



PROGRAM

SUPPORT NOTES

Food Chains and Food Webs

Program Support Notes by:
Spiro Liacos B.Ed.

Produced by:
VEA Pty Ltd

Commissioning Editor:
Sandra Frerichs B.Ed, M.Ed.

Executive Producers:
Edwina Baden-Powell B.A, CVP.
Sandra Frerichs B.Ed, M.Ed.

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For Teachers

Introduction

This program introduces students to the study of ecology and specifically to food chains and food webs. It opens with an explanation of why animals and plants need energy, and how these organisms obtain their energy. The concept of the food chain is introduced: plants produce their own food, herbivores eat plants and then carnivores eat the herbivores. Numerous examples are given. Using the example of an ecosystem on the African plains, the program then explores food webs, before finishing with the role of scavengers and decomposers in the recycling of nutrients and organic matter within the ecosystem.

Timeline

00:00:00	The need for energy
00:03:12	Food chains
00:06:14	Producers and consumers
00:09:57	Food webs
00:12:05	Decomposers and scavengers
00:15:25	Credits
00:16:04	End program

Related Titles

Classification Systems

Recommended Resources

<http://www.gould.edu.au/foodwebs/>

<http://www.gould.edu.au/foodwebs/marine.htm>

<http://www.gould.edu.au/foodwebs/africa.htm>

http://teacher.scholastic.com/activities/explorer/ecosystems/be_an_explorer/map/foodweb_play.htm

<http://www.vtaide.com/png/foodchains.htm>

Student Worksheet

Initiate Prior Learning

1. What are some of the things humans rely on to survive?

2. What do animals need to survive?

3. What do plants need to survive?

4. Why do we eat food?

5. How do plants get energy to grow if they don't eat food?

6. Can you think of an animal that eats plants and then itself gets eaten by another animal?

Active Viewing Guide

1. Write down four examples of how animals use energy.

2. How do animals obtain their energy?

3. Fill in the table.

Type of Animal	Brief Definition	Three Examples
Carnivore		
Herbivore		
Omnivore		

4. What does an ecologist do?

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5. Write down the food chain involving grass, lions and Zebras.

6. What does the food chain show?

7. What does the arrow in the food chain mean?

8. In the food chain grass → grasshopper → toad → snake → eagle, what could happen if all the eagles were hunted to extinction?

9. How does a plant obtain its food?

10. Draw a food pyramid based on the food chain in Question 8.

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11. Label the animals in the food chain as first-order consumers, second-order consumers and so on.

grass → grasshopper → toad → snake → eagle

(Producer) _____

12. In ecology, why are plants called producers?

13. What is a food web?

14. What is a scavenger? Give three examples.

15. What happens to the body of a dead animal if it is not eaten?

Extension Activities

1. What would happen if the sun's light was blocked for a year (say, due to a huge meteor hitting the earth and creating a massive dust cloud)?

2. What might happen if all the carnivores on Earth suddenly disappeared?

3. What might happen if all the decomposers on Earth suddenly disappeared?

4. What might happen if all the herbivores on Earth suddenly disappeared?

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5. There are a lot fewer lions than zebras. Why?

6. Consider a simple ecosystem consisting only of grass, insects and birds. A simple food chain to represent the passage of food would be written as follows:

grass → insects → birds.

If an animal like a cane toad (which mostly eats insects) is introduced into this ecosystem, what might happen to the amount of grass, insects and birds?

Suggested Student Responses

Initiate Prior Learning

1. What are some of the things humans rely on to survive?
Answers will vary, but may include food, air, shelter, clothing, a place to live, a job, water.
2. What do animals need to survive?
Answers will vary, but may include food, air, shelter, water. As a species, they need to mate.
3. What do plants need to survive?
Answers will vary, but may include water, sunlight, carbon dioxide, air (oxygen), nutrients.
4. Why do we eat food?
Answers will vary, but may include to obtain energy, to obtain the chemical building blocks that make up our bodies.
5. How do plants get energy to grow if they don't eat food?
Using the energy of sunlight, they produce their own food called glucose (C₆H₁₂O₆) by joining carbon dioxide molecules (CO₂) to water molecules (H₂O). They use the glucose for energy, but they then also join glucose molecules together to produce the other chemicals that make up all the different parts of the plant.
6. Can you think of an animal that eats plants and then itself gets eaten by another animal?
Answers will vary, as there are many examples, e.g. caterpillars, many insects, zebras, small fish, deer, wombats.

Active Viewing Guide

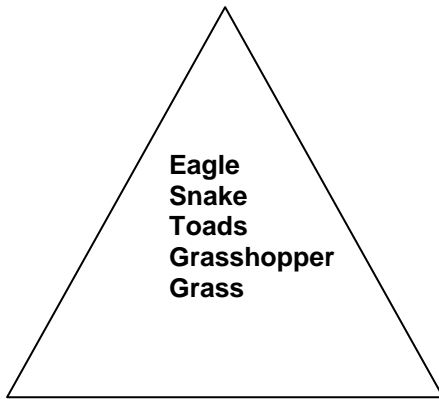
- Write down four examples of how animals use energy.
Answers will vary, but may include, find food, find water, build a nest, find a mate, evade capture by a predator, sustain life processes like pumping blood and producing new cells and chemicals within the body.
- How do animals obtain their energy?
By eating food.
- Fill in the table.

Type of Animal	Brief Definition	Three Examples
Carnivore	Meat eater	Tigers, wolves, lions, snakes, and frogs
Herbivore	Plant eater	Kangaroos, giraffes, deer, rabbits and rhinoceroses
Omnivore	Meat and plant eater (Omni means everything)	Bears, chickens, crows, pigs and humans

- What does an ecologist do?
Studies ecosystems and the way plants and animals interact within an ecosystem.
- Write down the food chain involving grass, lions and zebras.
grass → zebra → lion
- What does the food chain show?
The grass is eaten by the zebra and the zebra is eaten by the lion.
- What does the arrow in the food chain mean?
“Is eaten by”
- In the food chain grass → grasshopper → toad → snake → eagle, what could happen if all the eagles were hunted to extinction?
The snake numbers may increase for a little while because they would no longer be getting eaten by the eagles, but they might end up eating all the toads which would mean that they have no food left, resulting in their own demise. Only grasshoppers would be left, which would then increase to plague proportions.
- How does a plant obtain its food?
They produce their own food called glucose (C₆H₁₂O₆) by joining carbon dioxide molecules (CO₂) to water molecules (H₂O). This process requires light energy from the sun. The plants use the glucose for energy, but they then also join glucose molecules together to produce the other chemicals that make up all the different parts of the plant.

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10. Draw a food pyramid based on the food chain in Question 8.



11. Label the animals in the food chain as first-order consumers, second-order consumers and so on.

Grass → **grasshopper** → **toad** → **snake** → **eagle**
(Producer) 1st-order 2nd-order 3rd-order 4th-order

12. In ecology, why are plants called producers?

They produce their own food—glucose—by joining carbon dioxide and water molecules together.

13. What is a food web?

A chart or diagram that shows lots of interconnected food chains. Most animals rely on more than one food source or are eaten by more than one predator, so a food web shows all the paths that food is passed along within an ecosystem.

14. What is a scavenger? Give three examples.

A scavenger eats dead animals which it finds already dead (although hunting carnivores like eagles and lions will also scavenge if they happen to come across a dead animal). Rats, vultures, seagulls, jackals, Californian condors, sharks, and lions, are all examples.

15. What happens to the body of a dead animal if it is not eaten?

It decomposes. Tiny bacteria consume the body and many of the nutrients which the bacteria don't need return to the soil and are absorbed by the plants.

Extension Activities

1. What would happen if the sun's light was blocked for a year (say, due to a huge meteor hitting the earth and creating a massive dust cloud)?
The plants would stop growing. Without plants many animals would die. A meteor that hit the Earth 65 million years ago is believed to be the cause of the extinction of the dinosaurs (and about 90% of every other type of animal and plant that was alive during the time that it hit).
2. What might happen if all the carnivores on Earth suddenly disappeared?
The herbivores would increase in numbers, eat all the available plant material, and then, when there is no more plant material, die out. However, would plants grow at a faster rate than the rate at which all the herbivores could eat? It seems unlikely; imagine all the billions of insects, let alone every other herbivore, munching away at trees and grasses and shrubs.
3. What might happen if all the decomposers on Earth suddenly disappeared?
There are many possibilities. When an animal died, its meat would stay fresh and many smaller scavengers would thrive. Smaller animals like insects would be eaten by larger animals. However, the excrement from all these animals would probably build up and the return of nutrients to the soil would almost cease, resulting in the slowing of (and possibly the stopping of) the growth of plants.
4. What might happen if all the herbivores on Earth suddenly disappeared?
The carnivores would die out and the plants would thrive. (The answers to the above questions are speculative of course. Students may argue that the presence of omnivores will affect the outcomes.)
5. There are a lot fewer lions than zebras. Why?
There simply isn't enough energy. The only source of energy for lions is in the animals they eat, so a large population of (in this case zebras) is needed to provide the energy needs of the lion.
6. Consider a simple ecosystem consisting only of grass, insects and birds. A simple food chain to represent the passage of food would be written as follows:

grass → insects → birds.

If an animal like a cane toad (which mostly eats insects) is introduced into this ecosystem, what might happen to the amount of grass, insects and birds?

The cane toad will eat many of the insects that the birds used to eat, so fewer birds will survive. The cane toad is a really good case study of what can happen if an ecosystem is upset by the introduction of a new species.