

Dombeya

Conservation & Development
Association



LESSONS IN CONSERVATION

SERVING TO SAVE

SENIOR WORKBOOK

Becoming a conservation expert

NAME: _____

LESSON 1

CONTINUING YOUR CONSERVATION JOURNEY



Earth's **natural resources** include air, minerals, plants, soil, water and animals. Conservation is the care and protection of these resources.



CONSERVATION:

Conservation is the act of protecting the Earth, its habitats, ecosystems and diversity, so that it is healthy and functioning for all species, including humans. We conserve nature because nature is important. We also protect the Earth for future generations- so that our children can enjoy nature and have healthy lives. Conservation is the sustainable use of nature by humans.

EARTH PROVIDES US WITH SO MUCH:

- Air from plants and trees that we breathe.
- Water, from oceans, rivers and rain.
- Food in the form of plants and animals that we eat.
- Ecosystems, which are all of the living and non-living things in an area that depend on each other and work together.



HOW CAN WE HELP PROTECT OUR EARTH

- Don't litter!
- Plant indigenous species.
- Reuse bottles and bags.
- Reduce plastic use- say no to plastic bags and straws.
- Turn off water and lights when you don't need them.



CONSERVATION IS IMPORTANT BECAUSE IT:

- It protects animals and plants.
- Creates jobs.
- Helps with tourism and brings in money.



HOW DOES ALL THIS AFFECT ME?

We are all connected. Small actions done every day by millions of people add up. If one person drops a 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.

Your habits and actions affect everything either negatively or positively.



QUESTIONS:

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

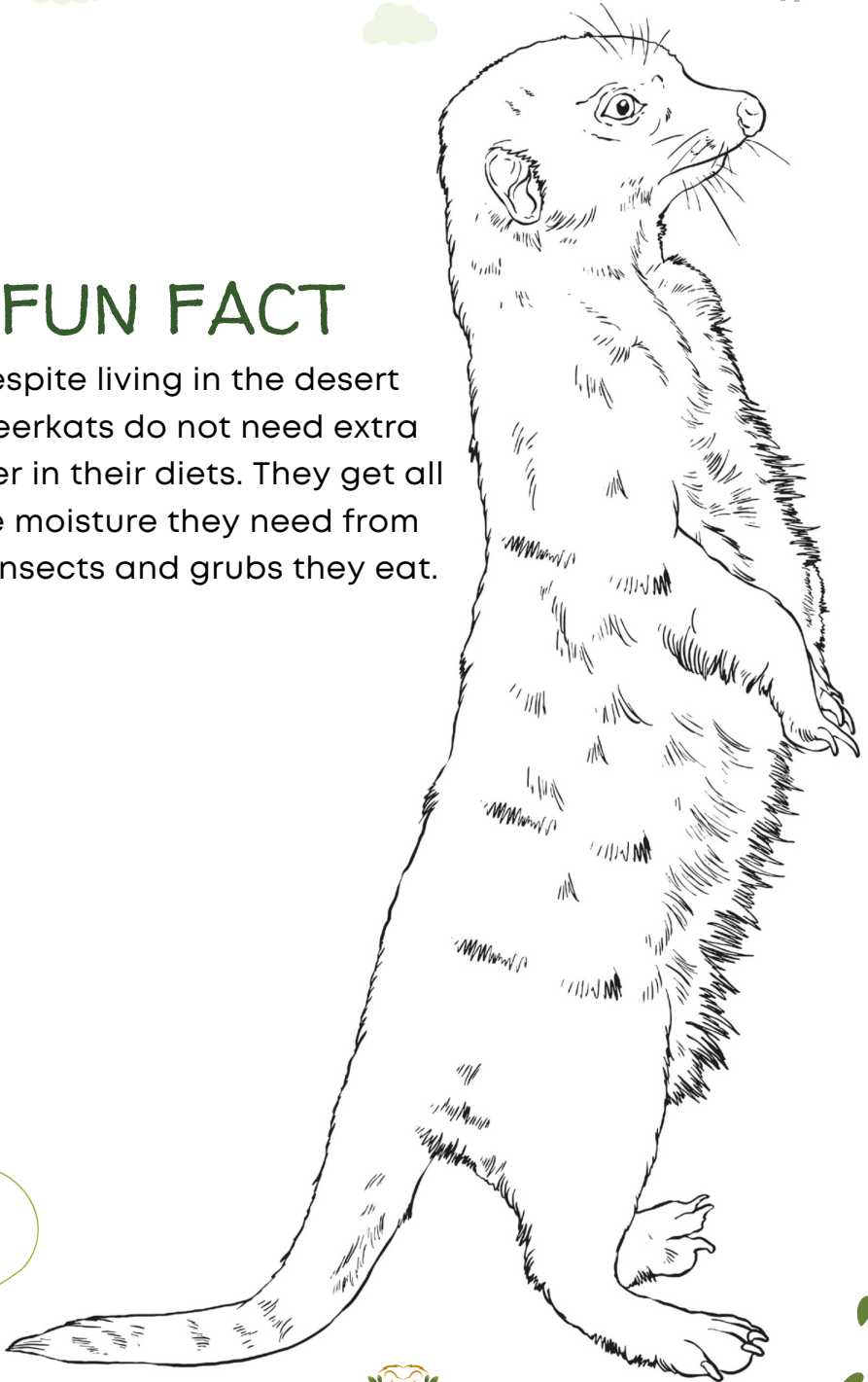
2. How can you conserve more at school and at home?

3. What do you think will happen if we don't look after the Earth?



FUN FACT

Despite living in the desert meerkats do not need extra water in their diets. They get all the moisture they need from the insects and grubs they eat.



LESSON 2

BE PART OF THE CIRCLE OF LIFE

All around us we see nature working together.
Teamwork is good because you can do more together!

ANIMALS WORK TOGETHER FOR:



Food



Protection



Warmth



Saving energy



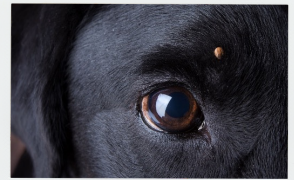
MUTUALISM

Both benefit
E.g. Oxpecker and Rhino



COMMENSALISM

One benefits and one is unaffected
E.g. Cow walks through grass and stirs up bugs for the birds to eat.



PARASITISM

One benefits and the other is harmed
E.g. Tick on a dog



ECOSYSTEM:

All of the living and non-living things in an area that depend on each other and interact.



THREATS TO ECOSYSTEMS:



- Pollution
- Deforestation
- Poaching
- Overgrazing
- Climate change
- Human population growth

WHY ARE ECOSYSTEMS IMPORTANT?

- Pollination, which gives us crops and fruit.
- Clean air to breathe.
- Clean water to drink and cook with.
- Raw materials to make everything we need.
- Medicine.
- Energy.
- Waste removal.

THESE ARE THE BUILDING BLOCKS OF LIFE.



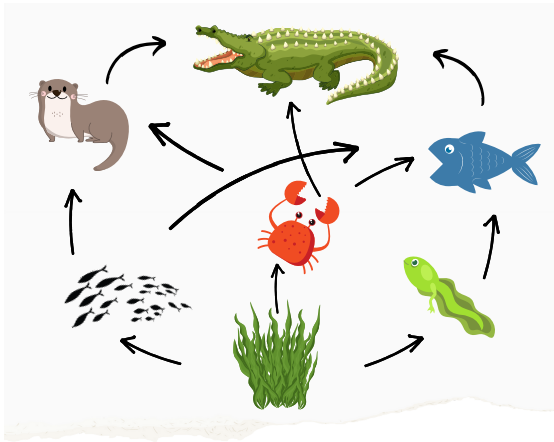
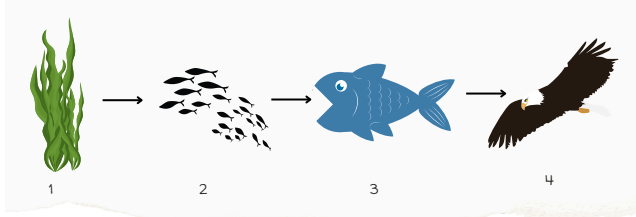
"EVENTUALLY WE'LL REALISE THAT IF WE DESTROY THE ECOSYSTEM, WE'LL DESTROY OURSELVES."
-Jonas Salk



WHAT IS THE DIFFERENCE BETWEEN A FOOD CHAIN AND A FOOD WEB?

A food chain shows a single path of energy from organism to organism. A food web is a complex network made up of many food chains, where the energy can follow many paths.

A FOOD CHAIN IN ESWATINI



A FOOD WEB IN ESWATINI

WHAT HAPPENS IF THE LINKS ARE BROKEN?

- Extinction
- Diseases
- Overpopulation
- Loss of indigenous species

THERE ARE 3 CATEGORIES OF ENDANGERED SPECIES:

CRITICALLY ENDANGERED

ENDANGERED

VULNERABLE

Experts decide when a species is endangered or not. They look at: (1) Is the species' habitat disappearing? (2) How many of the species are left? and (3) How quickly are the number of species getting less?

Up to one million plant and animal species face extinction because of humans and our actions.

EXTINCTION:

Extinction is the complete disappearance of a species from Earth.



A LETTER TO HUMANITY:

If you were Earth, what would you say to humanity?
Write a letter to humanity here:



A series of horizontal lines for writing a letter.



LESSON 3

SOARING TO NEW HEIGHTS

HOW DO BIRDS FLY?

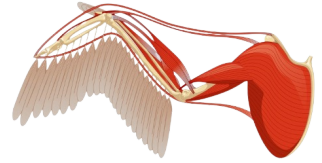
1. Wings and smooth feathers.



2. Hollow air-filled bones



3. Streamlined bodies with tail feathers for direction and stability.



4. Strong muscles for flapping power and an enlarged breastbone.

MIGRATION:

Seasonal movement between breeding grounds and feeding grounds.

Most birds migrate in big groups called **flocks**.



Breeding grounds



Feeding grounds

CHALLENGES FOR BIRDS:

- **Landscape 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?
- **Pesticides** are toxic for birds.
- **Habitat loss** means there are less spaces for the birds to live.
- Birds can also get **disorientated from light pollution**.
- Birds can also get hurt by **colliding with tall buildings** and electrical wires while they fly.

HOW DO BIRDS HELP US?

Birds help control insect populations, help with pollination and help with seed dispersal.



HOW TO IDENTIFY A BIRD

SIZE AND SHAPE:

How the bird looks, the size of its head, body and what shape it is.

BEHAVIOUR:

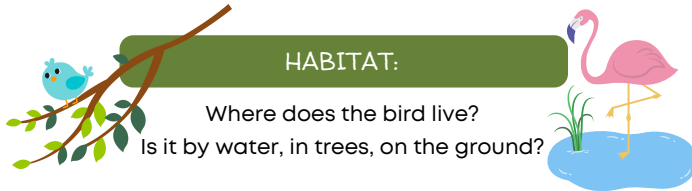
- How does the bird act?
- What actions does it do?
- How does it fly, sit, move?
- What noises does it make?

COLOUR AND PATTERN:

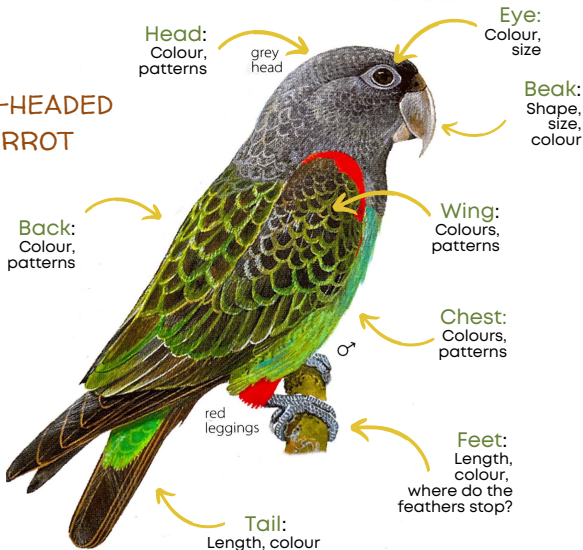
What colour is the bird, does it have any patterns? Look on the stomach, back, head and wings.

HABITAT:

Where does the bird live?
Is it by water, in trees, on the ground?



GREY-HEADED PARROT

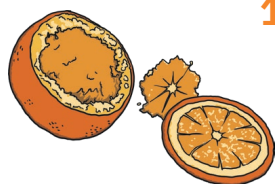


MAKE YOUR OWN BIRD FEEDER!

WHAT YOU NEED:

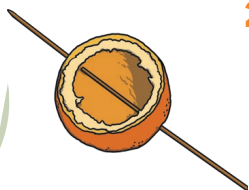
- String
- 1 large orange
- Bird seeds
- 2 wooden skewers
- Scissors
- Knife
- Scoop

WHAT TO DO:



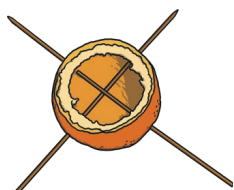
1

Cut one-third off a large orange and scoop the insides out.



2

Insert a skewer through one side of the orange and push through to the other.



3

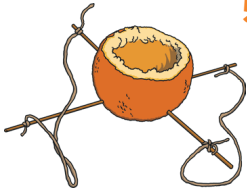
Insert another skewer on the other side and push through. The skewers should cross in the middle, forming a great perch for the birds.





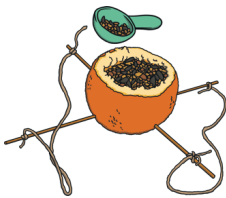
4

Use the scissors to cut two pieces of string that are equal in length.



5

Attach one string to the skewers on both sides to form a handle. Do this again to another two skewers to form another handle.



6

Scoop the seeds into the empty orange.



7

Use the two string handles to hang the bird feeder from a branch.



8

Watch the birds feeding in your garden.

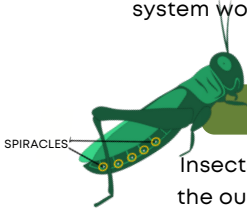


LESSON 4

INSPECT THE INSECTS

BIODIVERSITY:

There are many different types of plants, as well as insects. Biodiversity is 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. Everything depends on one another and diversity creates a stronger food chain and system.



HOW DO INSECTS BREATHE?

Insects have **spiracles**, which are holes on the outside of their bodies. They take in air from outside through their spiracles.



Insects have **EXOSKELETONS**.

PARTS OF AN INSECT:



HEAD



THORAX

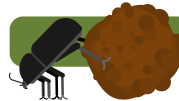


ABDOMEN



BEES:

- Bees are great pollinators!
- There are many bee products.
- Bees give us honey which is delicious, and has medicinal and antibacterial uses.



DUNG BEETLES:

- A dung beetle is a beetle that feeds on faeces!
- They are either "**rollers**", rolling the dung into balls and then burying the balls in soft soil; or "**burrowers**", taking the dung into tunnels directly under the main heap; or "**dwellers**" which actually live in the dung.

WHAT WILL HAPPEN IF THERE ARE NO BEES?



Bees themselves are also a part of the food chain as many birds and spiders and insects eat bees.



Plants will not be able to reproduce and will die.



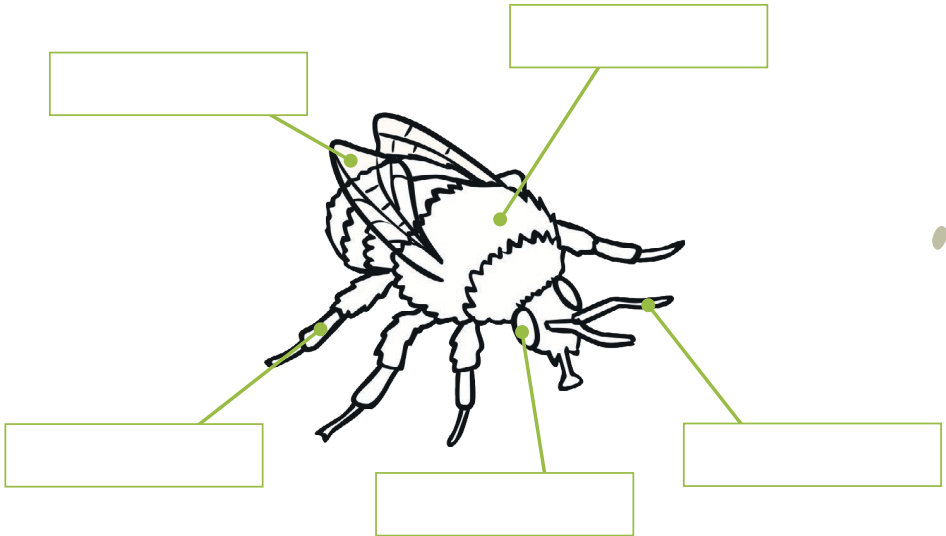
Trees and flowers serve as food and shelter for creatures and won't be able to grow.

- Dung beetles keep the Earth clean from dung!
- They minimize the number of flies and keep the environment healthy.
- Dung beetles help plant trees and plants which creates food and shelter within the environment.



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.

These help the bees to smell but also help them measure how fast they are flying!

These help the bee to fly.

This is the main body of the bee.

These help the bee know if danger is coming from any direction.

ANTENNA

THORAX

LEGS

WINGS

EYES



LESSON 5

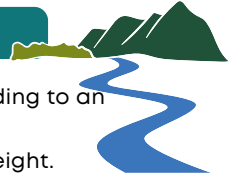
FIND YOUR FLOW



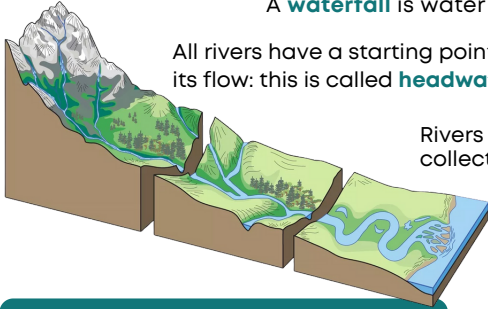
RIVER AND WATERFALLS:

A **river** is a flowing stream of water heading to an ocean, lake or another river.

A **waterfall** is water falling from a height.



All rivers have a starting point where the water begins its flow: this is called **headwater** or **the source**.



Rivers start in upland areas. Rain water or snow collect on high ground and form little streams.

These streams flow downhill and become larger forming rivers.

MBULUZI RIVER:

- The Mbuluzi river is a unique ecosystem, that supports many different animals including humans.
- It provides us with resources, such as food (fish), water, and it is also a home for animals to live.
- It also has an aquatic food web with plankton in the water for smaller fish to eat, and crocodiles who eat the fish.

THREATS TO OUR RIVERS:

1. **Pollution** kills fish and other animals, prevents fish from breeding well and allows invasive weeds to grow.
2. **Climate change** leads to changes in temperature and rainfall causing changes to the river levels.
3. **Overfishing:** As the human population grows, more people are dependent on the river for food. This decreases the amount of fish in the river. This can lead to a breakdown in the food chain and a lack of availability of food.



LITTER:

Rubbish and trash that is discarded where it is not meant to be. Litter is not natural and should not be in nature!

WHY IS LITTERING BAD?

- Ugly, and a form of pollution.
- It takes a long time to decompose, so it's around for a long time (up to 1,000 years for a plastic bag in a landfill)
- Expensive to clean up.
- Rivers can become blocked and cannot flow.
- Animals can choke, get trapped and tangled (die); this can also be a loss for humans when animals die.
- Takes a long time to decompose, so it's always around.



QUESTIONS:

1. Why are rivers important for us on Earth?

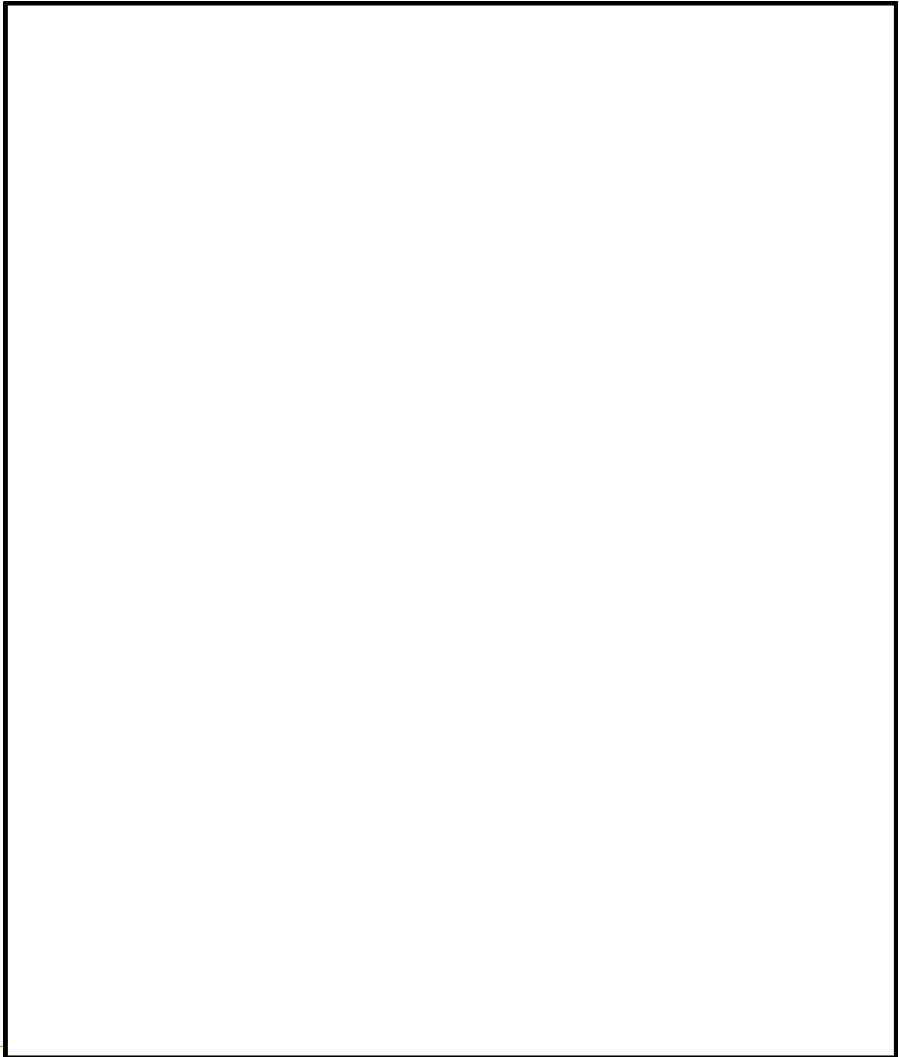
2. How are some ways that we can overcome threats to rivers?

3. What are some ways that you can reduce the amount of litter at your school?



DESIGN A "PROTECT THE MBULUZI RIVER" POSTER:

Using everything you know about the importance of rivers, design a poster telling people in your community to protect the Mbuluzi river. Your poster could be about what happens when people litter or why pollution is bad for rivers. You can explain all the reasons why water is important and why we need to protect and conserve it.



LESSON 6

BE THE CHANGE

WHAT IS THE DIFFERENCE BETWEEN WEATHER AND CLIMATE?



Weather

Weather describes the conditions outside right now for a specific place. E.g. rain, snow, sunny



Climate

Climate describes the weather conditions that are expected in a region at a particular time of year.

WHAT IS CLIMATE CHANGE?

Climate change is a long-term change in weather and temperatures. These changes can be natural or as a result of human activity and are not good for the planet.

WHAT IS GLOBAL WARMING

It is the long term rise in Earth's temperatures, caused by greenhouse gases, mainly from human activities like burning fossil fuels.

GLACIAL AND INTERGLACIAL:

- Temperature changes over time can be described as glacial events (lots of ice), or interglacial periods (warmer weather).
- Earth moves gradually between glacial events and interglacial periods over time.
- We are in an interglacial period right now.

WHAT CAUSES GLOBAL WARMING?



SOLUTIONS TO CLIMATE CHANGE AND GLOBAL WARMING

- Educate as many people as you can about what climate change is.
- Turn off your electronic devices when you are not using them.
- Recycle and reuse plastic containers and packets instead of throwing them away.
- Change your light bulbs to more energy efficient light bulbs.
- Plant a tree – a single tree will absorb one ton of carbon dioxide over its lifetime.
- Only purchase food that you will eat and compost any that is left over



CHANGE AN INVENTION:

We need to keep Earth healthy by reducing our waste, reusing things, and recycling. Scientists and engineers are continually improving existing inventions in order to make them better. For example, scientists and engineers took the invention of cars and made them more Earth-friendly by developing electric cars. Your goal today, as a scientist, is to improve upon an already existing invention to make it healthier for our Earth.

FIRST, IDENTIFY AN INVENTION YOU WANT TO IMPROVE FOR THE GOOD OF OUR EARTH.

Here are some ideas of inventions you may want to improve:



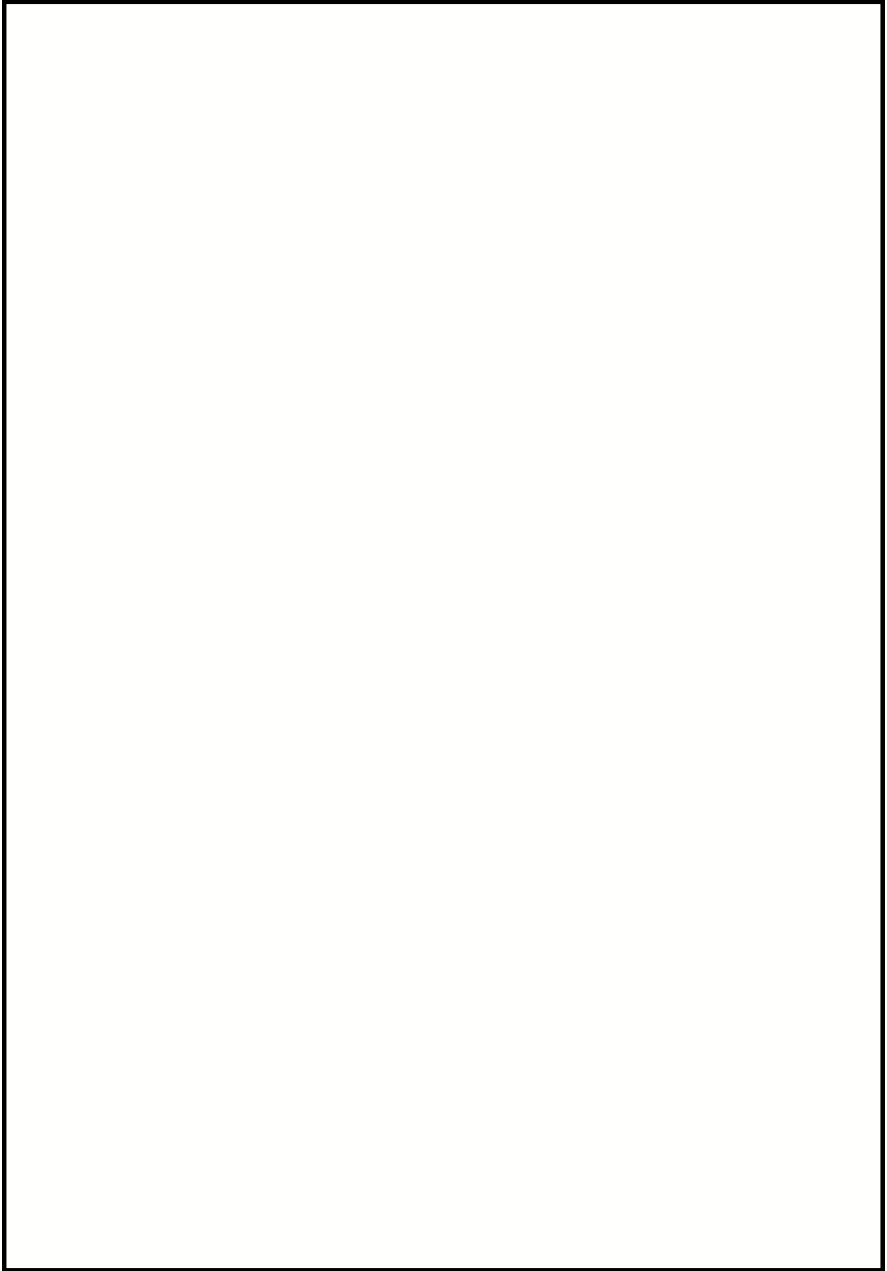
What invention are you going to improve? Write your answer below.

NEXT, WHAT NEEDS TO BE CHANGED IN THIS INVENTION TO REDUCE ITS IMPACT ON EARTH?

What are you going to change about this invention? Think about how this invention could be harming the Earth. Write your answer below.



DESCRIBE OR DRAW YOUR CHANGED INVENTION:



LESSON 7

EXPLORE WHAT'S UNDERNEATH YOUR FEET

ALIEN, EXOTIC OR NON-NATIVE:

Originate from somewhere and are introduced somewhere else.



WHY ARE INVASIVE SPECIES BAD?

- Cause extinction of native plants.
- Reduce biodiversity.
- Change habitats.
- Disrupt food webs.



IMPORTANCE OF TREES:

1. Oxygen
2. Air Purifier
3. Roots prevent flooding and soil erosion
4. Source of food and nutrition



HOW DO WE REMOVE INVASIVE PLANTS?



- Dig up and remove invasive species.
- Plant more indigenous plants in place of invasive ones.
- Tell your family and friends about alien and invasive plants so that they can remove them too.

WHAT IS SOIL?

SOIL =

Combination of abiotic (non-living)

- Broken down rock
- Water
- Air

+ and biotic (living)
Organic matter
(dead plants and animals)

WHY WE NEED SOIL:

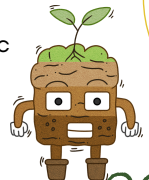
Allows us to grow food, purifies our water, protects us from floods, prevents droughts, stores carbon to fight climate change.

WHY DO WE NEED TO LOOK AFTER OUR SOIL?

- 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.

HOW CAN WE TAKE CARE OF OUR SOIL?

- Feed the soil by making compost.
- Plant crops using contours to slow down erosion and increase water retention.
- Ground coverage- keep organic matter, like blanket, on the soil.
- Plant different crops together.



QUESTIONS:

1. What is the difference between erosion and desertification?

2. Why is soil conservation so important?

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



SEED OBSERVATION JOURNAL:

Draw or describe your observations on each day:

Type of seed planted: _____

Date planted: _____

DAY: ____

DAY: ____

DAY: ____

DAY: ____

DAY: ____

DAY: ____

DAY: ____

DAY: ____

DAY: ____



LESSON 8

MAKE YOUR MARK

Animal tracking is using the tracks, scat and other signs and clues to locate animals in the environment and interpret their behaviour.



PELLETS

Many birds regurgitate parts of their food they cannot digest in compressed pellets. They may contain fur, feathers, or plant material.

Birds have a food preference and what is in the pellet will help you identify what bird it is.



INCIDENTAL SIGNS

These include signs like tufts of hair, feathers or porcupine quills.

VISUAL SIGNS

Signs of movement may mean an animal is 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.

CIRCUMSTANTIAL SIGNS

These signs are seen in the **behaviour of other animals**. Birds can indicate other animals, such as Oxepeckers that indicate buffalos.

Alarm calls can indicate predators. Eg. birds, monkeys, or baboons calling and being restless.



FEEDING SIGNS

Diets of animals in a particular area or time of year can help you track. Gives us a hint of what animals have been eating, which helps us follow spoor.

Eg. Feeding elephants leave a trail of broken branches. Circling vultures can help locate predators.



TERRITORIAL SIGNS

Scent-marking with urine, faeces, or scent transferring to bushes help us track. Scent is not visible, but territorial signs can be seen in the form of middens from rhinos. Some small antelope leave a black tarry substance on the tips of grass or twigs.

HOMES AND SHELTER

Few animals have permanent homes. Most animals only have a fixed home during breeding season to protect their young. You can identify different species from the size, structure, and materials used for the nest. Animals that do not make homes lie down to rest. which creates an impression in long grass or bushes. Other animals live in burrows underground.



PATHS

Most animals have a route or path they often follow. Paths will always take an easy route and avoid obstacles.



TRACKS

Thomson's Gazelle



Grant's Gazelle



Buffalo



Bushbuck



Warthog



Hartebeest



Eland



Duiker



Waterbuck



Impala



Gemsbok



Steenbok



Wildebeest



Klipspringer



Giraffe



Reedbok



Zebra



Kudu



Springbok



Okapi



Dik Dik



Sable Antelope



Nyala



Roan Antelope



Dassie



Hedgehog



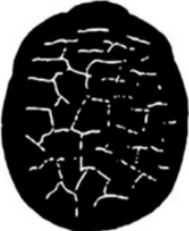
Baboon



Porcupine



Elephant



Caracal



Hyena



Hippo



Genet



Honey Badger



Cheetah



Jackal



Lion



Leopard



Aardvark



Rhino



Civet



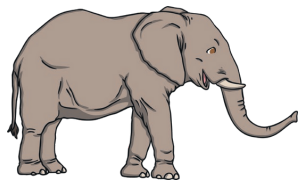
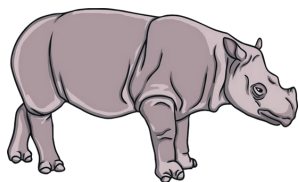
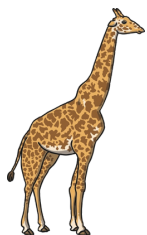
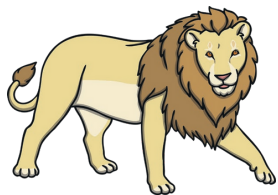
Serval



Wild Dog



MATCH THE ANIMAL TO THEIR TRACK



FUN FACT

Hyenas live in territorial social groups called clans. Clans are dominated by females and can reach up to 70 members.



LESSON 9

HOLD THE FUTURE IN YOUR HANDS



Tourist = A Person who travels for pleasure.

Tourism = Business of encouraging and supporting tourist. Eg. By creating nature reserves, we can encourage locals and tourists to spend time in Eswatini. Tourism creates jobs, and tourism money helps pay for nature conservation. This benefits people and the planet!



WHAT IS ECOTOURISM?

Tourism that involves low-impact visits to undisturbed ecological areas.



SUSTAINABLE TOURISM:

Tourism that takes responsibility for its current and future economic, social and environmental impacts.



WE CAN ALL PLAY A PART IN PROTECTING OUR WILDLIFE! CONSERVATION STARTS WITH YOU!



WHAT JOBS DOES CONSERVATION CREATE?

ALMOST EVERYTHING

- Accountant
- Architect
- Anti-poacher
- Chef
- Tracker
- Marketer
- Builder
- Photographer
- Artist
- Reserve manager
- Lawyer
- Web designer
- Scientist
- Project manager
- Game capturer
- Security guard
- Game ranger
- Events planner



FUN FACT

Butterflies use their feet to taste,
not a tongue like we do.



Dombeya Conservation & Development
Association

This conservation education project was implemented by the Dombeya Conservation and Development Association, Eswatini, with generous funding from the United Nation Development Programme and GEF Small Grants Programme.



TO MAKE A DONATION OR FIND OUT HOW TO GET INVOLVED, CONTACT US AT:

INFO@LESSONSINCONSERVATION.COM

