**Teacher notes**

**Activity 2: Level 5 Adaptations of organisms**

**Objectives**

After completing this activity, students will be able to:

* Identify physical conditions of grasslands
* Evaluate how organisms have adapted to live in grasslands

**Target audience**

Year 5

**Duration**

50 minute session plant adaptations

50 minute session animal adaptations

**Materials**

iPad, iPhone or computer with internet connection

Flora and Fauna Field Guide App. or Field Guide from the Ecolinc website

Data projector linked to a computer with an internet connection and PowerPoint

Student workbook

Pencil

**Activity**

This lesson builds upon what students have understood in Activity 1. In the first activity, students learnt that plants and animals are alike in some ways and different in others. In this activity, students will explore how various organisms satisfy their needs in the environments in which they live. They will consider the survival needs of organisms and consider how the conditions in particular habitats can limit the kinds of living things that can survive.

In this lesson, students will focus on plant and bird adaptations and in particular beak and feet adaptations for the birds. They will explore how plants have adapted to the harsh environments in grasslands, and how the shape of a bird’s beak and feet relates to diet and habitat.

Begin the lesson by introducing terms that students will use in the lesson (ecosystem, habitat, omnivore, herbivore, carnivore, invertebrates). Ask students to explain what is meant by each of these terms. If these words are new to your students, you could write each word on the board and take time to explain and define each of them using the following examples:

* Ecosystem – a biological community of interacting organisms and their environment
* Habitat – the environment in which an organism lives
* Omnivore – an organism that eats plants and animals
* Herbivore – an organism that eats plants
* Carnivore – an organism that eats animals
* Invertebrates – an animal without a backbone.

Secondly, introduce plant adaptations by engaging students in a brainstorm session about the conditions in grasslands. Ask students to tell you the conditions that plants and animals living in grasslands have to face, and how they have adapted to survive in these conditions. Record student responses on the board and consider these prompts to keep the discussion lively (answers have been provided):

1. What are the conditions found in grasslands?

Students may consider low rainfall, dominated by grasses, with low tree and shrub cover therefore a dry, exposed environment.

2. Would these conditions make it an easy or harsh environment to live in?

Grasslands can be a harsh environment, as there is low water availability, and it may be hot/cold, windy and exposed.

3. Considering grassland conditions, what are the main things grassland plants need to do to survive?

Grassland plants need to reduce water loss.

4. What is an adaptation?

An adaptation allows a plant or animal to live in a particular habitat.

Ask students to complete the first question in their workbook.

On the overhead projector, show students the Field Guide. As a class explore the variation in plants, and their adaptations. Select the following plants and pose questions along the way, to enable students to discuss adaptations of grassland plants (answers are provided). Go to Flora:

* Tree > Eucalypt > River Red Gum > Show photo 1

5. In which direction do the leaves point?

Leaves point in a vertical direction towards the ground, so when it rains the water will roll down the leaf and fall towards the soil for the roots to uptake.

* Tree > Eucalypt > Swamp Gum > Show photo 3 and read the Identifying Characteristics.

6. Do Eucalypts have thick or thin leaves? Why?

Eucalypts have thick leaves to reduce water loss.

* Graminoid > Grass > Kangaroo Grass > Show photo 1

7. In which direction do the leaves grow? Why?

Grass leaves grow in a vertical direction to reduce exposure to the sun, which reduces water loss.

* Graminoid > Grass > Kneed Spear Grass > Read the Introduction

8. What feature do the seeds have which acts as an adaptation? How does this help the plant?

Seed have awns (bristles), which attach to the fur of animals passing by. This aids seed dispersal.

* Graminoid > Grass > Serrated Tussock > Read Distinctive Features

9. What is an adaptation of the leaves? Why?

Leaves are bristle-like with a rough surface. Animals will not eat the leaves.

* Herb > Saltbush > Wingless Bluebush > Show photo and read Identifying Characteristics and Distinctive Features

10. What is an adaptation of the leaves? Why?

Leaves are fleshy and hairy. The leaves store water and the hairs reduce water loss.

After completing the brainstorm, ask students to complete the Plant Adaptations section of their workbook, which explores these ideas further.

Lastly, introduce animal adaptations by asking students to investigate birds. Have students brainstorm birds with which they are familiar, then focus the discussion on beaks and feet. Explain that to study bird adaptations, you need to look at their beaks and feet. Record student responses on the board and consider these prompts to keep the discussion lively (answers have been provided).

11. List the birds you know.

Students may list parrots, seagulls, sparrow, magpies, finches, eagles and others.

12. Are beaks the same in birds?

No. The shape and size of each species’ beak is specific to the type of food it gathers.

13. What do birds use beaks for?

Birds use beaks for eating, defence, feeding young, gathering nesting material, building nests, preening, scratching, courting and attacking.

14. What beak shapes have students seen?

Students may talk about beaks of water birds that are long and thin like a straw; other beaks are heavy and thick to crack seeds; meat eaters have thick hook-shaped beaks to tear flesh. Students will have varied answers.

15. Are feet the same in birds?

No, different species of birds have different shaped feet.

16. What do the feet of the bird tell you about its requirements?

The shape of the feet reflect the habitat that the bird can be found in and the type of food it might eat.

Show students the Beaks and Feet PowerPoint. Discuss the different types of beaks and feet, and have students brainstorm their adaptations (answers have been provided on the PowerPoint).

Explain to students that they will explore the differences in beaks and feet of three birds (Long-billed Corella, Pacific Black Duck and Straw-necked Ibis). Students will collate information from the Field Guide and complete their workbook. Students will compare and evaluate why the birds have particular shaped beaks/feet in the table and in the discussion questions. These questions encourage students to use the information gathered about diet and beak/feet shape and evaluate how these are linked. It will be useful for students to use the information provided in the PowerPoint presentation. This could also be printed out for students to utilise.

Conclude the session by engaging students in a brainstorming session about plant and animal adaptations and how they survive in grasslands. Ask students to tell you the physical characteristics of grasslands. Ask students to give you several examples of birds and plants, and how they have adapted to live in grasslands. Students will complete the conclusion questions in their workbook.

**Student worksheet**

**Activity 2: Level 5 Adaptations of organisms**

Organisms come in all different shapes and sizes. They live in diverse environments and have features or behaviours that are well suited to their habitats, which enable them to survive in that environment.

1. What are the conditions found in grasslands?

Grasslands have low rainfall, and can be dry, hot, cold and windy.

**Plant adaptations**

How do plants live in the grassland environment? Use the Flora and Fauna Field Guide to help explore how plants have adapted to this environment.

2. Complete the following table:

|  |  |  |
| --- | --- | --- |
| Plant group | Adaptation | Why? |
| Eucalypt | Thick or thin leaves? Thick | To reduce water loss from the leaves |
| In which direction do the leaves hang? Vertically | When it rains the water drips down the leaves to the ground and its roots  AND reduces sunlight from drying out the leaves |
| Grass | In which direction do the leaves grow? Vertically | To reduce sun exposure and water loss from the leaves |
| Feature of the Serrated Tussock leaves? Bristles-like, rough along the leaves | Animals do not like to eat this because the leaves are rough |
| Saltbush | Features of the leaves.  1. Fleshy  2. Hairy | To store water and reduce water loss |

3. Give one example of how grassland plants have adapted to their environment.

Students should explain one of the adaptations listed in their table.

4. How have plant seeds adapted to disperse?

Some plants seeds have awns (bristles), which attach to the fur of an animal. This aids seed dispersal.

**Animal adaptations**

You will explore bird adaptations. In particular you will observe their beaks and feet. Use the Flora and Fauna Field Guide to fill in the table for the following birds to explore different beaks and feet; Sulphur-crested Cockatoo, the Australian Shelduck and Straw-necked Ibis.

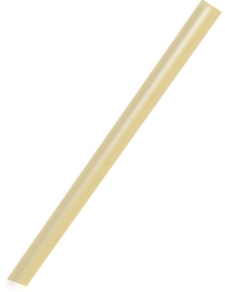
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BIRD** | **BEAK** | | | | **FEET** | | | |
| Draw the beak | Type and description of the shape of the beak | Diet of the bird | Why is the beak this shape? | Draw the feet | Type and description of the feet | Habitat of the bird | Why are the feet this shape? |
| Long-billed Corella |  | Cracker:  Heavy  Thick  Sharp  Curved | Omnivore: Mainly grass seeds. Also feeds on bulbs, roots and insects. | This thick and tough beak cracks seeds and bulbs. |  | Two toes forward and two toes backward enable parrots to grasp objects. | Grassy woodland grasslands, pastures, crop areas and urban parks. | This arrangement of toes enable the Corella to grasp branches. |
| Pacific Black Duck |  | Strainer:  Broad  Flat | Omnivore:  Mainly seeds of aquatic plants, and some small invertebrates (molluscs and aquatic insects). | Ducks strain small plants and animals from the water or mud. |  | Swimming:  Flat  Broad  Webbed | All types of water. Found in urban areas. | Webbed feet enable the duck to move through water. |
| Straw-necked Ibis |  | Spear:  Long  Down-curved | Carnivore:  Terrestrial invertebrates frogs, small reptiles and mammals. | Ibis use their long curved beak to find organisms in water, the ground and substrate. |  | Scratching:  Long toes  Nail-like toes | Grassland (wet or dry), shallow wetlands and cultivated and irrigated pasture. | Long legs and long toes help to walk through water and muddy substrate. |

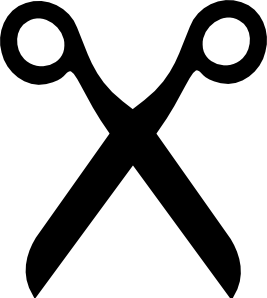
6. Do birds have the same shaped beak? Why/why not?

Birds do not have the same shaped beak as one another, as the size and shape is specific to the type of food gathered.

7. How similar are bird beaks? Give an example of a bird who’s beak resembles the following tools.

Scissors Straw Tweezers





Wedge-tailed Eagle Water bird Fairy-wren

8. Do birds have the same shaped feet? Why/why not?

Birds do not have the same shaped feet, as the size and shape reflects habitat and the type of food eaten.

**Conclusion**

9. Give an example of how plants survive in grasslands.

Students should discuss a plant they explored throughout this activity.

10. You investigated three birds; Pacific Black Duck, Long-billed Corella and the Straw-necked Ibis. What would happen if these birds changed habitats? Explain if these birds could survive in a desert ecosystem?

Students should explain that these birds could not succeed in a desert ecosystem as their habitat and food requirements would not be met. Below are some reasons why deserts are not a suitable ecosystem for these birds:

* Lack of water availability
* Lack of tussock grasses
* Lack of trees and shrubs
* Lack of food availability.