OL PEJETA CONSERVANCY

CONSERVATION EDUCATION CURRICULUM

Preface

Conservation education at Ol Pejeta conservancy

At Ol Pejeta conservancy (OPC) we believe that our conservation efforts today will only count if the next generation is invested in, engaged and empowered to carry them forward.

The OPC Conservation Education Program focuses its specific educational efforts not only on learners (post-kindergarten through university) and their educators in both classroom and informal settings, but to the wider visitor base.

Vision for the Conservation Education Program

OPC plays an effective role in developing an environmentally literate citizenry to sustain our diminishing natural wildlife population and their habitats whether public or private for future generations, and to develop the next generation of conservation leaders.

In fostering environmental literacy about forests, grasslands, and related natural resources, the Conservation Education Program:

- Recognizes that ecosystems are dynamic, that humans are an integral part of ecosystems, and that human activity has both positive and negative consequences;
- Aligns with the OPC mission and long-term strategic goals;
- Coordinates and supports delivery of conservation education programs with internal and external partners;
- Uses the conservancy's vast resources as opportunities for outdoor education to teach fundamental environmental processes across many disciplines, and encourages place-based education;
- Encourages consumer behaviors that sustain natural resources and minimizes negative consequences to the environment.

Mission of the Conservation Education Program

The Conservation Education Program works with partners to coordinate development and delivery of high-quality, science-based education about forests, grasslands, and related natural resources to pre-kindergarten through university learners and their educators and the wider public, in both formal and non-formal settings.

For the 25,000 school learners we welcome each year, we have launched a **conservation in action programme** with the aim of giving learners a hands-on experience on all conservation efforts put in place so as to better understand its importance. Visit www.olpejetaconservancy.org to read more on this.

We constantly aim to develop materials that learners will be able to use as tools to relate what they learn in class with the real world. OPC with its rich biodiversity and ecosystems offers the ideal outdoor classroom.

It is our ambition that by so doing we will instill a sense of awareness and concern for the environment that will give birth to a movement for conservation in the current and next generations.

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Definitions

- **Environment** - the surroundings or conditions in which a person, animal, or plant lives or operates
- **Species** - a set of animals or plants in which the members have similar characteristics to each other and reproduce within themselves
- **Habitats** - the natural home of an animal, plant, or other organism
- **Web of life** - it is the link between different organisms in the environment through which energy and nutrients are transferred
- **Community** - consists of a group of animals and plants that live in the same habitat
- **Native plants or animals** - These are plants/animals that occur naturally, or existed for many years in an area
- **Adaptation** - a body part or feature or a behavior that helps a living thing survive and function better in its environment.
- **Herbivore** - an organism that eats mostly plants
- **Carnivore** - an organism that eats mostly meat
- **Omnivore** - an organism whose diet includes both animal and plant foods
- **Predator** - an animal that lives by killing and eating other animals
- **Prey** - an animal hunted as food by another animal
- **Camouflage** - protective coloring that helps an animal blend in with its surroundings
- **Metamorphosis** - transition during the life history of some animals from birth or hatching to the adult stage
- **Decomposing -** to decay, or to cause something to decay
- **Chlorophyll** - the green coloring matter found mainly in the leaves and stems of some plants that absorbs energy from sunlight to produce carbohydrates from carbon dioxide and water during **photosynthesis**
- **Photosynthesis -** a process by which a plant produces its food using energy from sunlight, carbon dioxide from air and water and nutrients from the soil
- **Anthers -** the male part of the flower that contains the pollen
- **Stigma -** The female part of the flower where pollen germinates
- **Pollen -** a fine powdery substance, typically yellow, consisting of microscopic grains discharged from the male part of a flower or from a male cone. Each grain contains a male cell that can fertilize the female ovule
- **Ovule -** the part of the ovary of seed plants that contains the female cell and after fertilization becomes the seed
- **Pollen tube -** a hollow tube that develops from a pollen grain when deposited on the stigma of a flower. It conveys the pollen to the ovule.

- **Pollination -** the act of transferring pollen grains from the male anther of a flower to the female stigma with the goal of creating offspring for the next generation
- **Fertilization** - When the male and female cells fuse in the ovary to form seeds.
- **Ecosystem -** includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere)
- **Food chain** - a series of organisms ranked in a way in which each is dependent on the next as a source of food.
- **Food web** - is a natural interconnection of food chains
- **Trophic level** - each of several hierarchical levels in an ecosystem, comprising organisms that share the same function in the food chain and the same nutritional relationship to the primary sources of energy
- **Producers** - these includes all plants that make their own food. **Producers** are then eaten by primary consumers that cannot produce their own food, such as giraffes and zebras.
- **Equator** - an imaginary line on the surface of the earth of equal distance from the north and south poles that divides the earth into northern and southern hemisphere
- **Equinox** - the time or date at which the sun crosses the equator causing day and night to be of equal length. It happens twice a year about 22nd September and 20th March

Objectives

TOPIC 1: OUR WORLD – the living things around us

This topic aims at helping learners understand that as humans we share our world with many other living things both domestic and wild. In this section the learners will be led to look at and appreciate the many different plants and animals found within the conservancy and their own environment.

Through this it is hoped by the end of the lesson learners will understand the connections between the natural world and themselves and how our actions as human beings impact other living things.

Plants in our environment

- Learners will understand that the **environment** has many different plant **species.**
- They will be able to identify various plants found in Ol Pejeta and in their own environment.

Animals in our environment

- Learners will be able to understand that as humans we share the planet with different kinds of animals.
- They will be able to identify and name a good number of animals that they see in OPC.

Habitats and communities

In this section learners will be able to understand:

- How all living things are inter- connected.
- What habitats are and their importance.
- How to identify communities of plants and animals.

TOPIC 2: HOW DO ANIMALS FUNCTION?

Learners will understand how animals:

- Are grouped for classification purposes.
- Adapt to their environment.
- Compete for survival.
- Feed.
- Interact with each other.

Mammals

- Characteristics of mammals
- Different types of mammals

Birds

- Learners will be able to identify and name some common birds seen on Ol Pejeta/ in their environment

- Learners will start to take note of birds in the environment and the role they play
- Learners will understand how adaptations help different species of birds to cope with their environment

Reptiles and Amphibians

Learners will develop an understanding of:

- Difference between amphibians and reptiles.
- Warm blooded vs cold blooded.
- What is **metamorphosis**.
- **Adaptations** of amphibians and reptiles.

The learners will be able identify and name a few reptiles and amphibians, those seen at OPC during their visit and those found in their local environment.

Insects

For learners to understand:

- More about insects and how they function.
- How various **adaptations** in species of insects helps them cope with their environment.

TOPIC 3: HOW DO PLANTS FUNCTION?

This topic will highlight the components of a plant, how plants reproduce and plants classification according to their different characteristics.

Parts of a plant

- For learners to understand the parts of a plant and what role they play.

Pollination

- For learners to understand the process of pollination and its importance.

Seed dispersal

- For the learners to understand how and why seeds are dispersed.

TOPIC 4: HOW DO ECOSYSTEMS FUNCTION?

- To explain what ecosystems are and how they function.
- What is man's role in the ecosystem.

Equator

- How the equator affects day and night, seasons and biodiversity.

Introduction to Conservation Education Curriculum

The aim of this curriculum guide is to provide a chronological set of lessons and hands on activities that will connect learners to their environment. It's hoped that this way, they will understand the connections between nature and their own lives. The lessons and projects in this curriculum should teach learners about the world they live in and how it works and how our presence as humans impacts other species and the overall functioning of habitats and ecosystems.

The curriculum is on a larger part modelled around the ecosystems of OPC as a wildlife conservancy while incorporating various take home activities. We hope to use the curriculum to impart knowledge and understanding about the natural world and the importance of conservation to learners so that as they visit OPC, they can relate all they learn in class about nature to the real world. We hope that as they enjoy the beautiful biodiversity of the conservancy it can be like a nature book come to life.

Summary of Lessons

The lessons are divided into 4 major topics with various sub topics, under which the following will be highlighted.

- ➢ Background information

This will provide facilitators with the foundational information they need to administer the lesson.

- ➢ Activity sheets

This will consist of one or more activities that will help to cement the objective of the lesson. It will also give information on any materials and preparation required for an activity.

- ➢ Questions and discussion

This section will give learners an opportunity to give their views and ask questions at the end of each lesson.

Hopefully, these questions will spark a discussion among the learners about the topic learnt.

TOPIC 1: OUR WORLD – the living things around us

Learners will be required to;

1. Observe and describe the different plant and animal **species** encountered while in the conservancy.
2. Take note of their abundance and the locality they are spotted in e.g. near the river, marsh area or in the open grassland.
3. Understand how various organisms relate to each other.

Plants in our environment

Background information

Plants come in many shapes and sizes. Different plants grow in different **habitats.** From grasses to trees, shrubs and herbs, plants are able to absorb sunlight to make their food and grow.

The different parts of plants provide food and many other benefits for people and other animals.

Activity sheets

Activity 1:

Procedure

1. The facilitator could divide the learners into small groups and have one person in the group take down the following details on a piece of paper:
    i) Plant species names, if known (common/local name).
    ii) Describe flowers, leaves and any seeds that may be seen.
    iii) Type of animals, if any, found on the plant.
    iv) Approximate height (short, medium or tall).
    v) Outstanding physical features of the plant e.g. thorns or galls on the whistling thorn tree.
2. Have the learners list all the plants that they see on their game drive and at the Chimpanzee sanctuary forest walk, Hippo hide river walk or Morani information centre area. Samples of grasses and flowers can be collected, but try to take as few of each as possible (guides can help the learners name plants observed).
3. Afterwards, make one list of every species that was seen by the learners.
4. The facilitator could then guide the learners to look at each plant seen, help to **identify** it and analyze which plants were **most frequently** seen and location seen and thus their preferred habitat.
5. This will be useful to explain a lot about the different types of plants the learners observed on the trip.

Also discuss various uses and benefits derived from various plants (herbs, shrubs and trees) to the environment, humans and other animals.

Materials needed:

Notebook and pencil/pen

Activity 2

For younger learners

Colors and patterns of nature

The learners can be guided to collect different shapes and sizes of leaves, different colour flowers, seeds and seed pods, pieces of tree bark etc. as they walk along hippo hide river walk. Also, as they walk, let them stop and feel the different texture barks of trees (watch out for trees with thorns on the barks)

After completing the walk, they can sit at the picnic tables there and stick the different

materials collected on a white piece of paper to make a colorful mural that they can take home.

Activity 3

Leaf animals

Have learners make an art of their favorite animal with various plants, sticks, fruits, seeds collected on a white piece of paper. After that, show others your art and describe what it is.

(The purpose is to improve creativity through playing with plants.)

<u>Materials needed:</u>

A4 pieces of paper or Manilla paper

Office glue or two-sided sticky tape

Scissors

Animals in our environment
Background information

The world is full of different types of animals. From the ocean, to the air and the vast land and below ground, various animals inhabit particular **habitats**. They all play a critical role in the **web of life**. Learning how and why they function the way they do, can enable us to better appreciate, conserve and coexist with them.

Activity sheets

Procedure

1. Divide learners into small groups. If groups have few members each one can do an activity individually. Then have them record the various animals observed as they go through OPC, including birds, reptiles, amphibians and insects (a guide can help in identification).
2. Use the following format to make it more enjoyable.

Activity 1

Wild Alphabet

Can you try and spot animals for all the letters of the alphabet A-Z (First letter of each name).

3. Afterwards have the learners pick 2 or 3 of the animals observed and describe their individual traits and characteristics/behavior.

    Name of the animal

    Seen alone or in a group

    What do I eat?

    Where do I live?

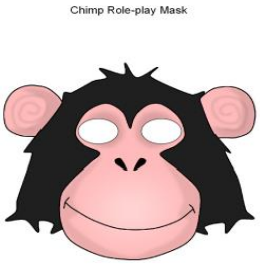
    Who might eat me?

    How many legs do I have?

    What else can you find out about me?

Activity 2:

For younger learners



Role play

Print out masks/draw and cut out the faces of different animals for the learners to wear. Then they can role play the animals' behavior to accompany a story telling about those animals.

Poetry

Have the learners write a poem about their favorite animal or one that they have learnt about.

Gesture game

Write names of different animals on separate pieces of paper and put them in a closed box.

One learner picks up a paper that is written a name of an animal from the box and gestures (without talking) to the other learners then they guess which animal it is.

Activity 3:

Quizzer

- ✓ How can you tell between a male ostrich and a female ostrich?
- ✓ Which is the largest antelope?
- ✓ Name one physical difference between a Grant's gazelle and a Thomson's gazelle
- ✓ Which animal has the shortest sleep requirements of any mammal, only spending 10 min to 2hrs of sleep per day?
- ✓ Tusks are for elephant's … teeth

a) Canine b) Incisors c) Molar

Habitats and communities
Background

A habitat is the natural home of an animal, plant or other organism. The world is made up of different types of habitats where different types of animals and plants are found. From grasslands, deserts, forests, to mountains, riverine and in water. A group of animals and plants living in a habitat make up a community

Activity sheet

Activity 1

➢ Have the learners revisit the lists of plants they identified earlier on their game drive to various sections of the conservancy. Let them group together different plants according to where they were seen e.g. yellow barked acacia – along the river, wetland, whistling thorn acacia – on grassland/bushland.

The learners can be assisted to understand that each grouping of plants represents a habitat.

Habitats found in Ol Pejeta include

- Grassland
- Bushland – mixed acacia
- Wetland
- Riverine

➢ Now have the learners go over the list of animals they identified and match them to the various habitats they were spotted in (including birds, insects, reptiles etc.). This will now make a community. Note that some animals are present in more than one habitat.

Discussion and take-home activities

The facilitator can then lead the learners to discuss and do the following;

1. The causes and effects of habitat loss for native animals. Also find out what planned development activities that threaten sensitive habitats in your area.
2. Take part in tree planting activities at your school/community. Find out which native trees would benefit native animals in your school.
3. Plant a garden/ create a habitat on your school grounds to attract wildlife and birds
6. Participate in river cleanups under proper and knowledgeable supervision. Replant river banks with native plants to provide wildlife habitat and to prevent soil erosion.

Activity 2:

For younger learners

Make my habitat

Divide the learners into small groups. Let each group choose a particular habitat e.g. group A – grassland, group B – riverine, group C – wetland.

Then lead the learners to make a model (using modelling clay, cardboard carton), drawing or painting of the habitat they have chosen, making sure to include the different animals and plants that were seen in that habitat.

TOPIC 2: HOW DO ANIMALS FUNCTION

At this point we have established that we as humans share the planet with many other living things. There are different types of species and all of them are related in one way or the other in the greater web of life. Hence all living things, each with different requirements, need to live together and share resources. For us to be able to coexist with other living things in the environment, it is important that we understand how they function and why they do the things they do.

Background

It is estimated that there could be between 2 to 50 million different species on earth. Animals belonging to the same species are more like each other than they are like any other group of animals. They can breed with each other but not with members of other species. A way of sorting through all those species is to organize them by similar characteristics. This process is called **classification**.

Now let us look at the different classes of animals.

Mammals

Some general characteristics of mammals include:

- Are vertebrates (which means they have a backbone or spine)
- Are warm-blooded – animals that regulate their own body temperate which allows them to live in almost every climate on earth
- Have hair on their bodies
- Produce milk to feed their babies
- Give birth to live young ones

Activity sheets

Activity 1

➢ From the lists of animals that they identified on their field trip in OPC, have the learners visit the Morani information centre to match some of the animals to their:

❖ Bones
❖ Horns
❖ Teeth
❖ Skulls
❖ Dung

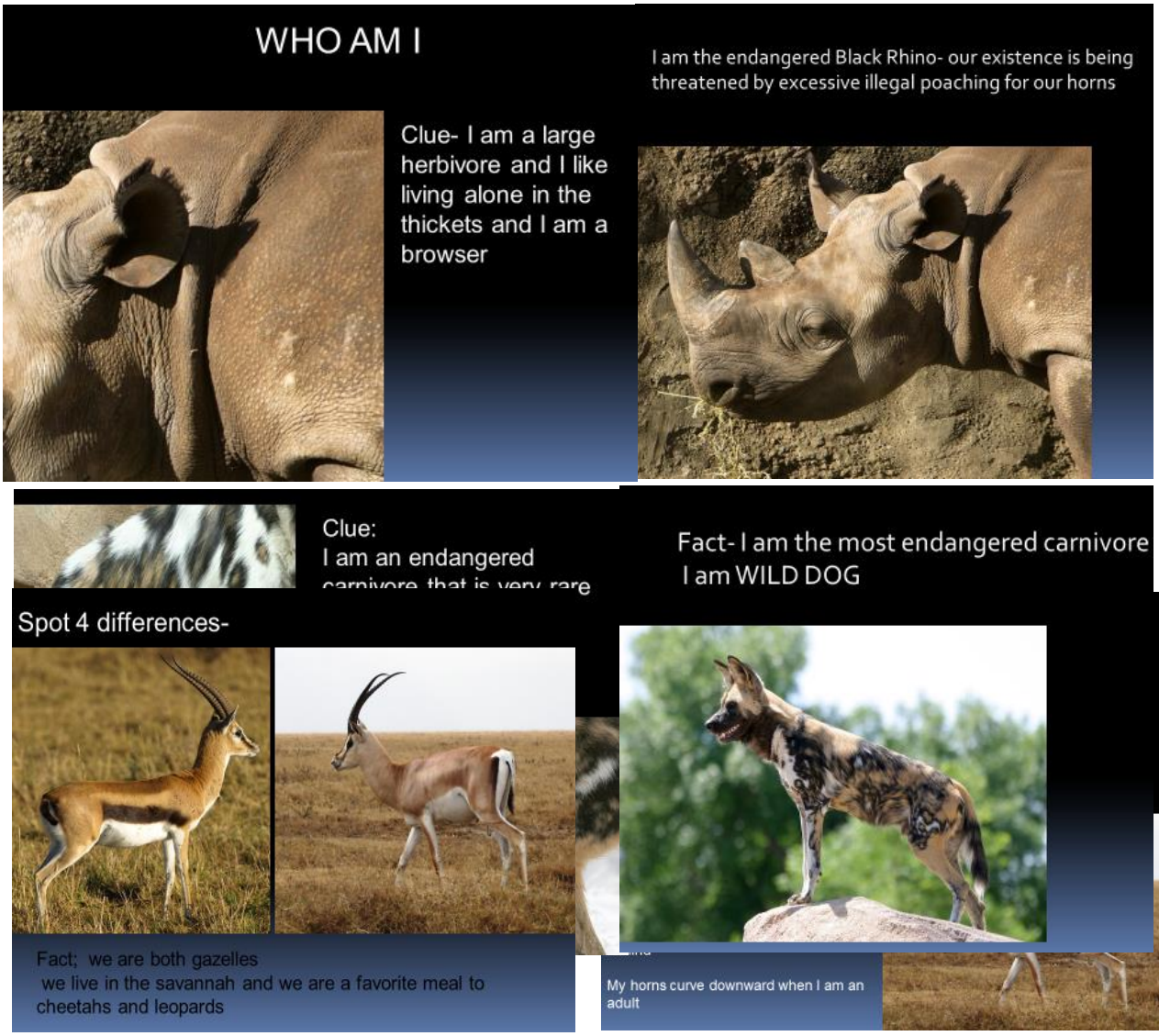
Also add other characteristics of animals learnt and identified earlier.

- Introduce and discuss the terms herbivore, carnivore, and omnivore. Have learners go through their lists of the animals they have seen, and tell which mammals herbivores are, which are carnivores, and which are omnivores. After looking at any mammal teeth at the information centre, explain to the learners that herbivores have smooth teeth for tearing and grinding plants; carnivores have sharp teeth for catching, killing, and tearing prey. Discuss the terms predator and prey.

- Also discuss how different animals interact with each other. Do they live alone or in groups? What is the reason for this? Herbivores like gazelles, zebras and impalas live in groups as a protection strategy from being eaten by carnivores. Animals like black rhinos and leopards live alone (solitary), others like hyenas live in packs.

Activity 2

Who Am I?



Activity 3

Predator/Prey Active Game

To demonstrate the concept of predator/prey relationships within the conservancy, ask the participants to come up with one predator/prey pair they know about. Examples: Lion and zebra, secretary bird and snakes, etc. Choose one of those for the game. Set up four cones to be the general boundary, and set up a few sporadic cones or hula hoops (depending on the size of the playing field) within the middle of the playing field to act as shelter/safety spots. Out of the participants, choose two to three (again, depending on the size of the participating group) to be the predators and the rest of the participants to be the prey. One end zone will be the starting point and considered a shelter/safe zone for prey and the other end zone will contain "food" that the prey need to obtain without being tagged by a predator. The participants acting as prey need to obtain 2 food items and make it safely back to the side they began on to win the round. Predators cannot tag prey at any point the prey is behind the end zones or touching a cone/hula hoop in the center. Additionally, predators cannot tag prey that are frozen (camouflaged in their environment).

- ➢ Visit the Hippo hide and learn more about hippos which are mammals that can stay in water for long periods of time only coming out at night to graze. Try to spot them in the river as you take a river walk with our guide there.

Birds

Background

Birds show the same diversity of lifestyles as do mammals, but they also show some unique adaptations. Most can fly, while few mammals can (only bats). Some use highly detailed coloration to camouflage themselves in order to blend in with their surroundings and hide from predators, while others use showy coloration to attract mates. Because birds have different shaped beaks, they can eat different kinds of foods. They also have different types of feet to help them wade in water or perch on tree branches or scratch the ground for worms and insects. And birds build different kinds of nests in different kinds of places with different kinds of materials.

Activity sheets

Materials needed:

- Bird feathers
- Bird nests
- Bird eggshells
- Bird books, pictures of birds & Ol Pejeta birds checklist
- Note books

- Binoculars if possible
- Brown paper bag

Activity 1

This activity will be carried out at the Chimpanzee Sanctuary forest walk.

Using Ol Pejeta birds checklist to help guide you and the help of a guide, help the learners tick out all the birds that they are able to identify from bird walk.

The learners should then write down the names of birds identified in their notebooks and write as many characteristics of the birds as they can.

When a bird is spotted let the learners also note what the bird is doing, what sound its makes and the difference in plumage between male and female birds.

Additional activity:

1. Look out for feathers that may have fallen on the ground and with the help of a guide try to identify which bird each feather belongs to.

   Put all the feathers you find in a little brown paper bag.

   After the activity, stick the feathers/shells in your notebook and write a few notes about each bird.

2. Look out for different birds' nests/egg shells on trees and on the ground and ask a guide to help you identify which birds the nests/shells belong to.

3. Listen out for bird calls as you walk along, and ask a guide to help you identify which calls belong to which birds. Why do birds make different sounds? What do the different calls mean?

4. Discuss the different kinds of foods birds eat: insects, seeds, nectar, other birds' eggs, worms etc. and the role they also play in ***pollination*** of different plants including many food crops.

➢ Then at the Morani Information centre, the learners will also be able to see and touch the bone structure of an ostrich- the biggest bird-as well as touch its egg shell to be able to understand the concept of a 'hard shell'

➢ The learners should be helped to note that in many species of birds, the males are more brightly colored than the females. In some species, like the long-tailed widowbird, the male's tail feathers are much longer than the female's. The males use these bright colors and long feathers to attract females in their courtship displays. This is an ***adaptation***.

➢ Birds are a good indicator of a healthy ecosystem.

Activity 2

Bird Drawings

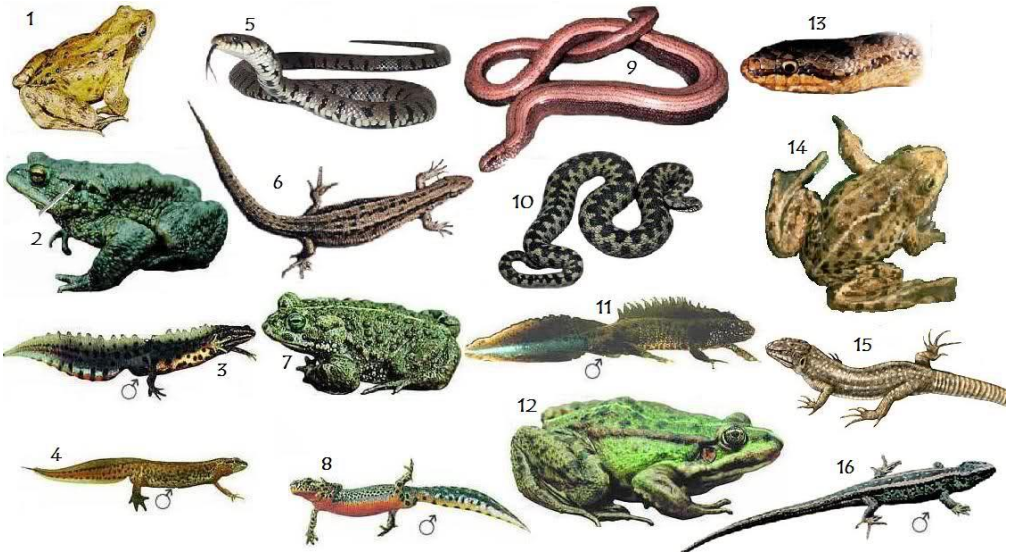
Have learners draw pictures of birds and decorate them with real feathers collected.

Reptiles and Amphibians

Background

Reptiles and amphibians are animals that are cold blooded. That means that their body temperature changes based on the temperature of their environment.

Majority of amphibians and reptiles start life from eggs. Amphibians lay their eggs in water without a hard shell. Whereas most reptiles bury their eggs – with a hard shell- underground. Reptile eggs hatch as small replicas of adults. Amphibian eggs hatch in water and have to grow up there before moving to land. Amphibians have a complex life cycle with different body shapes/structures that enables them to adapt to two different habitats.



Activity sheets

Activity 1

1. Let the learners look out to identify various amphibians and/or reptiles as they go on their game drive – at the chimpanzee sanctuary forest walk, hippo hide, Morani information centre.
2. Ask the learners to make a list of some reptiles and amphibians (those they see at Ol Pejeta or at home). The facilitator can help add to the list those that the learners did not think of.
3. Have learners draw pictures of amphibians and reptiles on drawing paper.
4. Then list characteristics of reptiles and amphibians. Make a common list. The facilitator can add any more the learners did not think of. Have the learners compare and contrast reptiles and amphibians.

Discussion
The facilitator can help the learners to discuss:

- ➢ How do reptiles and amphibians communicate? Like the changing color of chameleons in response to its emotion or to attract suitors –for males, hissing sound in snakes or croaking of frogs. Can you tell what they mean?
- ➢ Discuss coloration and patterns in frogs, toads, snakes, and lizards in relation to blending into their environment.
- ➢ What do reptiles and amphibians eat and how do they do it? Lizard and frogs eat insects. Most snakes eat birds, their eggs, small rodents or other snakes.
- ➢ Explain the life cycle of a frog/toad

Activity 2

For younger learners

Materials needed:

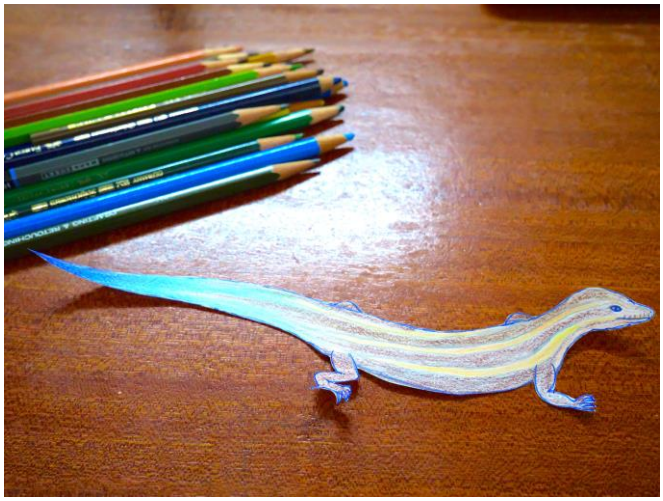
- Two paper plates for each child
- Stapler
- Scissors
- Green sock

Tortoise puppet

Have the learners color two paper plates, one to resemble the top shell on a tortoise and one to resemble the bottom shell. Staple together on sides only. Now let them put their hand into a green sock that you have glued wiggly eyes on and slip it through the two plates. Use the tortoise puppet for story time about the life of a reptile!

Lizard Bracelet

Cut out a lizard from paper and let the learners color or paint it. Wrap it around their wrist and staple the tail to the head.



Insects

Background

Insects are the largest group in the animal kingdom. Some insects can fly while others crawl.

Insects help us by:

- ✓ **Pollinating** our food crops.
- ✓ **Decomposing** organic matter.
- ✓ Controlling pests for instance, ladybird beetles feed on aphids that destroy flowers and crops.
- ✓ Provide us with products like silk, honey, beeswax.

They can also harm us, for example by spreading diseases and damaging plants and structures. Insects have a complex life cycle. To grow into an adult, they go through 4 stages: egg, larva, pupa (chrysalis) and adult – this is called a **metamorphosis**. Each stage has a different goal - for instance, caterpillars need to eat a lot, and adults need to reproduce.

Activity sheets

Activity 1

Have the learners name and write down different kinds of insects that they see on their field trip to Ol Pejeta and those they see at school or home environment. The facilitator can help to add others they didn't think of.

Discussion and take-home activity

Discuss what they know about insects. Make a list of characteristics, adding any the learners didn't think of.

Activity 2

Make your own sweep net.

Materials needed:

- ✓ Sweep nets.
- ✓ Magnifying glass if possible.
- ✓ Notebooks.
- ✓ Two wire hangers, an old, light-colored pillowcase, scissors, pliers, long wooden broomstick, and duct tape/cello tape.
- ✓ Jars.
- ✓ Large white piece of fabric, like an old sheet.

You will need an area with long grass.

Make one by straightening and twisting two wire hangers together. Form them into a loop, leaving about 3 inches (8cm) straight on either end. Cut about one third off of the open end of a pillow case and pull the mouth of the pillowcase over the wire loop. Tape it securely around the perimeter.

In their school compound or at home let the learners look for and collect insects with the sweep nets. Have them put the insects in the clear jars with loose lids.

Have them count how many legs they have, how many body segments, look for antennae, wings and unique color. Record the observations in a notebook.

At Ol Pejeta the learners can carry magnifying glass to closely look at the different insects they observe at the various stop over points within the conservancy. They should then write down what they see.

The facilitator can then help discuss their observations and talk about the points below.

1. Life cycle of e.g. a butterfly.
2. Movement of the different insects – some fly while others crawl.
3. Coloration of the insects – For defense from predators (to warn or confuse potential predators) and to blend into their background.
4. Communication – for instance. Crickets use sound, fireflies flash light, moths attract each other with odors, and honeybees use a dance to tell other bees the location of food.
5. Social structure – e.g. Termites are social insects that live in colonies. The termite social structure is organized into a caste system based on termites' unique roles.

- *Reproductives:* The reproductive class includes primary reproductives (the king, queen and swarmer termites) and secondary reproductives (the primary source of egg production supporting the queen, once the colony is established). The king and queen are the colony's founders and are responsible for increasing the colony's population. When weather conditions are optimal, the queen produces many primary reproductives (called swarmers) that fly out of the colony to start new colonies.
- *Soldiers:* Soldier termites are responsible for defending the colony from invaders, such as ants.
- *Workers:* Worker termites are responsible for building and repairing mud tubes and tunnel walls, feeding other termites in the colony, caring for eggs, removing mold and mildew from tunnel walls, and removing dead termites from the colony.

Extra activity

How far can grasshopper jump?

Materials needed:

- ✓ Sweep nets
- ✓ Tape measure

The learners look for and collect grasshopper with the sweep nets. Have them put the grasshopper in the clear jars with loose lids

Describe that grasshoppers can fly 20 times farther away of its height with a single jump.

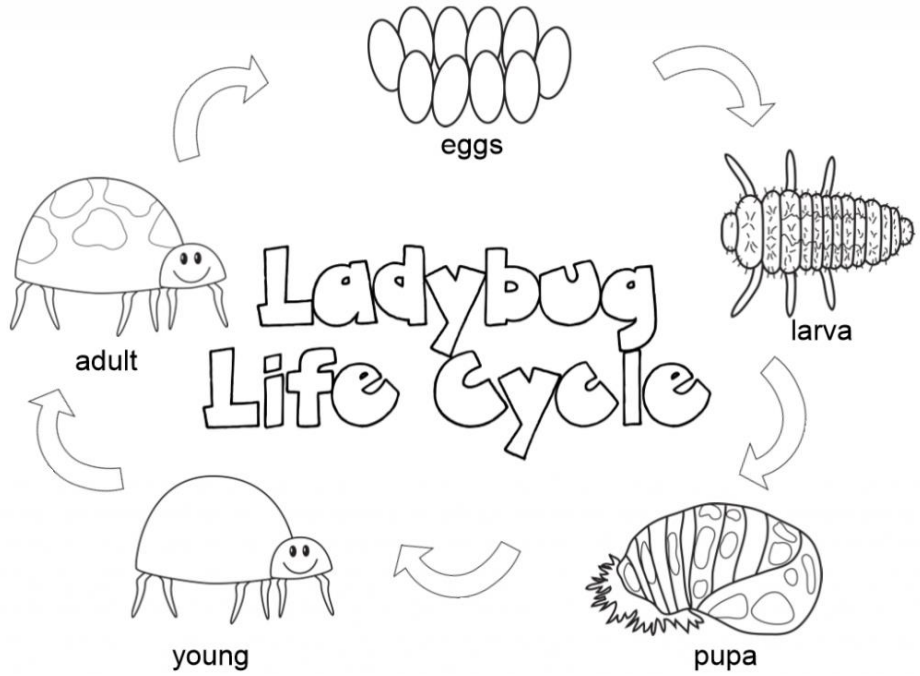
“If we are grasshoppers, how far can we jump?”

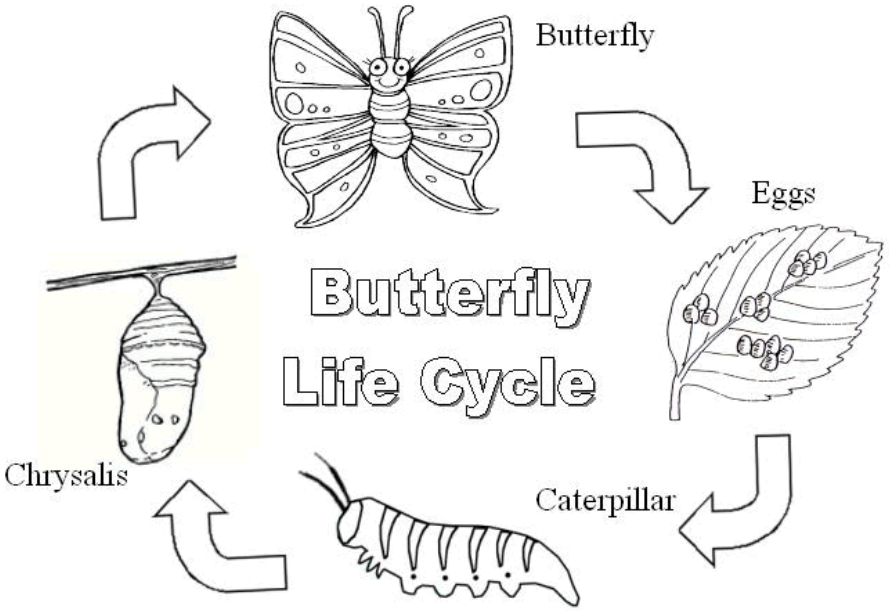
The teacher/facilitator measures the height of just one kid and we set a goal - the distance being 20 times the height of the kid - farther away .

Line up at the start line and jump 20 times toward to the goal.

After that, describe that if you are a grasshopper, how far you can jump and tell them how amazing their ability, insects are.

Activity 3
For younger learners
Colouring activity





TOPIC 3: HOW DO PLANTS FUNCTION

Plants are the only living things that can make their own food. They do this during the day while there's sunlight, using a process called **photosynthesis**, which uses carbon dioxide and produces oxygen. People and animals need oxygen to breath. This makes plants very important to life on earth.

Parts of a plant
Background

Basic parts of almost all plants are roots, stems, leaves, flowers, fruits, and seeds.

The **roots** help provide support by anchoring the plant and absorbing water and nutrients needed for growth from the soil. They can also store sugars and carbohydrates that the plant uses to carry out other functions.

Stems do many things. They support the plant. They conduct water and nutrients from the roots and food in the form of glucose from the leaves to other plant parts. Stems can be herbaceous like the soft stem of a daisy or woody like the trunk of a tree.

Leaves come in different shapes and sizes. They are designed to capture sunlight using a green substance in leaves called **chlorophyll** in a process called photosynthesis. Leaves make food for the plant. To do this they need water and mineral salts obtained from the soil. They are carried inside little veins in the leaf.

Flowers produce seeds which form new plants. The seeds can be fleshy like a mango or hard like a nut. However not all plants have flowers.

Fruits provide a covering for seeds. Fruit can be fleshy like an apple or hard like a nut.

Seeds contain new plants, seeds form inside the fruit.

Activity sheets
Discussion and take-home activities

Discuss how we use different parts of plants e.g. for **food, shelter, medicine, to hold soil, for fuel and clean air.**

Activity 1
Materials needed:

Clear jars, white flowers and/or celery, food coloring, water.

Colored Flowers/Celery
Put some white flowers/celery in colored water and leave it overnight so that it takes up the color. This is a good experiment to demonstrate to learners on capillarity and osmosis.

Activity 2
Materials needed:

Two large sponges, four water containers (buckets or tubs).

To demonstrate the 'sponge' effect – Relay activity

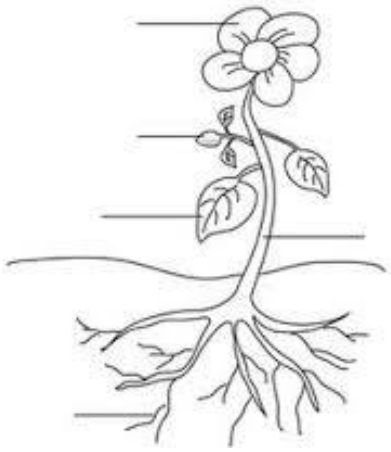
Explain how plants help soil to soak up rain water through their roots and prevent flooding just like a **sponge**, and hence why floods and runoff happens when we cut down trees and vegetation.

For the relay, we are going to transfer all the water from one bucket to another, and see which group can do this fastest. Set up two buckets per team. One bucket should be filled with water. The first participant of the team will dip a sponge into the water filled bucket, soak up as much water as possible, and run down to the other empty bucket and squeeze out as much water as possible. Then run back to the teammates and have the next participant do the same.

Activity 3
For younger learners
Materials needed:

coloring materials.

Parts of a plant – coloring activity
Have worksheets ready with crayons and markers for participants to color the objects that a plant needs to grow!

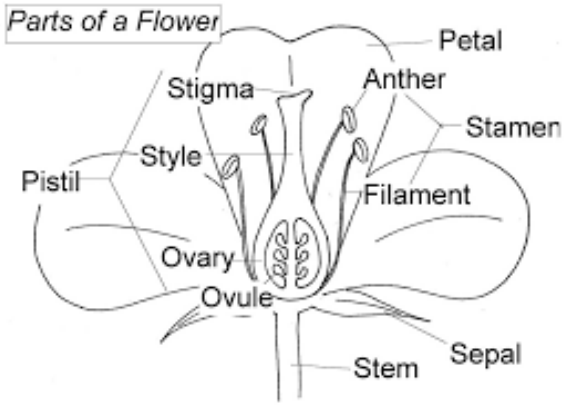


Activity 4
Mural Creation: Leaf rolling
Collect different kinds of leaves (either off of the ground or collect them from the plant.
Then paint the surface of the leaves – you can use different colors for different leaves - then roll the leaves onto white plain paper to make colorful leaf print patterns.

Pollination

Background

The goal of every living organism, including plants, is to create offspring for the next generation. One of the ways that plants reproduce is by making seeds. **Pollination** is the act of transferring pollen grains from the male **anther** of a flower to the female **stigma.**



Flowers are the tools that plants use to make seeds. Seeds can only be produced when pollen is transferred between flowers of the same **species**.

How does pollen get from one flower to another? Flowers must rely on **vectors** to move pollen. These vectors can include wind, water, birds, insects, butterflies, bats, and other animals that visit flowers. Animals or insects that transfer pollen from plant to plant are called **pollinators**.

The pollinator is often eating or collecting pollen for its protein and other nutritional characteristics or it is sipping nectar from the flower when **pollen** grains attach themselves to the animal's body. When the animal visits another flower for the same reason, pollen can fall off onto the flower's **stigma** and may result in successful reproduction of the flower.

Pollen from the anthers of one flower is deposited on the stigma of another flower. 0nce on the stigma, pollen may "germinate," which means that a **pollen tube** forms on the sticky surface of the stigma and grows down into the **ovule** of the plant. This leads to **fertilization** of the flower and the growth of seeds and fruit.

N.B., It is important to note that some plants don't have flowers. Plants such as mosses and ferns reproduce by **spores**. Cone-bearing plants, like pine trees for example, reproduce by means of pollen that is produced by a male cone and travels by wind to a female cone of the same species. The seeds then develop in the female cone.

Activity sheets

Activity 1

On your field trip to Ol Pejeta, let the learners look out for plants that are flowering or have fruits already. Let them take a closer look at the different types of flowers and their parts as learnt. Help them appreciate the connections between the flowers and the fruits. This can easily be done at the Chimpanzee Sanctuary forest walk, hippo hide river- walk and Morani information centre grounds.

Take-home activities

For younger learners

Activity 2

Pollination Relay Race

Separate your learners into two teams with equal number of members. Give each team a bee. The bee can be a puppet, or a picture of a bee glued to a craft stick. Set bucket 10 feet in front of each team, another bucket 10 feet away from the first bucket and pretend beehive 10 feet away from the second bucket. Fill the two buckets with circular coins made from paper. Half of them must have a "P" written on the top for pollen and the other half "N" for nectar. Instruct the learners to line up. One student from each team will go at a time, pretending to be the bee. The learners must run to the first bucket, grab a

pollen coin and a nectar coin, and head to the second bucket to deposit a pollen coin. Next, the learners grab another nectar coin and a new pollen coin and run to the beehive to deposit all of the coins. Learners then run back to their teammates and pass the bee off to the next person in line. The team who finishes first wins.

Activity 3

Pollination Demonstration

Give each learner a picture of a flower, or have them draw a picture of their favorite flower on a sheet of paper. Make sure each flower has a circular center. Allow the learners to color the center of their flowers with a piece of chalk. The facilitator will then take a cotton ball to act as the bee. Stop by each flower and rub the cotton ball in the center of the flower. Show the learners the cotton ball when you finish. They should notice that the pollen (chalk) transferred from the flower onto the bee (cotton ball).

Seed Dispersal

Background

We have learnt that when pollination occurs, eventually seeds are formed inside a covering which becomes the fruit. From these seeds new plants will be formed.

It is therefore important that a plant finds ways to spread out its seeds to places with better growing conditions than directly under it. This is important so that new plants will have enough space, sunlight, water, and nutrients to grow. The act of spreading out its seeds is called **dispersal**. The main methods plants use to disperse their seeds are gravity, animals, force, wind and water.

Discuss seed dispersal with the learners and how it helps to spread different species of plants throughout the environment all over the other. Also highlight how it has brought about the spread of invasive species to new environments.

Activity sheets

Activity 1

Plant some seeds/seedlings

Guide the learners to plant some seeds in a pot of soil at school or at home so that they can watch them germinate.

The facilitator can organize with the conservancy beforehand for the learners to participate in Ol Pejeta's tree planting programme where we plant seedlings of some indigenous trees in exclusion zones. This can also be done at home or school so the learners can watch the trees grow and begin to produce flowers and fruits.

Extra activity - Sound of tree

The facilitator lets the learners to listen to the sound of their own heart beat with a stethoscope/paper cup telephone before planting trees.

"Do you think you can also hear the beat of a tree?"

“Guess if the tree has a sound?”

Try to put a stethoscope to stem of tree to listen if you hear anything.

The aim is to realize that the tree is alive and to treat the environment better.

The leaners plant the trees knowing that they are planting things that are alive.

Activity 2

Seed Dispersal Hide and Seek

For this activity, collect a *Bidens pilosa* (black jack) plant so participants can see an example of seed dispersal in plants. Black jack is super successful at dispersing seeds from long distances by sticking on animals and humans! In this activity, participants will use a cotton ball or some type of object representing a seed, and will place it in a location (within a pre-determined boundary) they think the seed has the best opportunity to grow – where all four components of habitat are present (food, water, shelter, space). To play, divide the group in half. One half will hide their seeds while the other group counts to thirty. When they have completed counting to thirty, the seekers will go look for the seeds and determine if they have been placed in an acceptable location. If so, bring back the seeds and share where they were found. In the next round, the other half of participants should place the seeds in the worst location possible while half of the participants are counting. Repeat the procedure and discuss the differences between good places for seeds to land and bad places.

TOPIC 4: THE FUNCTIONING OF ECOSYSTEMS

Background

So far, we have learnt that we share the earth with many species of plants and animals. We have looked at how they function and survive, each playing a role in the complex web of life.

An **ecosystem,** therefore, includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere).

An ecosystem can be as large as a desert or an ocean or as small as a tree or a pond. Think of it this way, if there isn't enough light or water or if the soil doesn't have the right nutrients, plants will die. If the plants die, animals that depend on them will die. If the animals that depend on the plants die, any animals that depend on those animals will die. I.e. **food chains** and **food webs** are affected. This is how ecosystems work. All the parts work together to make a balanced system!

In ecosystems, energy is transferred from one **trophic level** to another - starting from plants absorbing sunlight energy through photosynthesis making them **producers** and eventually to decomposers that break down the energy once plants and animals die back into the soil as nutrients.

Not every kind of animal or plant can live in every ecosystem. Both have adaptations that help them get what they need in order to survive in their ecosystem. For example, Savannas are perfect for birds of prey, with wide open spaces for hunting with their long-range vision and trees for perches and nest sites.

Man's Role in the Ecosystem

Man is also entwined in the whole ecosystem as man's survival is dependent on the processes of the ecosystem primarily deriving energy from plants to sustain life. Too much consumption of plants or animals or destroying any of the components that make up the ecosystem leaves the ecosystem with virtually nothing to cycle and recycle to keep it stable. The normal cycling of nutrients may be interrupted and the ecosystem loses its balance. Once the normal cycling patterns in an ecosystem is lost, man's very survival is threatened.

Pond Ecosystem

Activity sheets

Activity 1

Help the learners look at and observe the different ecosystems at Ol Pejeta and for each identify;

- Its characteristics.
- The animals that found here and their features/adaptations.
- The plants found here and their features & adaptations.
- How the different components interact.

Let them think about what would happen if one of the components of a particular ecosystem was removed, reduced or increased. Let each student select one ecosystem and write an essay about the points above and 3 different situations where one component of that ecosystem was either removed, reduced or increased.

Ol Pejeta ecosystems include:

- Grassland
- Bushland – mixed acacia
- Wetland – mash area
- Riverine – at hippo hide river walk

Activity 2:

Step on it! A life-sized food-web

Make a life-sized version of a savanna food web for learners to work their way through
Here the facilitator prints photos of different animals/components on a food web and at least 9 arrows. Set up the food web in a large open space. You can use chalk instead of the paper arrows to make the area even larger for all the learners. Then the learners stand in the different stations on the food web and act out the activities that go on in the web.

Activity 3:

Real life food chain or food web
Make 9 posters on Manilla paper with the sun, producer, primary consumer, secondary consumer, tertiary consumer and energy flows. Each student gets a sign and they put themselves in order to model a food chain by holding up their poster.

The Equator – seasons, day & night and biodiversity

Make sure to stop at the equator crossing point within Ol Pejeta.

While there, the facilitator can talk to the learners about how the equator affects night and day, seasons and biodiversity.

How the equator affects night & day, seasons

- The equator itself crosses the land or territorial waters of 14 countries. People living on the equator experience the quickest rates of sunrise and sunset in the world, taking a matter of minutes.
- Places on the equator have a constant twelve hours of day and night throughout the year.
- In its seasonal movement through the sky, the sun passes directly over the equator only twice each year, on the March and September equinoxes.
- It is mistakenly believed that the weather on the equator stays the same. Tropical areas along the equator can experience wet and dry seasons while some areas may be wet throughout the year.
- While temperatures at the equator are very high, there is one single point on the equator where snow is found. The highest point on the equator is 4,690m, on the south slopes of Volcán Cayambe in Ecuador. This is the only place where you could go skiing on the equator.

Biodiversity

- The parts of the Earth that lie on the equator mark the area with the world's greatest concentration of natural biodiversity.
- It is also the case that almost half the world's rainforests are concentrated on the equator in just three countries; Brazil, Congo and Indonesia

Activity 1

Divide learners into smaller groups. Then each group will select a country found on the equator.
Each group should then research on the country they have picked and find out the following:

1. Geography of the country
2. Population
3. Interesting wildlife (animals and plants) found in that country
4. Climate of the country
5. Major economic activities engaged in
6. Tourist attractions

Activity 2

Walk through the continents

1. Print out a large map or prepare large cut outs of the different continents through which the equator crosses.
2. Place these on the floor and let a small group of learners stand in a straight line along where the equator would cross the different continents.
3. Whichever continent a child finds themselves standing on, let them form groups with the other learners and find out 10 interesting facts about those continents including which countries the equator actually crosses.

Discussion

The facilitator should help the learners understand that if they were standing on the equator, they wouldn't see a line at all. The imaginary line on our maps represents the line that divides the globe in half, exactly the same distance from the north - pole to the south - pole.

Activity 3

For younger learners

Materials needed:

- Printed world maps
- Ribbons of different colors
- Paper glue

1. The facilitator/ teacher can print copies of the world map.
2. Discuss with the learners what the equator is and lead them to name the countries along which it crosses. Also discuss what it means to live on the equator.
3. Give each child a copy.
4. Then let the learners select different color ribbons to stick along the equator (they can also stick along the prime meridian)

Extra activities

Activity 1

How many sounds do you hear?

The facilitator instructs the earners to close their eyes and be completely quiet for 10 seconds and to listen to the sounds in the environment. The learners try to listen carefully while the facilitator counts the time. After 10 seconds, the learners open their eyes and discuss how many sounds they heard and what sound it was.

The aim is to feel nature by using only their ears (hearing) rather than by eyesight and to understand how important hearing is for wild animals to be able to survive and find food in nature

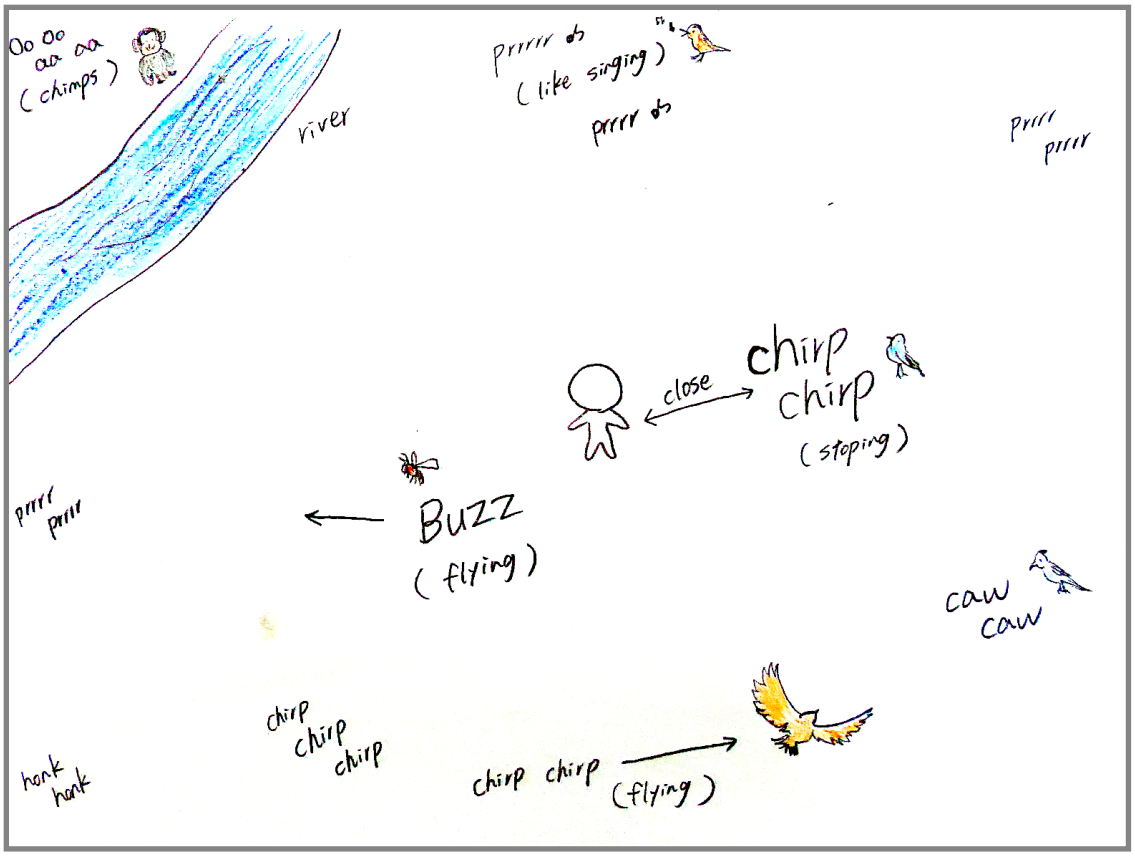
(Humans have 5 senses which are touch, taste, hearing, eyesight, smell but humans get information from 80～90% eyesight.)

Activity 2

Sound map

The facilitator provides the learners with plain white paper each

They then draw themselves in the middle and then stand still and just listen to the sounds around them.



When they hear a sound, they write/draw the sound and the direction its coming from. When they hear the sound close by, they should write it in big letters, when the sound is heard far away, they write it in small letters. After that, guess and image which animals make which sounds and draw pictures

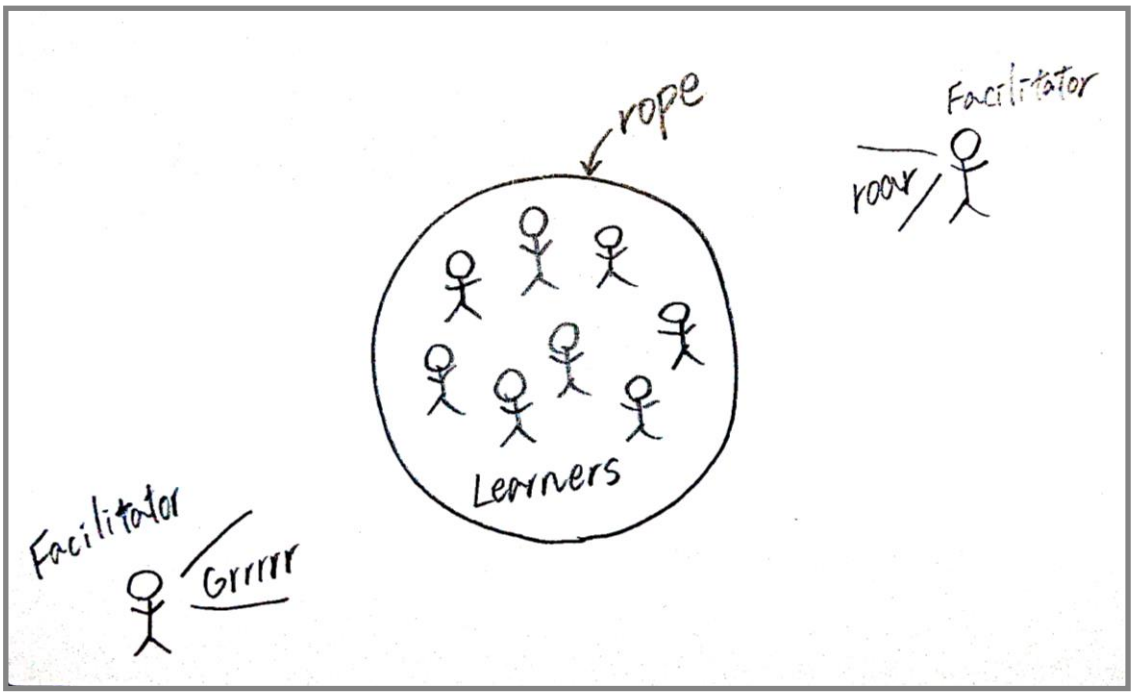
The aim is to realize that it's not only you, there is lots of animals around you even when you cannot see them. We share the environment.

Activity 3

Look at the sound!

The leaners close their eyes in a circle that is made a rope. The facilitator makes/plays a recorded sound/noise like that made by a carnivore, around the leaners. The learners turn their body toward to the sound without opening their eyes. When the facilitator says "Open your eyes." the leaners can check if the direction is correct or not.

The facilitator explains that some herbivores don't have good eyesight but it's really important for them to use hearing to survive.



Activity 4

Tag of Bat and Moth

The facilitator selects one learner as a bat and explains that bats live in a cave so they don't use eyesight but use ultrasonic.

Another learner acts as a moth.

Other learners act as a cave by making a circle using their hands

The 'bat' learner put a cloth around eyes so they can't see anything – to mimic the poor eyesight in bats.

The 'moth' learner can use eyesight.

The 'bat' learner and the 'moth' learner are in a cave that is made by other learners. It's like a tag game and the time limit is 1 minute.

The ‘bat’ learner chases the ‘moth’ without using eyesight but uses ultrasonic (hearing) and says “BAT!” then the ‘moth’ learner responds by saying “MOTH!” as soon as they hear “BAT!” from the ‘bat’ learner. If the ‘bat’ learner says twice “BAT BAT!” then the ‘moth’ learner also needs to say “MOTH MOTH!”

The ‘bat’ learner should catch the ‘moth’ learner within 1 minute, then the ‘bat’ learner win.

If one minute runs out and the ‘bat’ learner has not caught the ‘moth’ learner, the other learners in a circle hurdle in closer together to make the circle (cave) smaller and thus increase chances of the ‘bat’ catching the ‘moth’.

The aim is to teach learners the different abilities of other animals.