the pond. Ask the learners how the river looks? (Lots of diversity and different species of fish and plants).</li> <li>- <u>Step 2:</u> As more fish are caught, some species will be removed from the pond.</li> <li>- <u>Step 3:</u> Demonstrate overfishing. Eventually all the fish will be caught and the other species will be gone to show that if you fish everything out of the river nothing is left to reproduce to make more food and the ecosystem and food chain collapses.</li> <li>- <u>Step 4:</u> Repeat the activity but the learners must be mindful of how many fish they catch. If they show sustainability then add fish to show that they can reproduce if overfishing does not occur. Reiterate what sustainable fishing is.</li> </ul>
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	<p><i>Images: Showing how to explain the activity with the items in front of you and then how the learners use the “fishing rods”.</i></p>
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**Content continued:**

Slide 26	<p>Litter</p> <ul style="list-style-type: none"> <li>● Where do we see most of the litter? <ul style="list-style-type: none"> <li>○ Rivers</li> <li>○ Beaches</li> <li>○ Schools</li> <li>○ In towns</li> <li>○ Next to roads</li> </ul> </li> </ul>
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**Video:**

Slide 27	<p>Show video on littering.</p> <ul style="list-style-type: none"> <li>● Ask the learners to describe what happened in this video.</li> <li>● Ask how it made them feel and if it made them want to change anything about littering.</li> <li>● Video length: 2 minutes 27 seconds.</li> </ul>
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**Content continued:**

Slide 28	<p>The danger of littering. Ask the learners what happens to the earth when humans litter.</p> <ul style="list-style-type: none"> <li>● Rivers become blocked</li> <li>● Animals die (they get trapped, suffocate, etc.)</li> <li>● Plants suffer</li> <li>● Washes into the ocean</li> <li>● Takes a very long time to decompose</li> <li>● Expensive to clean</li> </ul>
Slide 29	<p>How bad is the litter problem?</p> <ul style="list-style-type: none"> <li>● The great pacific garbage patch <ul style="list-style-type: none"> <li>○ A collection of litter that has ended up in the North Pacific Ocean.</li> <li>○ Use this picture to demonstrate how severe the litter problem is.</li> <li>○ The great pacific garbage patch is 1.6 million square kilometres, which is bigger than South Africa. <ul style="list-style-type: none"> <li>▪ SA is 1.22 million square kilometres</li> </ul> </li> </ul> </li> </ul>

**Video:**

Slide 30	<p>Show video on the great pacific garbage patch.</p> <ul style="list-style-type: none"> <li>● Ask the learners what they took away from this video.</li> <li>● Ask the learners how they would feel swimming in an ocean/pool/lake covered in that much litter? How do they think the animals survive?</li> <li>● Discuss microplastics with the learners and what impact this has on marine life and humans as well. <ul style="list-style-type: none"> <li>○ Fish eat the microplastics (broken down plastic invisible to the naked eye), which then accumulates in their tissues and organs, which are then consumed by humans.</li> <li>○ Due to the consumption of microplastics, humans have been reported to have increased risks of cancer, chronic inflammation and endocrine function disturbances.</li> </ul> </li> <li>● Ask the learners what impact this will have and how they think we can help stop and prevent this from getting worse?</li> <li>● Video length: 2 minutes 1 second.</li> </ul>
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**Content continued:**

Slide 31-32	<ul style="list-style-type: none"> <li>● 80 000 tonnes = 13 333 elephants</li> <li>● 1.8 trillion pieces of litter = 250 pieces for every human. <ul style="list-style-type: none"> <li>○ Discuss with the learners how large the problem is because many people are contributing to it and we need to work together to combat the problem.</li> </ul> </li> </ul>
Slide 33	<p>Let's be litter heroes!</p> <ul style="list-style-type: none"> <li>● Ask the learners how they can be litter heroes, have a class discussion.</li> <li>● Ask the learners how to stop pollution, have a class discussion.</li> <li>● Learners can say a pledge to be "Litter Heroes" and promise to protect the earth.</li> </ul>

**Workbook explanation:**

The workbook has 3 questions on rivers for the learners to answer. The workbook also has an activity where the learners must design a "Protect the Mbuluzi River" poster.

**Worksheet answers:**

1. *Why are rivers important for us on Earth?*

Possible Answers	
<ul style="list-style-type: none"> <li>● Rivers provides us with resources, such as fish for food</li> </ul>	<ul style="list-style-type: none"> <li>● Rivers provide us with water to drink and clean with</li> </ul>
<ul style="list-style-type: none"> <li>● Rivers create a home for animals which is important for the ecosystem which keeps us alive</li> </ul>	

2. *How are some ways that we can overcome threats to rivers?*

Possible Answers	
<ul style="list-style-type: none"> <li>● Stop littering and pollution</li> </ul>	<ul style="list-style-type: none"> <li>● Stop overfishing</li> </ul>

<ul style="list-style-type: none"> <li>● Pick up litter</li> </ul>	<ul style="list-style-type: none"> <li>● Only catch bigger fish and do not catch more than you need</li> </ul>
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3. What are some ways that you can reduce the amount of litter at your school?

Possible Answers	
<ul style="list-style-type: none"> <li>● Do not put rubbish/litter on the floor</li> </ul>	<ul style="list-style-type: none"> <li>● Put rubbish and litter in a bin</li> </ul>
<ul style="list-style-type: none"> <li>● Educate and teach everyone around you why we need to protect our environment</li> </ul>	<ul style="list-style-type: none"> <li>● Educate and teach everyone what happens if we litter</li> </ul>
<ul style="list-style-type: none"> <li>● Use material bags rather than plastic ones</li> </ul>	<ul style="list-style-type: none"> <li>● Try reuse items if you have to buy plastic</li> </ul>
<ul style="list-style-type: none"> <li>● Try get everyone to pick up litter every day even if its only one piece</li> </ul>	<ul style="list-style-type: none"> <li>● Have a litter drive where everyone cleans up a specific area</li> </ul>

**Extra Resources:**

- *Types of pollution:* <https://byjus.com/biology/types-of-pollution/>
- *Harmful effects of litter:* <https://www.plano.gov/486/Harmful-Effects-of-Litter#:~:text=Litter%20is%20Harmful,stuck%20and%20starve%20to%20death.>
- *Litter harms animals:* <https://www.conserve-energy-future.com/littering-effects-humans-animals-environment.php#:~:text=The%20plastic%20creates%20health%20problems,and%20cause%20injury%20or%20death.>

**References:**

- [https://www.wikiwand.com/en/List\\_of\\_rivers\\_of\\_Eswatini](https://www.wikiwand.com/en/List_of_rivers_of_Eswatini)
- <https://education.nationalgeographic.org/resource/understanding-rivers/>
- <https://education.nationalgeographic.org/resource/food-web/>
- <https://www.discoverwildlife.com/animal-facts/mammals/facts-about-hippos/>
- <https://a-z-animals.com/animals/nile-crocodile/>
- <https://education.nationalgeographic.org/resource/great-pacific-garbage-patch/>
- <https://theoceancleanup.com/great-pacific-garbage-patch/#:~:text=A%20total%20of%201.8%20trillion,every%20human%20in%20the%20world>

## Lesson 6: Be the change

### Lesson Summary:

This lesson discusses climate change and global warming. The differences between natural changes and human activity are discussed, as well as the consequences of human activity and how they contribute to the impact of climate change and global warming. The specific consequences of climate change and global warming on migratory birds and rivers are discussed, as well as possible solutions to the climate change and global warming problems.

### Lesson Objectives:

- The aim of the lesson is for learners to understand that climate change is normal, it is the rate of change due to human interference that is having a negative impact, as natural species cannot adapt as fast as the change is occurring.
- Learners demonstrate an understanding of climate change, and provide examples of natural changes and human activity changes.
- Learners demonstrate an understanding of what global warming is, how it is caused and the effect that it has on our planet and future.
- Learners can discuss possible solutions to global warming and climate change issues.

### Core Competencies Grade 6-7

#### Life Skills:

- Caring for animals
- Caring for people

#### Natural Sciences:

- Ecosystems and food webs

#### Social Sciences:

- Climate and vegetation around the world

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Ice cube tray
2. Ice cubes
3. Stop watch
4. Cling wrap/film
5. 2 containers for the ice to be placed in
6. Experiment worksheets

### Introduction:

Slide 1	Recap previous lesson <ul style="list-style-type: none"><li>● What is a river and how is it useful to us?<ul style="list-style-type: none"><li>○ A flowing stream of water heading towards an ocean, lake or another</li></ul></li></ul>
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	<p>river. They provide food for humans and animals and places for other animals to live.</p> <ul style="list-style-type: none"> <li>● What threats are there to our rivers? <ul style="list-style-type: none"> <li>○ Climate change, overfishing, pollution and litter.</li> </ul> </li> <li>● What is pollution and litter? <ul style="list-style-type: none"> <li>○ Pollution is when humans put substances or materials into the environment that are harmful or poisonous to all living things.</li> <li>○ Litter is when rubbish and trash is discarded where it is not meant to be.</li> </ul> </li> <li>● What is overfishing and what are the consequences it has? <ul style="list-style-type: none"> <li>○ An increase in human population causes more people to depend on the river for food. Overfishing decreases the number of fish in the river. This can lead to a breakdown in the food chain and eventual ecosystem decline.</li> </ul> </li> </ul>
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**Content:**

Slide 2	<p>Ask the learners what they think climate is.</p> <ul style="list-style-type: none"> <li>● Discuss some answers, no guidance from the teacher.</li> <li>● Ask how they think climate is different from weather.</li> </ul>
Slide 3	<p>Weather vs climate</p> <ul style="list-style-type: none"> <li>● Weather - describes the conditions outside right now for a specific place. <ul style="list-style-type: none"> <li>○ e.g. rain, snow, sunny, temperature, wind conditions</li> </ul> </li> <li>● Climate - describes the weather conditions that are expected in a region at a particular time of year.</li> </ul>
Slide 4	<p>Climate change</p> <ul style="list-style-type: none"> <li>● Ask the learners what they think climate change means? <ul style="list-style-type: none"> <li>○ Have a discussion with their answers.</li> <li>○ Long-term changes in weather and temperatures.</li> <li>○ These changes can be natural or as a result of human activity.</li> <li>○ These changes are not good for the planet.</li> </ul> </li> </ul>
Slide 5	<p>Temperature changes over time</p> <ul style="list-style-type: none"> <li>● Glacial events – lots of ice</li> <li>● Interglacial periods – warmer weather</li> <li>● Earth has moved gradually between glacial events and interglacial periods over time.</li> <li>● A whole section of glacial events and interglacial periods over time is called an ice age.</li> <li>● We are actually in an interglacial period right now.</li> </ul>
Slide 6	<p>What is global warming?</p> <ul style="list-style-type: none"> <li>● Let the learners discuss their ideas and answers.</li> <li>● Global warming is part of climate change and is associated with the rising temperatures of the global climate.</li> <li>● The Earth’s temperature is getting hotter and increasing by about 1°C over the last 100 years.</li> <li>● That doesn’t seem like a lot, but this is a faster rate of warming than ever before and it’s because of humans.</li> </ul>
Slide 7-8	<p>What causes global warming?</p> <ul style="list-style-type: none"> <li>● Over the past 200 years, industrialisation and a huge increase in the world’s population has led to the increase of gases that can lead to the rising temperatures around the world.</li> <li>● Industrialisation includes: <ul style="list-style-type: none"> <li>○ Electricity and heat</li> <li>○ Transportation</li> </ul> </li> </ul>





- Manufacturing and construction
- Agriculture (including fertilisers)
- Think back to the hottest day you have ever had, and then imagine wrapping yourself in lots of blankets. If possible try place lots of jerseys/jackets on a learner to demonstrate this.




**Video:**

Slide 9	<p>Show video on the greenhouse effect.</p> <ul style="list-style-type: none"> <li>● Ask the learners to discuss their understanding of what the greenhouse effect is. Have a class discussion on the impacts this will have on Earth and the species that inhabit it.</li> <li>● Video length: 1 minute 25 seconds.</li> </ul>
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**Content continued:**

Slide 10	<p>Why is global warming bad?</p> <ul style="list-style-type: none"> <li>● The weather needs to be just right to keep the living things on Planet Earth happy and healthy.</li> </ul>
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**Activity:**

Slide 11	<p><i>Ice cube activity</i></p> <ul style="list-style-type: none"><li>● Learners have a science experiment worksheet to demonstrate the effects of climate change.</li><li>● One set of ice cubes will be left in the shade/cool classroom and the other set will be left in the sun.<ul style="list-style-type: none"><li>○ If it is a cold day, two learners can hold the container with ice (wrap their hands around it) to represent human interference with the increased rate of climate change.</li></ul></li></ul>  <ul style="list-style-type: none"><li>● Learners will need to time both sets and see how long the ice takes to melt.</li><li>● The ice in the sun should melt a lot faster demonstrating how a warmer climate is melting ice faster than a cooler one.</li></ul>
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**Content continued:**

Slide 12	<p>What happens if the weather isn't just right?</p> <ul style="list-style-type: none"><li>● There are a lot of different environmental changes that are happening as a result of global warming.</li><li>● Increased heat leads to melting and shrinking glaciers, resulting in rising sea levels, plant species shifting locations, trees and plants flowering much earlier in the year and species becoming endangered.</li></ul>
Slide 13	<p>Migratory birds</p> <ul style="list-style-type: none"><li>● Climate change is affecting migratory birds.</li><li>● Migratory birds are particularly vulnerable to climate change effects because they depend on multiple habitats and sites.</li><li>● Warming is occurring rapidly in the Arctic, and at least 85 of the world's bird species breed in global Arctic regions.</li></ul>

**Video:**

Slide 14	<p>Show video on the weekly Arctic Sea ice age between 1984 and 2016.</p> <ul style="list-style-type: none"><li>● Explain while video plays that this is a time lapse, and that normal melting and freezing is taking place, but because of human interference, these changes are happening too quickly and therefore the ice is melting at a much faster</li></ul>
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	<ul style="list-style-type: none"> <li>rate and cannot refreeze quick enough.</li> <li>● Video length: 1 minute 27 seconds.</li> </ul>
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**Content continued:**

Slide 15	<p>Desert birds</p> <ul style="list-style-type: none"> <li>● Climate change is affecting desert birds.</li> <li>● An iconic Southern African bird, the Southern yellow-billed hornbill, could be wiped out in the hottest parts of its range in the arid Kalahari Desert by 2027 because of rapid warming from climate change. <ul style="list-style-type: none"> <li>○ Ask the learners if they have seen the Lion King, this bird is Zazu!</li> </ul> </li> </ul>
Slide 16-17	<p>Rivers</p> <ul style="list-style-type: none"> <li>● Higher temperatures cause more frequent algal blooms and reduce oxygen levels. <ul style="list-style-type: none"> <li>○ Algal blooms consume oxygen and block sunlight from underwater plants.</li> </ul> </li> <li>● This can cause fish to die and is harmful to ecosystems.</li> <li>● As air temperatures rise, water temperatures do as well, particularly in shallow stretches of rivers and surface waters of lakes. This makes the rivers unsuitable for cold-water fish to live, so only species that thrive in warmer waters can survive there.</li> <li>● Some warm-water species are already moving to waters at higher latitudes and altitudes.</li> </ul>
Slide 18	<p>What are some solutions to climate change and global warming?</p> <ul style="list-style-type: none"> <li>● Educate as many people as you can about what climate change is and how they can get involved to stop it.</li> <li>● Recycle more <ul style="list-style-type: none"> <li>○ Reduce, reuse, recycle.</li> </ul> </li> <li>● Plant a tree <ul style="list-style-type: none"> <li>○ A single tree will absorb one ton of carbon dioxide over its lifetime.</li> </ul> </li> <li>● Turn off your electronic devices when you are not using them.</li> <li>● Change your light bulbs.</li> <li>● Only purchase food that you will use / eat and compost any that is left over.</li> </ul>

**Activity:**

Slide 19	Learners can do the allocated section in their workbooks
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**Workbook explanation:**

There is a “Change an Invention” activity where the learners need to pick an item and explain how they are going to improve it to ensure the item is more eco-friendly. Learners also need to explain how the item could be harming the Earth and why it needs to be improved.

**Extra Resources:**

- *Climate change vs. Global warming:* <https://climate.nasa.gov/global-warming-vs-climate-change/>
- *Effects of global warming:* <https://www.nationalgeographic.com/environment/article/global-warming-effects>
- *Global warming:* <https://education.nationalgeographic.org/resource/global-warming/>

**References:**

- [https://www.nasa.gov/mission\\_pages/noaa-n/climate/climate\\_weather.html](https://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html)
- <https://www.epa.gov/nutrientpollution/effects-dead-zones-and-harmful-algal-blooms#:~:text=Excess%20nitrogen%20and%20phosphorus%20cause,in%20the%20water%20is%20consumed.>

## Lesson 7: Explore what's underneath your feet

### Lesson Summary:

This lesson is focused on soil and trees, their importance for life on Earth, as well as what will happen if we neglect to look after them. The lesson also introduces invasive species by explaining what they are, how they are introduced into the country, why they are bad for the local environment and how to prevent their introduction and spread.

### Lesson Objectives:

- Learners demonstrate an understanding of what soil is and its importance in life on Earth.
- Learners can give examples of how soil is being threatened and what can be done to help soil survive.
- Learners can discuss the importance of trees and how they provide for life on Earth, as well as the consequences of deforestation and how to prevent this..
- Learners can differentiate between invasive and indigenous species and how to prevent the introduction and spread of invasive plants, as well as why the introduction and spread of invasive plants has a negative effect on the ecosystem in that area.

### Core Competencies Grade 6-7

Social Sciences:

- Climate and vegetation around the world

Natural Sciences:

- Photosynthesis
- Ecosystems and food webs

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Seeds
2. Ziplock bags
3. Cotton wool
4. Permanent markers
5. Germination journal in learners' workbooks
6. Stickers
7. Two laminated posters for class
8. A3 piece of paper
9. Colouring-in crayons

### Introduction:

Slide 1	Recap previous lesson: <ul style="list-style-type: none"><li>● What is climate change?<ul style="list-style-type: none"><li>○ Long-term changes in weather and temperatures.</li></ul></li></ul>
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	<ul style="list-style-type: none"> <li>● What is global warming and why is it a challenge for us? <ul style="list-style-type: none"> <li>○ Global warming is part of climate change and is associated with the rising temperatures of the global climate. The weather needs to be just right to keep the living things on Planet Earth happy and healthy.</li> </ul> </li> <li>● What are some solutions for climate change and global warming? <ul style="list-style-type: none"> <li>○ Education, recycle, plant more trees, turn off electronic devices when not in use, change your lightbulbs, only buy food you will use, compost leftovers.</li> </ul> </li> </ul>
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**Content:**

Slide 2	<p>How do plants help us to survive?</p> <ul style="list-style-type: none"> <li>● Plants clean the air we breathe and supply us with oxygen which we need to stay alive. <ul style="list-style-type: none"> <li>○ Ask the learners if they can recall how plants do this. <ul style="list-style-type: none"> <li>■ Photosynthesis.</li> </ul> </li> </ul> </li> <li>● Plants give us food to eat.</li> <li>● Plants give us medicine.</li> </ul>
Slide 3	<p>There are many different types of plants that grow in different areas.</p> <ul style="list-style-type: none"> <li>● Some plants have flowers and grow in grasslands.</li> <li>● Highlight diversity and its importance.</li> <li>● Everything is interconnected so we need diversity for healthy ecosystems.</li> </ul>
Slide 4	<p>Some plants live in water.</p> <ul style="list-style-type: none"> <li>● Water lilies, seaweed, algae</li> </ul>
Slide 5	<p>Some plants live in the hot dry desert.</p> <ul style="list-style-type: none"> <li>● Cacti</li> <li>● Succulents <ul style="list-style-type: none"> <li>○ They have thick stems that store water, and sparse leaves that minimize evaporation.</li> </ul> </li> </ul>
Slide 6	<p>The importance of trees.</p> <ul style="list-style-type: none"> <li>● Trees give us oxygen to breathe.</li> <li>● They act as air purifiers. They make sure the air we breathe is clean as they remove toxins from the air.</li> <li>● Their roots keep soil in place which helps prevent flooding and soil erosion.</li> <li>● They are also a source of food and nutrition as well as medicine.</li> <li>● They are also a source of shelter for animals and birds.</li> </ul>

**Video:**

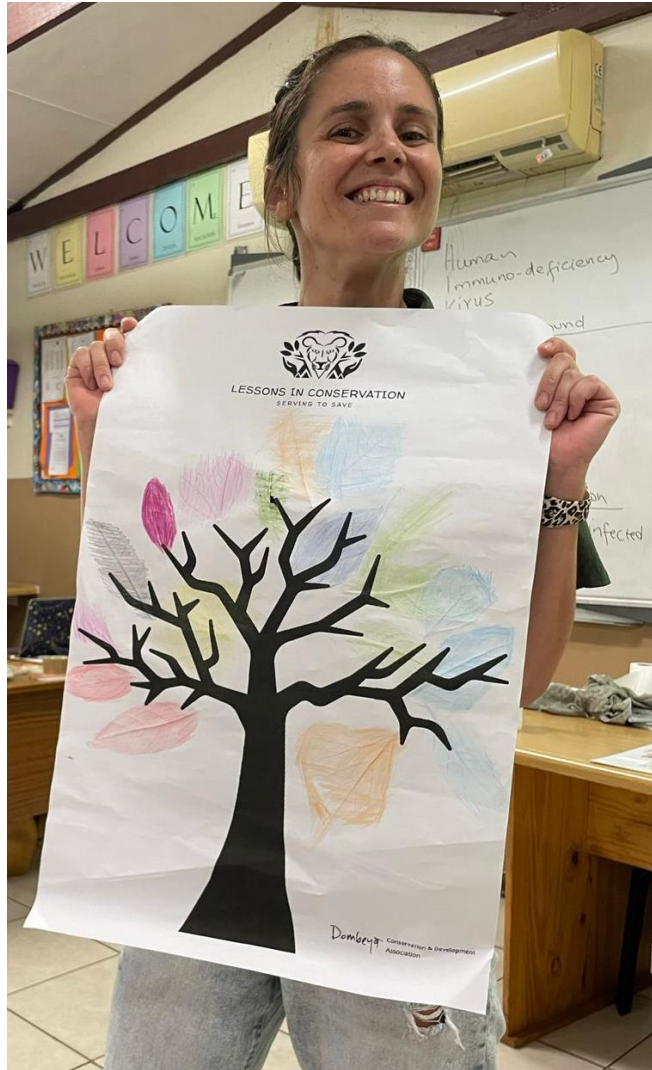
Slide 7	<p>Show video on the importance of trees.</p> <ul style="list-style-type: none"> <li>● Ask the learners what was important in that video or what they learnt.</li> <li>● What could we do to save the trees? Have a class discussion.</li> <li>● Video length: 2 minutes 57 seconds.</li> </ul>
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**Activity:**

Slide 8	<p><i>Leaf Rubbing</i></p> <ul style="list-style-type: none"> <li>● <u>Step 1:</u> All the learners need to find a leaf and pick a colouring-in pencil/ roll</li> </ul>
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- up/ twistie. The leaves can be different shapes and sizes.
- **Step 2:** On a A3 piece of white paper, draw a large tree trunk.
- **Step 3:** Learners need to put the leaf vein-side up behind the piece of paper. They then must use the colouring pencil and colour over the leaf. Rub the side of a crayon or an oil pastel gently on the area over the leaf. As you do this, you'll see the coloured areas start to take the shape of the leaf. Continue until you've rubbed over the entire leaf.
- **Step 4:** Each learner needs to do this to create the leaves for the tree on the piece of paper.



**Content continued:**

Slide 9	Plants are very important for the environment and have been alive for many years.  This incredible Baobab tree is about 3000 years old!
Slide 10	What are alien species?  Alien species are non-native plants, animals, and diseases that cause harm to the environment, human health and the economy.

	<p>Native plants are originally from that area.</p> <ul style="list-style-type: none"> <li>● Alien species are brought into an area, they do not originate naturally in the area. E.g. Plants that originate from somewhere else and are introduced to a new area.</li> <li>● They are known as alien species, exotic or non-native species.</li> </ul>
Slide 11	<p>How do invasive species get here?</p> <ul style="list-style-type: none"> <li>● Some arrive by accident like insects hitching a ride in wooden crates or aquatic animals and plants carried over with cargo ships.</li> <li>● Sometimes they are intentionally brought here like landscape plants that are sold at nurseries, which eventually escape from gardens.</li> </ul>
Slide 12	<ul style="list-style-type: none"> <li>● Why are invasive species bad? <ul style="list-style-type: none"> <li>○ They cause extinction of native plants (outcompeted)</li> <li>○ Reduces biodiversity</li> <li>○ Change habitats</li> </ul> </li> <li>● Invasive species have no natural predators, so populations grow quickly and outcompete native species for resources.</li> <li>● This disrupts food webs and can even endanger some species.</li> </ul>

**Video:**

Slide 13	<p>Show video on invasive species.</p> <ul style="list-style-type: none"> <li>● Ask the learners to share some things that stood out to them from the video.</li> <li>● Ask the learners what the challenges are with having invasive species and how they affect non-invasive species.</li> <li>● Video length: 4 minutes 45 seconds.</li> </ul>
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**Content continued:**

Slide 14	<p>Invasive plants in eSwatini that harm indigenous plants in the area are:</p> <ul style="list-style-type: none"> <li>● Green Wattle</li> <li>● Black Wattle</li> <li>● Mauritius Thorn</li> <li>● Red Sesbania</li> <li>● Guava</li> <li>● Lantana</li> <li>● Bugweed</li> <li>● Triffid Weed - Sandenezwe, meaning “spread throughout the world”. <ul style="list-style-type: none"> <li>○ Ask the learners if they have seen any of these plants before and if they know they are not meant to be in eSwatini.</li> </ul> </li> </ul>
Slide 15	<ul style="list-style-type: none"> <li>● How do we get rid of invasive plants? <ul style="list-style-type: none"> <li>○ Remove the plants that are invasive, making sure you pull out the entire root.</li> <li>○ Plant indigenous plants.</li> </ul> </li> <li>● It is really important to get rid of invasive species as they harm the indigenous plants and animals.</li> <li>● Tell your family and friends about invasive plants and how to remove them.</li> <li>● How can we prevent the introduction of invasive species? <ul style="list-style-type: none"> <li>○ We can be sure not to track dirt from one area to another on our shoes, tyres, or other equipment.</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ Dirt could contain the seeds or eggs from invasive species.</li> </ul> <p><i>Demonstration: invasive plant posters</i></p> <p>Introduce the invasive plant species “jail” poster, as well as the landscape poster of eSwatini.</p> <p>Explain to the learners how they are now part of the “invasive plant police force” and have to go out, find and remove the invasive plant species.</p> <p>The posters will go up in the class and each time the learners find and remove an invasive species, they can put a dot sticker on the landscape poster.</p> <p>This is to demonstrate how invasive the plants are and how they have spread so easily across the land, taking space and other resources away from indigenous plant species.</p>
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**Activity:**

Slide 16	<p><i>Germinate a seed</i></p> <ul style="list-style-type: none"> <li>● <u>Step 1:</u> Learner’s write their name and the date on their ziplock bag with the permanent marker.</li> <li>● <u>Step 2:</u> Each learner should take two pieces of cotton wool. Wet the one piece with water so that it is damp, not soaking. Excess water can be squeezed out. Place that piece in the ziplock bag.</li> <li>● <u>Step 3:</u> Place the seeds on that piece of cotton wool, spaced out evenly. Each learner should get about five seeds each.</li> <li>● <u>Step 4:</u> Wet the second piece of cotton wool with water so that it is slightly more damp than the first piece, and place it on top of the seeds so that they are all covered.</li> <li>● <u>Step 5:</u> Place the ziplock bag on the windowsill or somewhere where they will get some sunlight each day.</li> <li>● <u>Step 6:</u> Begin the seed observation journal in the workbook. Every day, draw the changes that are seen in the seeds. Learners can lift the top piece of cotton wool once a day to observe the changes.</li> <li>● <u>Step 7:</u> Remember to water the seeds each day, depending on how quickly the top piece of cotton wool dries out. A spray bottle can be used with water inside to spray the top piece of cotton wool and the seeds underneath. Alternatively a cup with water can be used and the learners can pour a small amount of water over the top layer of cotton wool each day.</li> </ul>
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*Image: Learners with their various seeds.*

**Content continued:**

Slide 17	<p>What is soil?</p> <ul style="list-style-type: none"> <li>● Discuss learners' answers.</li> <li>● Soil is the skin of the earth.             <ul style="list-style-type: none"> <li>○ We need to take care of it and keep it moist, there are fungi and other organisms that live and grow in it.</li> </ul> </li> <li>● Soil is a combination of abiotic (non-living) and biotic (living) components.             <ul style="list-style-type: none"> <li>○ The abiotic (non-living) components include broken down rock, water and air.</li> <li>○ The biotic (living) components are made up of organic matter, such as dead plants and animals.</li> </ul> </li> </ul>
Slide 18	<ul style="list-style-type: none"> <li>● Only 7% of the Earth's surface has fertile topsoil to plant crops.             <ul style="list-style-type: none"> <li>○ Fertile soil has lots of nutrients for the plants to grow.</li> </ul> </li> <li>● The rest is mountains, oceans, lakes, deserts and polar regions.</li> <li>● We have already buried and destroyed a lot of our topsoil under our cities, roads, landfills and shopping centres.</li> </ul>
Slide 19	<p>Why is soil so important?</p> <ul style="list-style-type: none"> <li>● Without soil, we won't be able to survive. Soil supports life on earth.</li> <li>● Plants             <ul style="list-style-type: none"> <li>○ Many plants need soil to grow. Plants use soil not only for nutrients, but also as a way to anchor themselves into the ground using their roots.</li> </ul> </li> <li>● Atmosphere             <ul style="list-style-type: none"> <li>○ Soil impacts our atmosphere by sequestering gasses such as carbon dioxide from the air.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>● Living organisms <ul style="list-style-type: none"> <li>○ Many animals, fungi, and bacteria rely on soil as a place to live. There are more living individual organisms in a tablespoon of soil than there are people on the earth.</li> </ul> </li> <li>● Nutrient cycles <ul style="list-style-type: none"> <li>○ Soil plays an important role in cycling nutrients including the carbon and nitrogen cycles.</li> </ul> </li> <li>● Water <ul style="list-style-type: none"> <li>○ The soil helps to filter and clean our water.</li> </ul> </li> </ul>
Slide 20	<p>What happens if we don't look after our soil?</p> <ul style="list-style-type: none"> <li>● Soil erosion. Erosion is when tiny pieces of the Earth's surface are moved from one place to another. This is usually caused by moving water or wind.</li> <li>● Desertification is when healthy land turns into a desert. The soil dies and becomes dirt.</li> </ul>
Slide 21	<ul style="list-style-type: none"> <li>● Earth will run out of usable topsoil within 60 years.</li> <li>● 2 cm of topsoil takes 1 000 years to form.</li> <li>● Discuss with the learners what this means and the impact this will have.</li> </ul>
Slide 22	<p>How to look after and save our soil:</p> <ul style="list-style-type: none"> <li>● Ground coverage (blanket) to protect the soil.</li> <li>● We need to keep organic matter on the soil like a blanket to protect the soil against erosion and desertification.</li> </ul>
Slide 23	<ul style="list-style-type: none"> <li>● Make compost <ul style="list-style-type: none"> <li>○ Put nutrients and organic matter back into the soil so that plants can grow well.</li> </ul> </li> </ul>
Slide 24	<ul style="list-style-type: none"> <li>● Plant crops using contours. <ul style="list-style-type: none"> <li>○ Plant crops along the natural contour lines of a field (slope of the land), rather than in straight rows.</li> <li>○ This will slow down water erosion and increase water retention.</li> </ul> </li> <li>● <i>Demonstration: running with contours</i> <ul style="list-style-type: none"> <li>○ Ask the learners if it's easier to run in a straight line or zigzag. (They will say straight line).</li> <li>○ Choose two or three learners to run and the rest must make a straight tunnel (line up opposite each other) for the "water" to run through.</li> <li>○ The two or three learners act like the water and run through the straight tunnel. They will see this is quite easy.</li> <li>○ Then the tunnel learners now line up in a zigzag tunnel pattern that the others must run through.</li> <li>○ The two or three learners run through the new zigzag tunnel and see how they crash into the sides or have to slow down compared to before.</li> <li>○ This demonstrates how water creates more damage flowing against its natural path, therefore we should rather plant crops along natural contours to preserve the soil from water erosion.</li> </ul> </li> </ul>
Slide 25	<ul style="list-style-type: none"> <li>● Plant different crops together <ul style="list-style-type: none"> <li>○ Plant beans with maize to give food for the maize. <ul style="list-style-type: none"> <li>▪ Beans put nitrogen in the soil, maize needs nitrogen to grow for food.</li> </ul> </li> <li>○ Plant a few pumpkin seeds between maize seeds for ground coverage to protect soil from the sun.</li> </ul> </li> </ul>

### Workbook explanation:

The workbook has 3 questions for the learners to answer based on the lesson. The workbook has a Seed Observation Journal for the learners to record the growth of their seed.



## Worksheet answers:

1. What is the difference between erosion and desertification?

Answers	
● Erosion	When tiny pieces of the Earth's surface are moved from one place to another. Usually caused by moving water or wind.
● Desertification	When healthy land turns into a desert. The soil dies and becomes dirt.

2. Why is soil conservation so important?

- Soil is very important because without soil, we won't be able to survive.
- Only 7% of the earth's surface has fertile topsoil to plant crops.
- We have already buried and destroyed a lot of our topsoil under our cities, roads, landfills and shopping centres.
- We need to protect the soil we have against erosion and desertification.
- Helps with increasing the quantity and quality of crop yields long term.
- Improved air and water quality.

3. What would happen if we do not remove invasive plants?

- Native plants will become endangered and eventually extinct.
- Biodiversity will be reduced.
- Habitats would change.
- Food webs will be disrupted.

## Extra Resources:

- *Why do we need plants?:* <https://www.woodlandtrust.org.uk/blog/2018/04/why-plants-are-important/#:~:text=Without%20plants%20there%20would%20be,create%20complex%20carbon%2Dcontaining%20molecules.>
- *Importance of plants:* <https://www.bbc.co.uk/bitesize/topics/zxfrwmn/articles/zss9msg>
- *Soil Conservation:* <https://online.maryville.edu/blog/soil-conservation/#:~:text=Soil%20conservation%20focuses%20on%20keeping,it%20from%20erosion%20and%20deterioration.>
- *Invasive Species:* <https://education.nationalgeographic.org/resource/invasive-species/>
- *Invasive Alien Plant Species:* [https://www.grainsa.co.za/invasive-alien-plant-species-iap#:~:text=Invasive%20alien%20plant%20species%20\(IAP\)%20are%20species%20whose%20introduction%20and,cause%20economic%20or%20environmental%20harm.](https://www.grainsa.co.za/invasive-alien-plant-species-iap#:~:text=Invasive%20alien%20plant%20species%20(IAP)%20are%20species%20whose%20introduction%20and,cause%20economic%20or%20environmental%20harm.)

## References:

- <https://soilsmatter.wordpress.com/2013/08/29/soil-formation/>
- <https://www.soils.org/files/science-policy/sss-a-marketing-2013.pdf>
- <https://www.soils4teachers.org/lessons-and-activities/teachers-guide/its-not-dirt/>
- [https://savory.global/what-is-desertification-and-how-can-we-solve-it/?gclid=CjwKCAiAxP2eBhBiEiwA5puhNRNhCebpwQ9c1zS25ewUy-4tFKToccttpZ-eTLar\\_5dw-ZXsIRO28BoCrxIQAvD\\_BwE](https://savory.global/what-is-desertification-and-how-can-we-solve-it/?gclid=CjwKCAiAxP2eBhBiEiwA5puhNRNhCebpwQ9c1zS25ewUy-4tFKToccttpZ-eTLar_5dw-ZXsIRO28BoCrxIQAvD_BwE)



## Lesson 8: Make your mark

### Lesson Summary:

This lesson is focused on the skills of animal tracking. The basics of how to track an animal are discussed, as well as the factors that should be considered when tracking an animal.

### Lesson Objectives:

- Learners are able to describe what to look for when you are tracking an animal.
- Environmental factors to consider when tracking an animal are well demonstrated.
- Learners are able to apply knowledge of animal behaviour to a tracking scenario.

### Core Competencies Grade 6-7

Social Sciences:

- Map skills
- Climate and vegetation around the world

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Paint
2. Wrapping paper
3. Paper plates
4. Laminated mix and match cards
5. Playdough animal tracks (one made the night before to set, one made fresh)

### Introduction:

Slide 1	<p>Recap previous lesson:</p> <ul style="list-style-type: none"><li>● Why is soil important?<ul style="list-style-type: none"><li>○ Without soil, we won't be able to survive. Soil supports life on earth.</li></ul></li><li>● What is the importance of trees?<ul style="list-style-type: none"><li>○ Oxygen to breathe, air purifiers, roots keep soil in place and help prevent flooding and soil erosion, source of food, nutrition, medicine and shelter.</li></ul></li><li>● What are invasive species and how can we control them?<ul style="list-style-type: none"><li>○ Invasive species are non-native plants, animals, and diseases that cause harm to the environment, human health and the economy.</li><li>○ We can remove invasive plants and plant native plants instead, and educate others.</li></ul></li></ul>
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### Content:

Slide 2	<p>Introduce new lesson topic – tracking</p> <ul style="list-style-type: none"> <li>● Ask the learners what tracking is. <ul style="list-style-type: none"> <li>○ Animal tracking is using the tracks, scat and other signs and clues to locate animals in the environment as well as try to interpret their behaviour.</li> </ul> </li> <li>● Ask the learners if they have ever heard an animal alarm call, such as birds chirping, or if they have ever seen an animal track.</li> <li>● Don't focus on the ground. Lift your eyes, broaden your field of vision and think like an animal. Don't get frustrated and walk faster when you can't find tracks. Rather stop and head back to where the last track was seen.</li> <li>● What do you look for when you are tracking? <ul style="list-style-type: none"> <li>○ Tracks</li> <li>○ Droppings</li> <li>○ Flattened grass</li> <li>○ Mud on grass</li> <li>○ Feeding signs</li> <li>○ Hair and bones</li> <li>○ Claw marks on tree</li> <li>○ Alarm calls</li> </ul> </li> </ul>
Slide 3	<p>Other signs to look for when tracking include:</p> <ul style="list-style-type: none"> <li>● Pellets <ul style="list-style-type: none"> <li>○ Many birds regurgitate parts of their food they cannot digest in compressed pellets. They may contain fur, feathers, or plant material. They have a food preference and what is in the pellet will help you identify what bird it is</li> </ul> </li> <li>● Visual signs <ul style="list-style-type: none"> <li>○ This includes signs of movement when an animal may be hidden. Look for moving bushes or long grass. An animal running away could be spotted by branches moving or braking. Animals underwater could be spotted by bubbles rising to the surface.</li> </ul> </li> <li>● Incidental signs <ul style="list-style-type: none"> <li>○ These include signs like tufts of hair, feathers or Porcupine quills.</li> </ul> </li> <li>● Circumstantial signs <ul style="list-style-type: none"> <li>○ These signs are seen in the behaviour of other animals. Birds can indicate other animals such as Oxpeckers can indicate buffalos, eland, and kudu. Alarm calls can indicate predators such as birds, monkeys, or baboons calling and being restless. Antelope and buffalo will often stand and stare at intruders. Birds can indicate if there is a snake or dangerous animal around.</li> </ul> </li> <li>● Territorial signs <ul style="list-style-type: none"> <li>○ This includes scent-marking with urine, faeces, or scent transferring to bushes from special scent organs. Scent is not visible, but territorial signs can be seen in the form of middens from rhinos. Some small antelope wipe their preorbital glands on the tips of grass or twigs and leave a black tarry substance.</li> </ul> </li> <li>● Feeding signs <ul style="list-style-type: none"> <li>○ Diets of animals in a particular area or time of year can help you track. Feeding signs give us a hint of what animals have been eating. This then helps us follow spoor. Browsers can see which bushes they are eating. Feeding elephants leave a trail of broken branches. Circling vultures can help locate predators.</li> </ul> </li> <li>● Homes and shelters <ul style="list-style-type: none"> <li>○ Most animals have a route or path they often follow. Paths will always take an easy route and avoid obstacles. Several animal species can use the same path or parts of it. Paths are often clear in good feeding areas</li> </ul> </li> </ul>



	<p>or by water. Further away from these areas paths are less distinct. The main paths will often break off into smaller paths.</p> <ul style="list-style-type: none"> <li>● Paths <ul style="list-style-type: none"> <li>○ Only a few animals have permanent homes that they use throughout the year. Most animals will only have a fixed home during breeding season to protect their young. An example is nests. You can identify different species from the size, structure, and materials used for the nest. Animals that do not make homes simply lie down to rest. This will create an impression in long grass or bushes. Another shelter could be burrows and live underground. Many animals play an important role and their holes/homes are used by other animals. You can see who lives in the hole/burrow by the size of the entrance and how the soil was excavated as well as tracks and droppings at the entrance.</li> </ul> </li> </ul>
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**Video:**

Slide 4	<p>Show video on alarm calls by Alex and Renias.</p> <ul style="list-style-type: none"> <li>● Pause video after each sound demonstrated and repeat sound examples in real life with the learners.</li> <li>● Video length: 5 minutes 55 seconds.</li> </ul>
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**Content continued:**

Slide 5	<ul style="list-style-type: none"> <li>● Image of various animal tracks</li> <li>● Point out a few for the learners to see how they are all different. <ul style="list-style-type: none"> <li>○ Some have two toes (antelopes)</li> <li>○ Some have three toes (rhino)</li> <li>○ Some have claws (most wild cats)</li> </ul> </li> </ul>
Slide 6	<p>Do you think the animal walked on the sand in the left or the right picture? Why?</p> <ul style="list-style-type: none"> <li>● Left.</li> <li>● There is an impression mark in the sand.</li> </ul>
Slide 7	<p>Which grass patch did the animals walk through? Why?</p> <ul style="list-style-type: none"> <li>● Right.</li> <li>● There is a game path cleared through the grass.</li> </ul>
Slide 8	<p>Spot the cheetahs! Do you think the grass will be flat when they stand up?</p> <ul style="list-style-type: none"> <li>● Flattened grass shows you where an animal has been.</li> </ul>
Slide 9	<ul style="list-style-type: none"> <li>● Animal bones can indicate if predators are nearby or have just left the area. It also gives a sign as to who will come into the area next.</li> <li>● For example, lions may have left this carcass as the meat is finished. Then scavengers like hyenas or vultures will start to arrive.</li> </ul>
Slide 10	<p>Types of tracks:</p> <ul style="list-style-type: none"> <li>● Substrate effects size and freshness. <ul style="list-style-type: none"> <li>○ Substrate is the underlying layer.</li> </ul> </li> <li>● Thick sand and mud often make tracks look bigger.</li> <li>● Thin sand with hard beneath makes tracks look smaller.</li> <li>● Never look at a single track, walk up and down as there may be clearer tracks</li> </ul>

	<p>elsewhere.</p> <p><i>Demonstration: playdough tracks</i></p> <ul style="list-style-type: none"> <li>● Have two playdough tracks made. One should have been made the night before so that it is hard and can represent thin, hard sand making tracks look smaller.</li> <li>● The second one should be freshly made to represent the thick sand and mud that makes tracks look bigger.</li> <li>● Learners can see and touch the different substrates.</li> <li>● Can also use playdough set the night before and fresh sand from outside the school, if available.</li> </ul>
Slide 11	<p>How to distinguish if a track is fresh or not:</p> <ul style="list-style-type: none"> <li>● Are there clear outlines and ridges? <ul style="list-style-type: none"> <li>○ If the outline of the track is sharp and clear and the ridges are still prominent, it means that the tracks are fresh.</li> </ul> </li> <li>● Are there other tracks over it? <ul style="list-style-type: none"> <li>○ If there are other tracks over it, you must assess how fresh those tracks are.</li> </ul> </li> <li>● Are there raindrops over it? <ul style="list-style-type: none"> <li>○ When was the rain? Will give clues as to how old it is.</li> </ul> </li> </ul>

**Video:**

Slide 12	<p>Show video on the art of tracking.</p> <ul style="list-style-type: none"> <li>● Ask the learners what they have learnt from the video, what they found interesting, if they can imagine tracking animals in the wild. Have a short class discussion.</li> <li>● Video length: 2 minutes 52 seconds.</li> </ul>
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**Activity:**

Slide 13	<p><i>Make your own tracks</i></p> <ul style="list-style-type: none"> <li>● <u>Step 1:</u> Place some paint on the paper plates. Each plate can have a colour on it. E.g. one plate with only red paint, one plate with only blue paint, etc.</li> <li>● <u>Step 2:</u> Roll out the wrapping paper or lay out the piece of paper. It is better to have quite a large area for the learners to be able to paint on.</li> <li>● <u>Step 3:</u> The learners must place their hand in the paint that is on the paper plate. Their whole hand (palm and fingers) must be covered in paint.</li> <li>● <u>Step 4:</u> The learners must then place their hand on the paper to make their “track”.</li> <li>● The learners can use different paints and make as many tracks as they like. Try covering the paper with colourful hand prints. This can then be used as a classroom decoration if you wish.</li> </ul>
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*Image: Hand print activity.*

**Content continued:**

Slide 14	<p>Practical tracking</p> <ul style="list-style-type: none"> <li>● You need to understand how animals behave. To do this you need to understand: <ul style="list-style-type: none"> <li>○ Where they live</li> <li>○ Who they live with</li> <li>○ What they eat</li> <li>○ How much water they drink</li> <li>○ How they behave in different seasons</li> </ul> </li> <li>● Learning what to look for and when to look for it is very important. This takes years of practice and being in nature.</li> </ul>
Slide 15	<p>There are animals that live together and therefore you will always see their tracks together.</p> <ul style="list-style-type: none"> <li>● E.g. Impala and zebra.</li> </ul>
Slide 16-18	<p>Examples of animal behaviour</p> <ul style="list-style-type: none"> <li>● During hot summer months, Leopards spend more time in trees and atop termite mounds in mid-afternoon to feel a breeze.</li> <li>● Rhinos have territorial boundaries, when you get to know where their favourite wallowing sites are and you see tracks in that direction, you can be pretty sure where they are heading.</li> <li>● Buffalo and elephant are very water dependent. Drinking every day, sometimes twice a day in summer.</li> </ul>

**Activity:**



<p>Slide 19-26</p>	<p><i>Identifying who these tracks belong to</i></p> <ul style="list-style-type: none"> <li>● The next few slides will show different animal tracks. All learners need to guess who they think the track belongs to before you tell them the answer. If time permits, a few learners can give reasons for why they are saying the track belongs to a certain animal. <ul style="list-style-type: none"> <li>○ First track: Lion <ul style="list-style-type: none"> <li>■ 4 toes, 3 lobes, no claws</li> </ul> </li> <li>○ Second: White Rhino <ul style="list-style-type: none"> <li>■ 3 toes, shape of 3</li> </ul> </li> <li>○ Third: Buffalo <ul style="list-style-type: none"> <li>■ 2 toes</li> </ul> </li> <li>○ Fourth: Snake</li> </ul> </li> </ul>
<p>Slide 27</p>	<p><i>Mix and match the tracks</i></p> <ul style="list-style-type: none"> <li>● There will be mix and match cards that the learners will use for the activity.</li> <li>● One set has pictures of the animals on the cards and the other set has pictures of the tracks.</li> <li>● The learners need to mix and match the cards and figure out which tracks belong to which animals.</li> <li>● Learners split into groups of two or four, depending on the size of the class.</li> <li>● Each learner takes a turn to hold up a track and the rest of the learners state what animal they think it belongs to, then find the matching animal card.</li> <li>● Can make it a competition where the first team with all correct pairs, wins.</li> </ul>  <p><i>Image: Learners using their workbooks to figure out which tracks belong to which animal.</i></p>

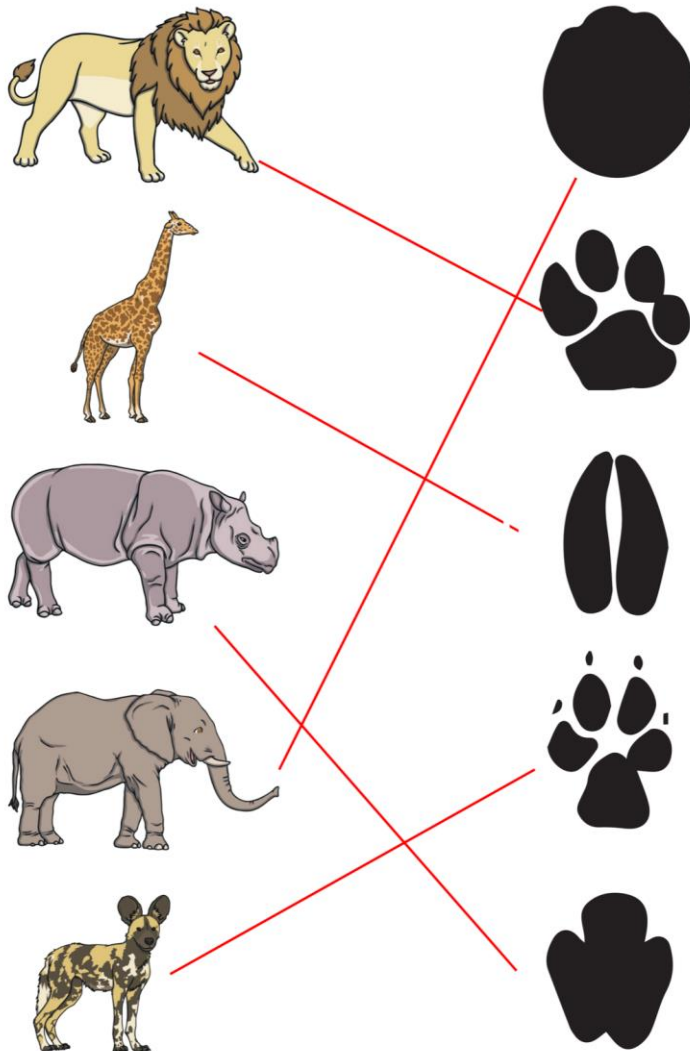
**Workbook explanation:**

Learners have a mix and match activity where they need to match the animal to its track. There is also a colouring-in page for the learners.

**Worksheet answers:**



# MATCH THE ANIMAL TO THEIR TRACK



## Extra Resources:

- *Tracking Information:* <https://www.wildernesscollege.com/tracking-animals-2.html>
- *Tracking:* <https://www.wildernesscollege.com/tracking-animals-2.html>

## References:

- *Slide 2:* <https://nature-mentor.com/introduction-to-animal-tracking/>
- *Information from:* L. Liebenburg 's A Field Guide to Animal Tracks of Southern Africa, 1990

## Lesson 9: Hold the future in your hands

### Lesson Summary:

This lesson focuses on what tourism is and how it is important for the economy and preservation of a country. It also focuses on sustainable tourism and ecotourism as the way forward in the tourism industry. Job opportunities in the tourism sector as well as in the conservation industry are discussed, with an importance on how learners are able to work towards attaining these jobs.

### Lesson Objectives:

- Learners demonstrate a complete understanding of what tourism is, and are able to distinguish between a tourist and tourism.
- Learners are able to discuss the positive and negative effects of tourism, as well as what sustainable tourism means.
- Learners can differentiate between different job opportunities available in the tourism sector as well as the conservation sector, and are able to discuss why these jobs are important and how they can work towards attaining one of these jobs.

### Core Competencies Grade 6-7

#### Social Sciences:

- Population – why people live where they do

#### Life Skills:

- Social responsibility – dignity of people’s religions, cultural rites of passage, caring for animals, caring for people, nation building and cultural heritage.

### Teaching Materials:

1. Projector
2. Screen
3. Cable leads
4. Extension cords and adapters
5. Laptop
6. Lesson presentation on PDF
7. Videos for lesson
8. Speaker

### Lesson Materials:

1. Post-surveys
2. Pens

### Introduction:

Slide 1	<p>Recap previous lesson</p> <ul style="list-style-type: none"><li>● What is tracking?<ul style="list-style-type: none"><li>○ Animal tracking is using the tracks, scat and other signs and clues to locate animals in the environment as well as try to interpret their behaviour.</li></ul></li><li>● What do you need to keep in mind when tracking an animal?<ul style="list-style-type: none"><li>○ Tracks, droppings, flattened grass, mud on grass, feeding signs, hair and bones, claw marks on trees, alarm calls, as well as animal behaviour.</li></ul></li></ul>
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### Video:

Slide 2	<p>Show video on tourism in Eswatini.</p> <ul style="list-style-type: none"> <li>● Ask the learners what their favourite part of the video was and why. Discuss some answers.</li> <li>● Video length: 2 minutes 55 seconds.</li> </ul>
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**Content:**

Slide 3	<p>Tourism</p> <ul style="list-style-type: none"> <li>● Ask learners what they think tourism is and discuss some answers.</li> <li>● Africa is full of diversity and different kinds of animals.</li> <li>● Lots of people from all over the world come to Africa to see these animals.</li> <li>● They want to experience the culture of Africa, eat local food and visit local places of interest.</li> </ul>
Slide 4	<p>Tourism</p> <ul style="list-style-type: none"> <li>● A tourist is someone who travels to a different destination for pleasure.</li> <li>● Tourism is the business of encouraging and supporting tourists.</li> <li>● E.g. the creation and maintenance of nature reserves for tourists to visit.</li> <li>● Ask the learners if they can think of any other places that tourists would like to visit in Eswatini or Africa.</li> <li>● Ask the learners if they think tourism has a positive or negative effect on the country and discuss their reasoning for their responses.</li> </ul>
Slide 5	<p>Positive effect of tourism (“the good”):</p> <ul style="list-style-type: none"> <li>● Generates income for maintenance, anti-poaching and roads and buildings for communities.</li> <li>● Creates more jobs for more local people.</li> <li>● Helps to conserve the environment, cultures and traditions.</li> </ul> <p>Negative effect of tourism (“the bad”):</p> <ul style="list-style-type: none"> <li>● Uses up the local natural resources.</li> <li>● Increased amount of pollution and litter.</li> <li>● There is more habitat loss to support the tourism trade.</li> </ul>
Slide 6	<p>Job opportunities in tourism:</p> <ul style="list-style-type: none"> <li>● There are many job opportunities in tourism. Ask the learners if they can think of any.</li> <li>● Tourist attractions – there needs to be people who manage the parks and locations, sell tickets, give tours, etc.</li> <li>● Accommodation and catering – providing places for tourists to stay and restaurants for them to eat at and enjoy.</li> <li>● Transportation – bus drivers, taxi drivers, aeroplane pilots, etc. who are needed to transport the tourists around.</li> <li>● Guiding service – experienced field guides to take groups of tourists on tours and teach them about local history and culture.</li> <li>● Tour operators – people who book tours and trips specifically for holiday packages.</li> <li>● Travel agents – people who book your transport, accommodation and can also offer certain all-inclusive food packages for tourists to buy when planning a trip.</li> </ul>
Slide 7	<p>Tourism in Eswatini</p> <ul style="list-style-type: none"> <li>● Every year, 1.3 million tourists visit Eswatini. There are about 1.2 million people living in Eswatini. That means that more people visit per year than live there!</li> <li>● On average, international tourism brings in E 338.02 million into Eswatini.</li> </ul>
Slide 8-9	<p>The big five</p>



	<ul style="list-style-type: none"> <li>● Ask the learners if they can recall the animals that make up the big five. <ul style="list-style-type: none"> <li>○ Lion, rhino, buffalo, leopard, elephant</li> </ul> </li> <li>● Ask the learners what their favourite big five animal is and why.</li> <li>● Why is the big five so important? <ul style="list-style-type: none"> <li>○ The big five are very important to Eswatini because it brings in a lot of tourists and tourism, which brings in a lot of money into the country and creates a lot more job opportunities for people in the country.</li> </ul> </li> <li>● There are a number of threats to the big five. <ul style="list-style-type: none"> <li>○ Ask the learners if they can think of what threats there may be.</li> <li>○ Poaching, extinction, trafficking, selling and buying illegal animal products (lion bone trade, rhino horn, elephant tusks, etc.)</li> </ul> </li> <li>● We need to tell people about the big five and how amazing they are to conserve them so our grandchildren can see them too.</li> </ul>
Slide 10	<p>Ecotourism</p> <ul style="list-style-type: none"> <li>● A form of tourism that involves low-impact visits to undisturbed ecological areas.</li> <li>● It helps local communities by giving them control over how tourism develops, and by helping locals to use what they have in sustainable ways.</li> </ul>
Slide 11	<p>Sustainable tourism</p> <ul style="list-style-type: none"> <li>● Tourism that takes responsibility for its current and future economic, social and environmental impacts.</li> <li>● Businesses in tourist areas need to be more eco-friendly and aware of the negative impacts that tourism can have.</li> </ul>
Slide 12	<ul style="list-style-type: none"> <li>● We can all play a part in protecting our wildlife!</li> <li>● Conservation starts with you.</li> <li>● Ask the learners for some ways that they think they can help protect our wildlife? What jobs can help protect our wildlife?</li> </ul>
Slide 13-16	<p>Job creation through conservation</p> <ul style="list-style-type: none"> <li>● There is almost anything you can do when you want to work in conservation.</li> <li>● Accountant, marketer, lawyer, architect, builder, web designer, anti-poacher, photographer, scientist, chef, artist, project manager, tracker, reserve manager, game capturer, security guard, game ranger, events planner, etc.</li> <li>● Architects, builders and project managers <ul style="list-style-type: none"> <li>○ Ask the learners what they think these jobs entail.</li> </ul> </li> <li>● Interior designers <ul style="list-style-type: none"> <li>○ Ask the learners what they think an interior designer does.</li> </ul> </li> </ul>

**Activity:**

Slide 17	<p><i>Architects and builders</i></p> <p>The learners must try to “make” objects out of their bodies. The idea is that they are architects and builders and use their body to imitate the item. The teacher will walk around and ask the learners what they are creating. The learners can use their bodies to make anything such as a house, a vehicle, an animal etc.</p> <p>Learners can be split into small groups of 3 or 4 and can work together to “build” objects.</p>
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**Content continued:**

Slide 18	<p>Anti-poacher</p> <ul style="list-style-type: none"> <li>● Discuss with the learners what kind of job this is and why it is important.</li> </ul>
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**Video:**

Slide 19	<p>Show video on Black Mambas anti-poaching unit</p> <ul style="list-style-type: none"> <li>● Discuss with learners what they think of being an anti-poacher after seeing the video. <ul style="list-style-type: none"> <li>○ Anti-poaching means opposing, prohibiting, or acting to prevent poaching.</li> </ul> </li> <li>● Video length: 4 minutes 42 seconds.</li> </ul>
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**Content continued:**

Slide 20-24	<p>Discuss more conservation related job opportunities with the learners, including what the job entails and whether they think it would be a good or bad job and why. Also discuss how they could work towards having a job in that field.</p> <ul style="list-style-type: none"> <li>● Photographer</li> <li>● Artist</li> <li>● Tracker</li> <li>● Field guide</li> <li>● Game capturer</li> </ul>
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**Conclusion:**

Slide 25	<ul style="list-style-type: none"> <li>● Ask the learners if they would like a career in conservation and why.</li> <li>● Discuss with the learners what they enjoyed most about our lessons.</li> <li>● Ask the learners what was most exciting to learn about.</li> <li>● Complete post-surveys.</li> </ul>
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**Extra Resources:**

- *Why is tourism important?:* <https://tourismteacher.com/importance-of-tourism/>
- *Ecotourism:* <https://parks.des.qld.gov.au/management/ecotourism/about#:~:text=The%20World%20Tourism%20Organisation%20defines,cultures%20prevailing%20in%20natural%20areas>
- *Sustainable Tourism:* <https://www.gstcouncil.org/what-is-sustainable-tourism/#:~:text=Sustainable%20tourism%20is%20defined%20by,the%20environment%20and%20host%20communities.%E2%80%9D>
- *Advantages and disadvantages of Tourism:* <https://www.javatpoint.com/advantages-and-disadvantages-of-tourism>
- *Tourism can benefit nature:* <https://sustainabletravel.org/how-tourism-benefits-nature-and-wildlife/>
- *Black Mambas Anti-Poaching:* <https://www.nationalgeographic.co.uk/travel/2021/03/meet-the-black-mambas-south-africas-all-female-anti-poaching-unit>