

# Chapter 5 – The Roles of Organisms in an Ecosystem

## 5.1: The Roles of Organisms in an Ecosystems

### Vocabulary:

**photosynthesis** – a process by which plants use water, carbon dioxide, and sunlight to produce sugars (food)

### Types of Organisms

**producer** – makes its own food from non-living materials (e.g. plants)

**consumer** – eats other living things for energy (e.g. animals)

**herbivore** – eats plants only (e.g. cow, rabbit)

**carnivore** – eats other animals only (e.g. lion, polar bear)

**scavenger** – eats already dead animals (e.g. vulture, hyena)

**omnivore** – eats both plants and animals (e.g. black bear, human)

**detrivore** – feeds on large parts of decaying plant and animal matter and on waste material (e.g. earthworm, beetle)

**decomposer** – consumes and breaks down dead organisms or waste matter into simple substances (e.g. bacterium, mould)

1. Producers get energy from food they make themselves. (e.g. plants)

Consumers get energy by eating other organisms. (e.g. animals)

2. Photosynthesis NEEDS: carbon dioxide, water, light

Photosynthesis MAKES: oxygen, sugars

(c) The sugars made in photosynthesis are used by the producer for energy and to build up its body. Oxygen

that the plant does not use itself is released into the atmosphere. The food and oxygen may be used by

animals when they consume plants and breathe in oxygen.

3. Detrivores get their energy by feeding on large parts of decaying animals and plants. Decomposers feed on decayed matter left behind by consumers and detrivores.

4. (a) Omnivores and carnivores are both types of consumers, and both eat animals.

(b) Omnivores eat plants, but carnivores do not.

5. Scavengers eat the remains of dead organisms.

## 5.2: Food Chains and Food Webs

### Vocabulary:

**food chain** – a sequence that shows how energy and nutrients are transferred from one organism to another in an ecosystem

**food web** – a model that shows how food chains in an ecosystem are connected

1. Sample answer of food chains from list provided:

algae → mosquito larva → mallard duck → human

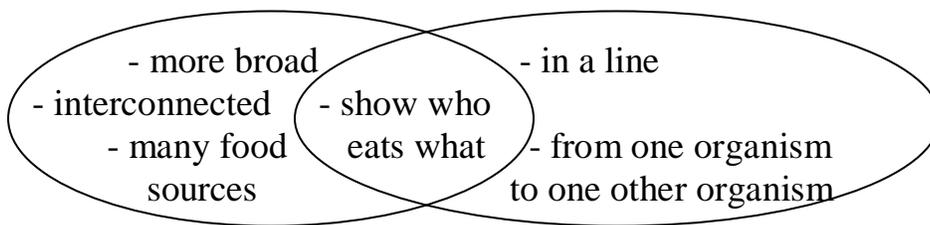
algae → freshwater clam → raccoon

2. The producers' role in food chains and food webs is to convert energy in sunlight into stored energy in food.

3.

#### Food Webs

#### Food Chains



3. (a) Food webs and food chains are both models that show how energy and nutrients pass from one organism to another in an ecosystem.

(b) In a food **chain**, each organism only has one source of food and is eaten by at most one other organism. In a food **web** every organism can have many food sources and can be the food source for more than one other organism.

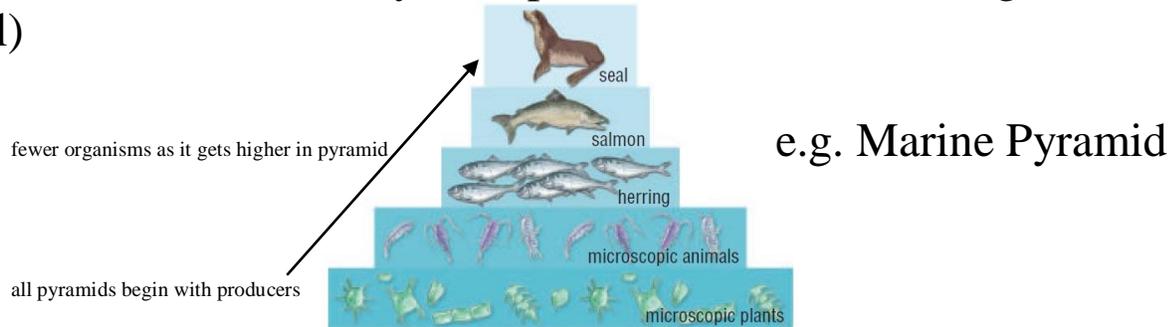
4. If a species is removed from a food web, it can cause species to die off, or compete for other food. The food web could collapse, or it could reorganize depending on how many organisms relied on the species that had been removed.

5. The initial source of energy for most food chains and food webs is sunlight.

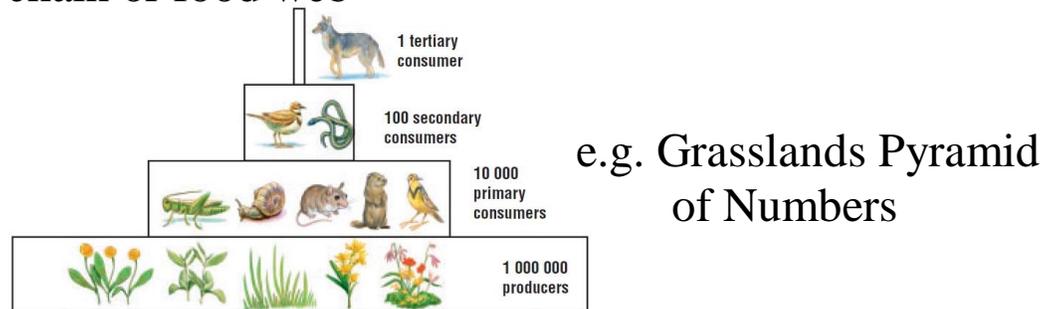
## 5.4: Energy Flow in an Ecosystem

### Vocabulary:

• **ecological pyramid** – shows the effects of energy loss at each level in a food chain in a visual way (compares total mass of all organisms at each level)



• **pyramid of numbers** – a model that shows the **number** of individuals at each level in a food chain or food web



1. Chicken eats grain → 30 % keeps the chicken alive  
→ 60 % is wasted  
→ 10 % is used for body growth

2. A pyramid of numbers shows the total numbers of organisms at each level of the food chain.

3. An ecological pyramid = total mass of organisms at each level.

4 a) The pyramid gets smaller at higher levels because the energy is being used up.

A pyramid of numbers = total number of different organisms in an ecosystem.

4 b) The pyramid shape happens because only 10 % of the energy stored in the bodies of the organisms at each level is available to the organisms at the next highest level.

5. The **first** level of the pyramid of numbers is always occupied by producers.

## **5.5: Matter Cycles**

### **Vocabulary:**

**closed system** – a system in which the amount of matter remains constant over time

**cycle** – a pattern in nature that repeats over time

**sustainable** – something that can be maintained and used indefinitely

**evaporation** – the process in which a substance changes state from liquid to gas

**condensation** – the change in state of a substance from gas to liquid

**precipitation** – water in the liquid or solid state that falls to Earth

1. A **cycle** is a looping pattern of events.

2. **Detritivores** break down matter from dead organisms into forms that can be reused by living plants.

3. “Ecosystems are sustainable” means that healthy ecosystems can be maintained indefinitely because matter is recycled.

### **4. The Carbon Cycle:**

- carbon dioxide from the air taken in by plants, used to make sugars

- some sugars used by animals that eat the plants

- carbon in sugars is either returned to the atmosphere as waste gas or buried in the ground

- carbon also released to the atmosphere when forests burn or when people burn fossil fuels

**5. The Water Cycle:** Water evaporates. It rises and condenses and then falls as rain or other precipitation. Some of the water runs off the land back into a river or stream and into the ocean. Some of the water moves through the ground, where plants take it up or people use wells to get the water from deep underground.

6. The supply of fresh water on Earth is at risk because people use a great deal of fresh water for agriculture and industry, and the water they use often becomes polluted or otherwise unusable. Large amounts of energy and time are required to clean the water.

## Chapter 5 Review questions

1. The “ingredients” of **photosynthesis** are carbon dioxide, water, and sunlight.
2. One food chain that has four organisms is:  
kelp → sea urchin → sea otter → shark
3. If dead organisms did not decompose, the bodies would quickly cover Earth and nutrients contained in the bodies would not be recycled for other organisms to use.
4. **Decomposers** play an important role in the carbon cycle.
5. Sample answer: **Ecosystem Role Examples**  
**producer** - grass, maple tree  
**herbivore** - cow, rabbit  
**carnivore** - lion, polar bear  
**omnivore** - black bear, human  
**scavenger** - vulture, hyena  
**detrivore** - earthworm, beetle  
**decomposer** - bacterium, mould
6. A **producer** gets its energy from the sun. A **consumer** gets energy from the other organisms it eats.
7. (a) A food **chain** includes only one link to and from each organism. A food **web** can have many links going to or coming from each organism.  
(b) A **carnivore** kills organisms for food. A **scavenger** eats the remains of organisms that are already dead.  
(c) **Decomposers** break down wastes and dead plant and animal matter into simpler substances, and consume those substances. **Detrivores** consume larger pieces of wastes and dead plant and animal matter.

**(d)** A **primary consumer** eats producers. A **secondary consumer** eats primary consumers.

**8.** In an ecosystem containing bald eagles, algae, mosquito larvae, and salmon, the algae would be producers, mosquito larvae would likely be primary consumers, salmon would be secondary consumers, and eagles would be tertiary consumers.

**10.** An organism stores in its body only about 10 % of the energy from the food it takes in. Only the energy stored in an organism's body can be passed on to the next organism in the food chain. Such large energy "losses" at each level of the energy pyramid of numbers means that there is relatively little energy left after a few levels to support many organisms.