7 SCIENCE

Quarter II

LIVING THINGS AND ITS ENVIRONMENT - Ecosystems

VIRTUAL FLIP PAGE
LEARNING MATERIAL

Batangas State University-The National Engineering University
College of Teacher Education

For Students

Grade 7 Science: Living Things and Its Environment - Ecosystems

Quarter 2

(Week 6-8)

Batangas State University- The National Engineering University
College of Teacher Education

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Module 5: Interactions

Overview

The environment is a collection of living and non-living things. Mosses growing on rocks, garden snails gliding on garden fences, and fish swimming in the water are just a few examples of how living and non-living things interact. The living components of the environment are also called organisms. The non-living components make up the physical environment of these organisms.

Organisms that belong to the same species and live in the same place form a population. The moss that grows on rocks makes up a population. Populations that live in the same place and interact with each other form a community; goats grazing on grass, chickens feeding on grains, and lizards preying on insects make up a community.

Interactions between organisms and their environment are also a familiar sight: carabaos helping farmers till the soil, earthworms burrowing in the ground, and birds using twigs to build their nests. Organisms interact with each other and their environment to meet their basic needs and survive.

Some interactions are beneficial; others are harmful. There are also interactions in which populations of organisms are neither benefitted nor harmed. All these interactions take place in ecosystems.

In this module, you will discover more about ecosystems, the components that make them up, and the interactions that take place among the components of the environment.

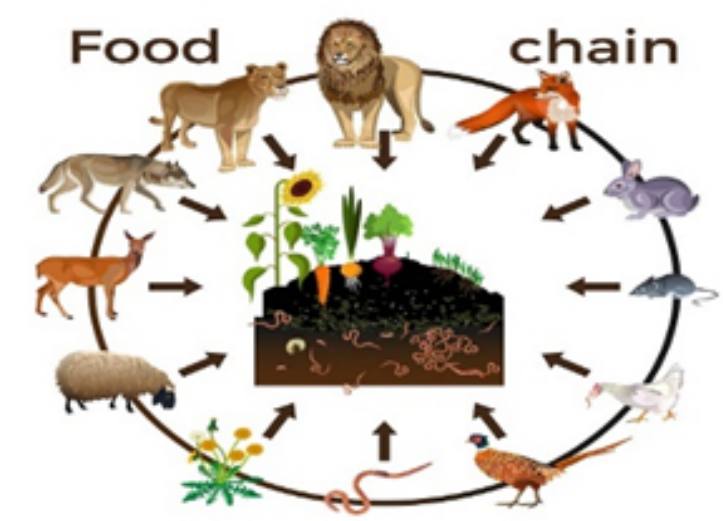
How do organisms interact with each other and with their environment?

How is energy transferred from one organism to the other?

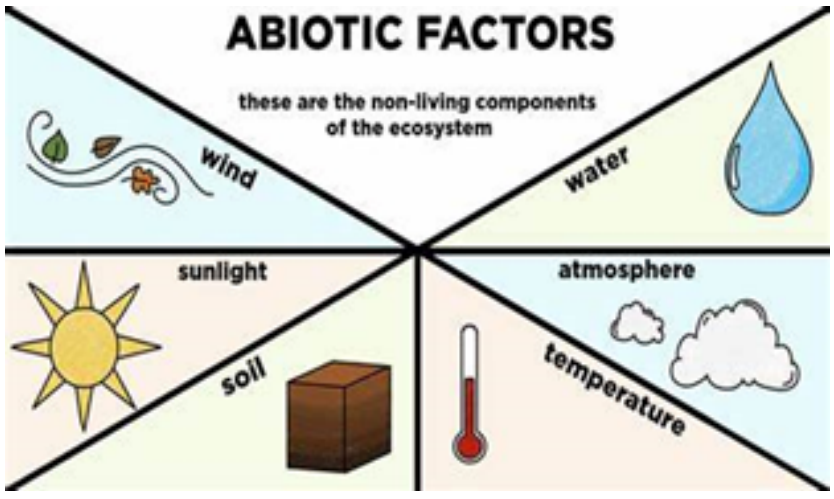
FACTORS AFFECTING LIVING ORGANISMS AND NON-LIVING ORGANISMS

Ecosystems have a natural balance of abiotic and biotic factors. Within a natural system, the transfer of energy drives the cycling of matter. All ecosystems consist of three basic components: autotrophs, consumers, and abiotic matter.

AUTOTROPHS



CONSUMERS



ABIOTIC MATTER

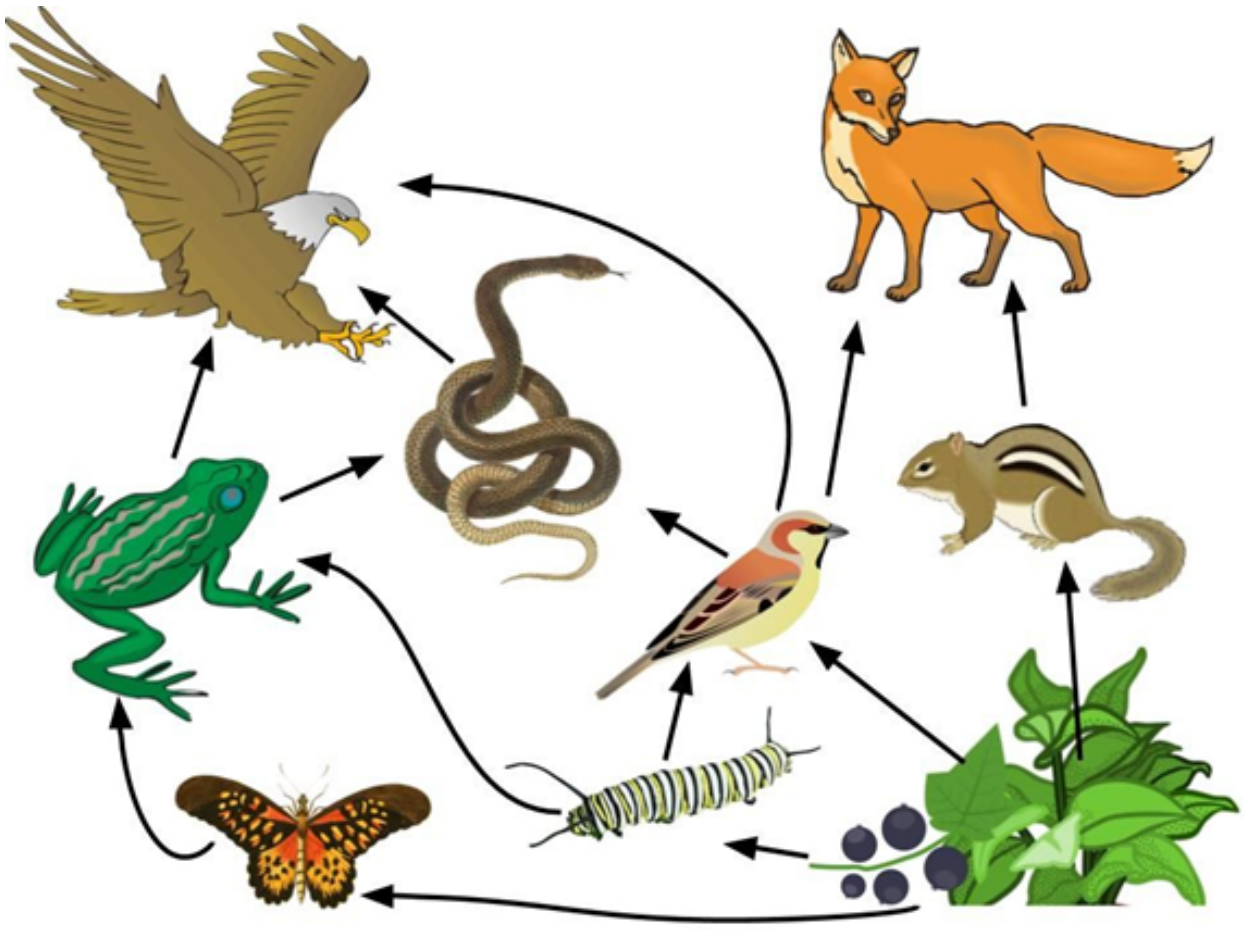
AUTOTROPHS

The **producers or autotrophs** are largely green plants that use the energy of the sun in photosynthesis to transform inorganic compounds into simpler organic compounds.

Learn more:

CONSUMERS

The **consumers or heterotrophs** use the organic compounds produced by the autotrophs as a source of food. Through the composition, heterotrophs eventually transformed these complex organic compounds into simpler inorganic compounds that are once used by the producers.



The heterotrophic component of the ecosystem is often subdivided into two subsystems: **consumers and decomposers.**

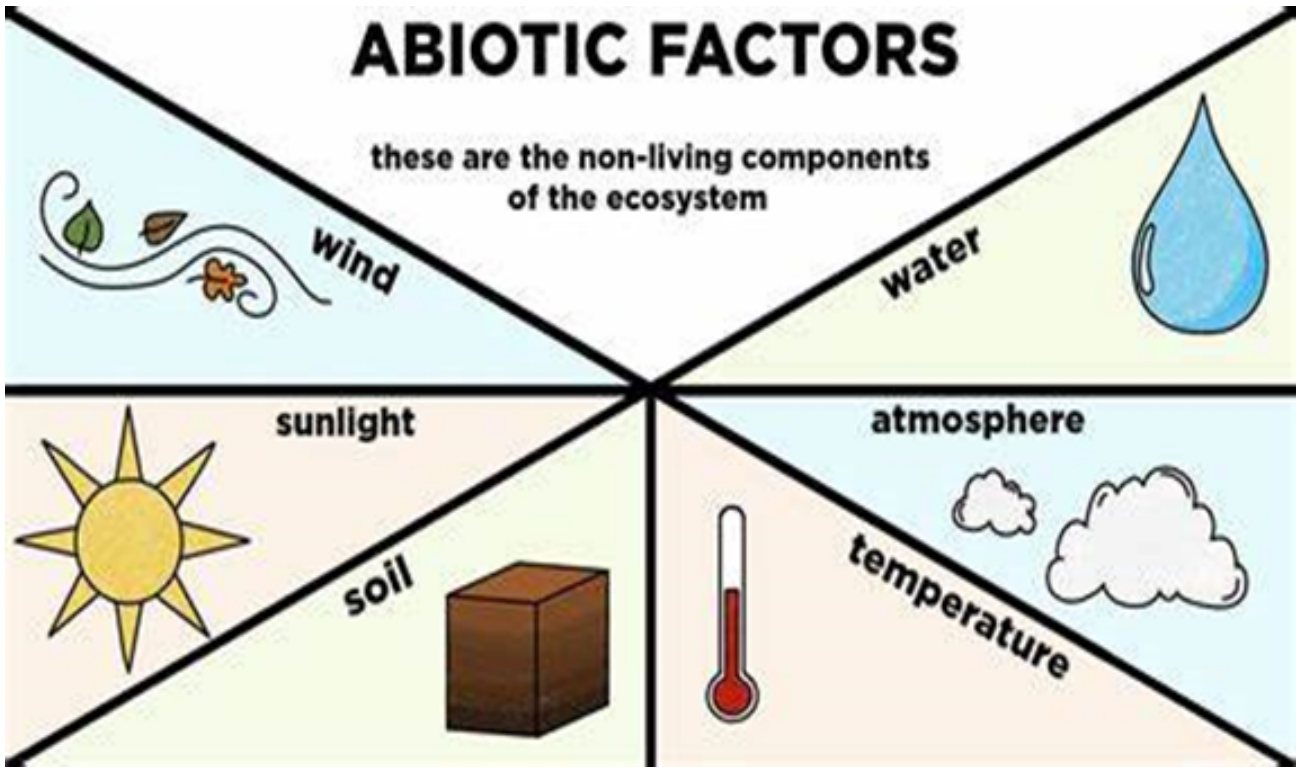
Consumers	Decomposers
Eat other organisms for food	Break down dead material
 	 

The decomposers feed largely on living tissues and other decomposers break down dead matter into inorganic substances no matter how classified they are.

Learn More:

ABIOTIC MATTER

The non-living parts of an organism's environment are the abiotic factors. Examples of abiotic factors include air currents, temperature, moisture, light, and soil. Ecology includes the study of features of the environment that are not living because these features are part of an organism's life.



The living environment includes abiotic factors which have obvious effects on living things and often determine which species survive in a particular environment.

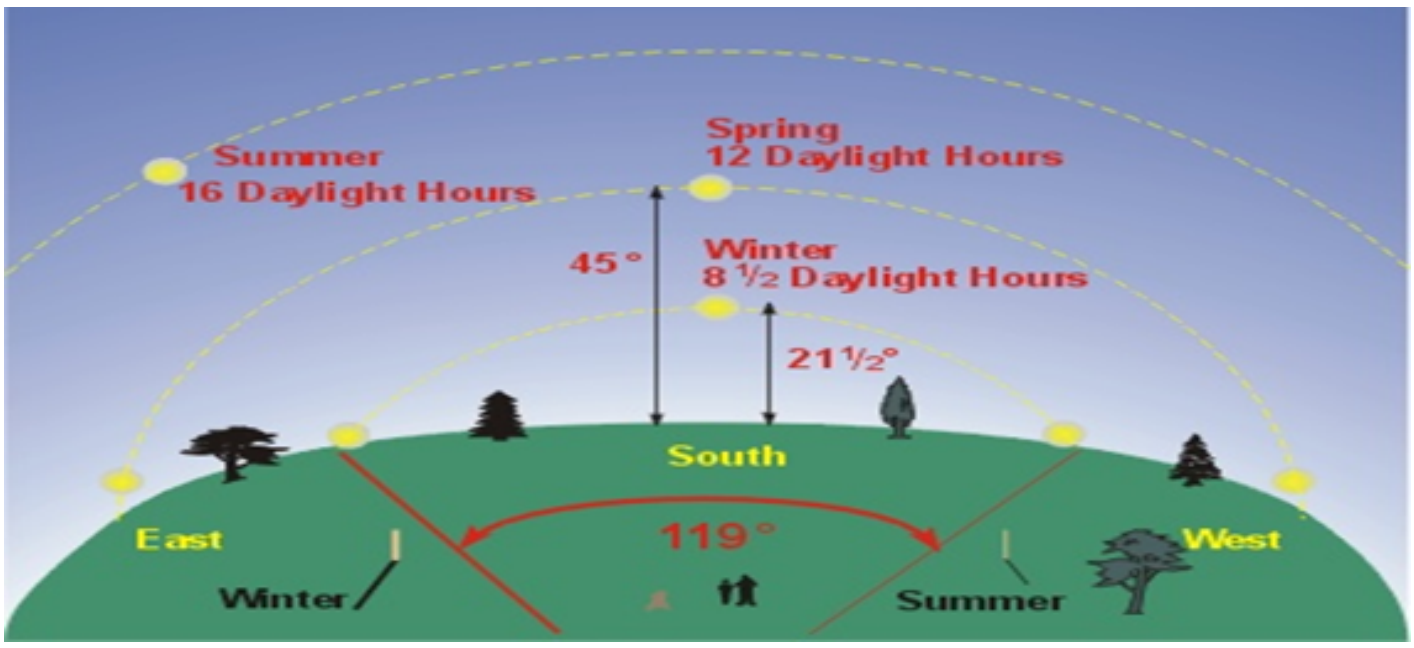
Example:

An extended lack of rainfall in the grassland can cause drought. Grasses would grow more slowly, it might produce fewer seeds, all the animals that depend on seeds for food would find it harder to survive.

THE ABIOTIC AND BIOTIC COMPONENT OF ECOSYSTEM

Abiotic Components

The abiotic components of our environment are often the sun (solar energy), rainfall, temperature, air, and soil. Many factors influence the abiotic components, including **height, location, and season.**



Example:

The temperature varies from the equator to the pole.
We have a high temperature near the equator and a very low temperature at the poles.

Physical factors such as pH level, temperature, light intensity, humidity, topography, microclimate, and the edaphic factor (physical and chemical compositions of the soil can affect the lives and distribution of organisms.

pH Value

- the pH value of the soil and water affects the distribution of organisms.
- ·Most organisms live in a neutral and nearly neutral environment (pH 6- 7.5)

Trivia:

Maize (corn), pineapple grows well in acidic condition

Coconuts grow well in an alkaline condition

Temperature

- ·Affects the biochemical reactions in the organisms

Poikilotherms

- Cannot control their body temperature
- Their body temperature varies with the environmental temperature.

Examples:

Homeotherms

- Can maintain their body temperature
- More widespread

Examples:

Plants and animals have a specific characteristic to help them adapt to areas of extreme temperature.

Light Intensity

- Affects the rate of photosynthesis
- The distribution of green plants will be more extensive in areas with higher light intensity
- All organisms that live in soil prefer a dark environment

Humidity of air

- Affects the rate of transpiration (plants) and the rate of water evaporation (animals).

Learn More:

Topography

- Shape of the Earth's surface

Altitude

- High altitude = fewer organisms, temperature, atmospheric pressure, and air humidity are low
- Different plants are found in different altitudes

Gradient/slope

- Affect the rate of water flow
- In steep areas, the swift flow of water causes soil erosion, in flat areas, the water is stagnant and both are not suitable for plants and animals.

Aspect

- The direct facing or opposing the wind and sunlight. Areas facing are not suitable and have fewer organisms

ACTIVITY 1:

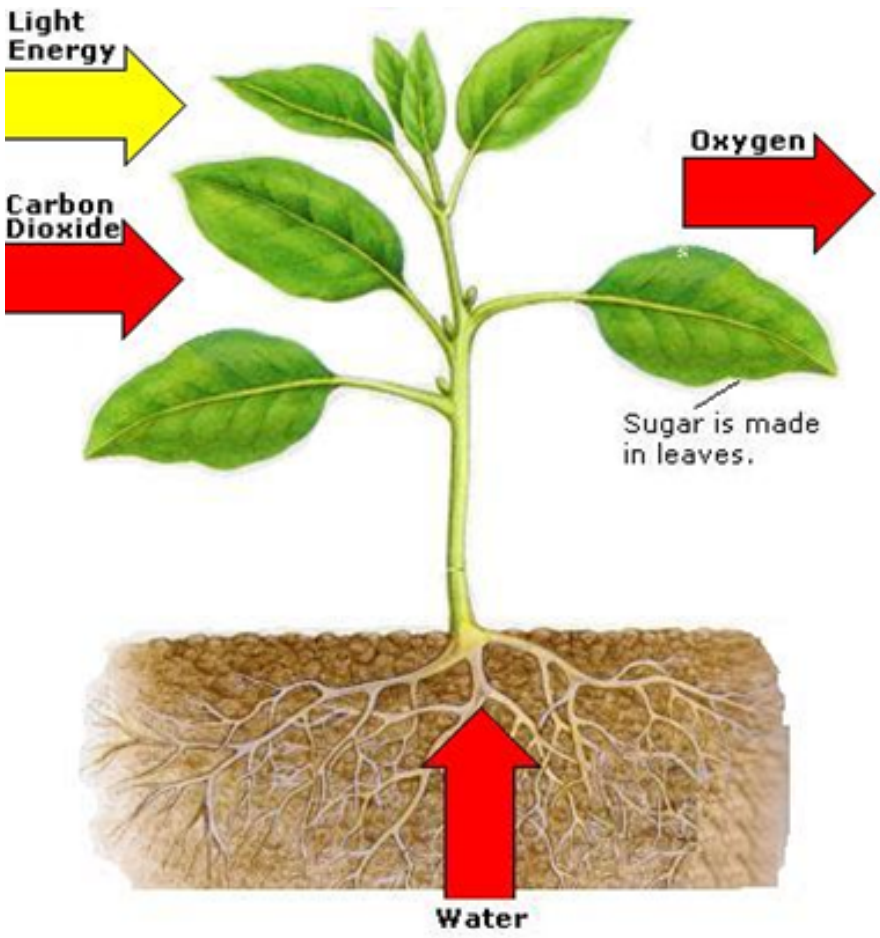
Population		Organisms that can maintain their body temperature.
Autotrophs		Decomposers that decompose organic matters by eating it and digesting it internally.
Environment		A collection of living and non living things.
Community		Populations that live in the same place and interact with each other.
Heterotrophs		Organisms that cannot produce their own food..
Saprotrophs		Affects the biochemical reactions in the organisms.
Detritivores		Feed largely on living tissues.
Temperature		Organisms that cannot eat organic matter directly because they do not have an internal digestive system.
Homeotherms		Largely green plants that use the energy of the sun in photosynthesis.
Decomposers		Organisms that belong the same species and live in the same place

Submit Answers

Biotic Components

Biotic components are made up of organisms, living organisms, dead organisms, and the waste products of these. Biotic components are classified on how they obtain energy.

- **Autotrophs:** these organisms feed themselves and thus known as self-feeders. They prepare their food using sunlight, water, CO2, and nutrients. They are also known as **producers.**



- **Heterotrophs:** these organisms can’t produce their food and thus rely on other organisms for their energy requirements. They are also called consumers as they consume food from the producers.

Heterotrophs are further classified on the basis of what they eat.

Herbivores

- Animals that consume plants.

Example:

Carnivores

- Animals that consume other animals.

Example:

Omnivores

- Animals that consume both plants and other animals.

Example:

There is another category apart from the heterotrophs and autotrophs without which life can’t function. They are the decomposers.

Decomposers

They are the second most important organisms after the producers. These decomposers also help the producers to produce their food too. They are the second most important organisms because they decompose all the remaining organic matter. They also provide nutrients that the producers use to produce food. If these nutrients are not present life won’t be possible on earth.

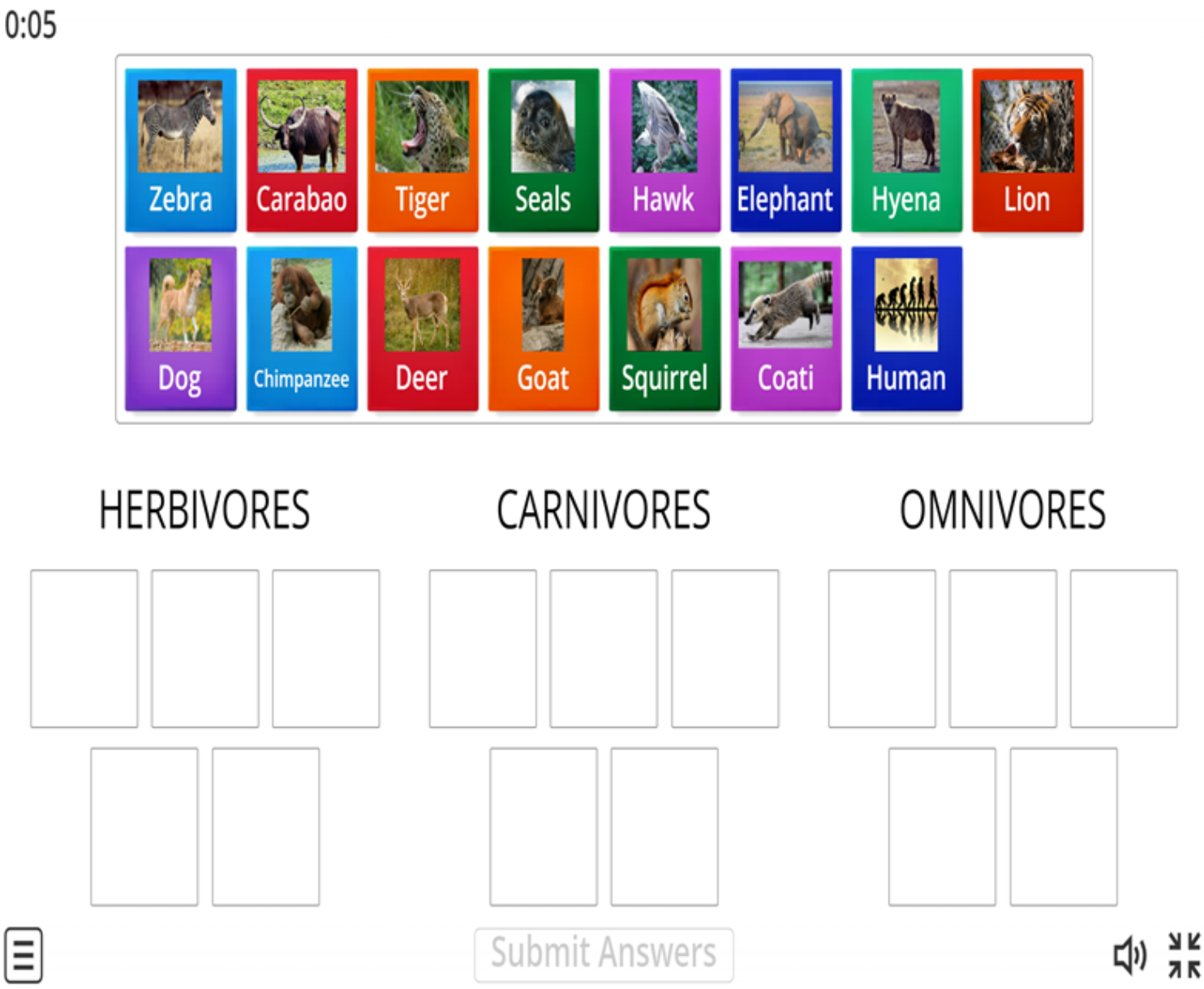
Decomposers are of two types;

- **Detritivores:** these decomposers or organisms decompose the organic matter by eating the organic matter and digesting it internally.

Example:

- **Saprotrophs:** these organisms cannot eat the organic matter directly because they don’t have an internal digestive system. They secrete digestive enzymes with the help of these digestive enzymes the organic matter breaks down and changes its form. Then the organism can consume it.

ACTIVITY 2: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Zebra
Carabao
Tiger
Seals
Hawk
Elephant
Hyena
Lion
Dog
Chimpanzee
Deer
Goat
Squirrel
Coati
Human
HERBIVORES
CARNIVORES
OMNIVORES
Submit Answers

ECOLOGICAL RELATIONSHIPS WITHIN POPULATION

A **population** is a group of organisms of the same species, which interbreed and live in the same area at the same time.

How organisms in a population share the resources of their environment may determine how far apart the organisms live and how large the population may become. *Members of the same population may compete for food, water, mate, or other resources.*

Competition increases when resources are in short supply. *Some species have adaptations that reduce competition within a population.*

Example:

An example is a life cycle of a frog. The juvenile stage of the frog called the tadpole looks very different from the adult and has different food requirements.

Many species of insects, including butterflies and moths, also produce juveniles that differ from an adult in body form and food requirement.

INTERACTIONS WITHIN COMMUNITIES

No species lives independently. Just as a population is made up of individuals, several different populations make up a biological community

A **biological community** is made up of interacting populations in a certain area at a certain time.

Example:
Different species of flowers in a grassland.

A forest of trees and undergrowth plants, inhabited by animals and rooted in soil containing bacteria and fungi.

A change in one population in a community may cause changes in other populations. Some of those changes can be minor, such as when a small increase in the number of individuals in one population causes a small decrease in the size of another population.

Example:

If the population of mouse-eating hawks increases slightly, the population of mice will, as a result, decrease slightly.

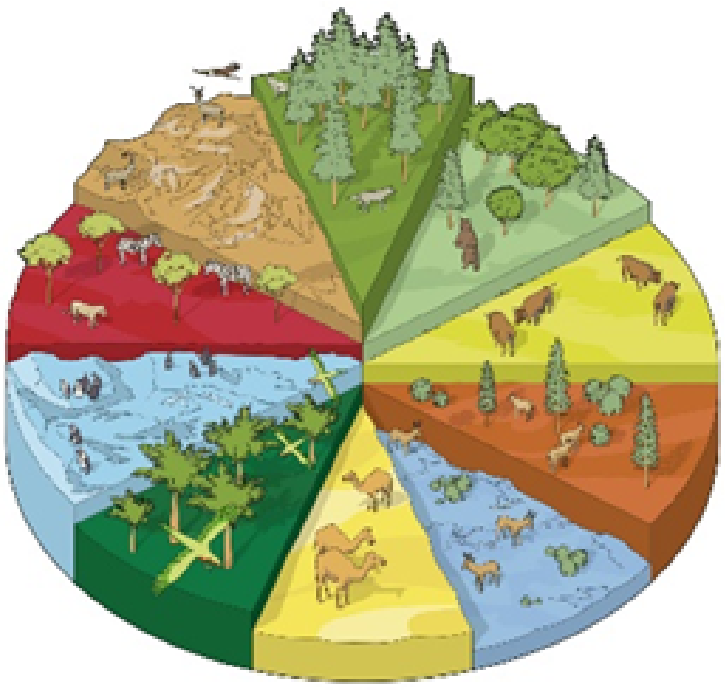
Other changes might be more extreme, as when the size of one population grows so large, it begins affecting the food supply for another species in the community.

ORGANISMS IN ECOSYSTEM

Some special birds make their homes in the fruit-bearing tree. In these areas, they find food, avoid enemies, and reproduce.

A **habitat** is a place where organisms live out their life.

Land habitat



Water habitat

A **niche** is all strategies and adaptations a species uses in its environment. How it meets its specific needs for food and shelter how and where it survives and where it reproduces. A species' niche, therefore includes all its interactions with the biotic and abiotic parts of its habitat.

ECOLOGICAL RELATIONSHIPS

Predations

Predation is found in all ecosystems and includes organisms that eat plants and animals. Predators may be animals such as lions and insect-eating birds. The animals that predators eat are called prey. A predator-prey relationship such as the one between cats and mice involves a fight for survival.

Symbiosis

The relationship in which there is a close and permanent association between organisms of different species. Symbiosis **means living together.**

Three kinds of symbiosis are recognized: **mutualism, commensalism, and parasitism.**

Mutualism

A symbiotic relationship in which **both species benefit** is called mutualism. Ants and acacia trees living in the subtropical region of the world illustrate mutualism. The ants protect the acacia tree by attacking any animal that tries to feed on the tree. The tree provides nectar and a home for the ants.

Commensalism

Commensalism is a symbiotic relationship in which **one species benefits** and the **other species is neither harmed nor benefitted.** Commensal relationships occur among animals and in plant species too. Spanish Moss is a kind of flowering plant that draped itself on the branches of trees. Orchids, ferns, mosses, and other plants sometimes grow on the branches of the larger plant. The larger plant is not harmed but the smaller plants benefit from the habitat.

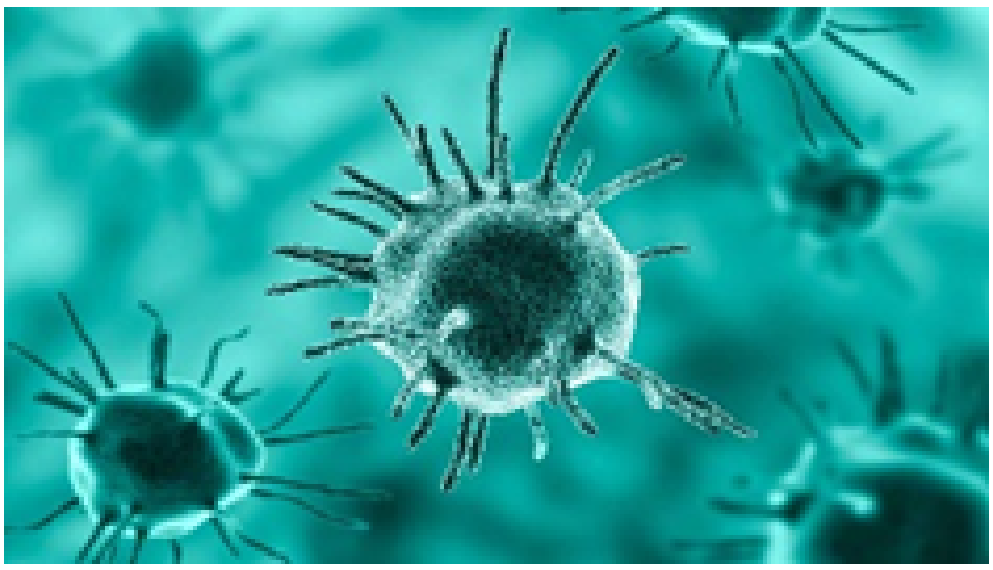
Parasitism

A symbiotic relationship in which a **member of one species benefits at the expense of another species (the host)** is called parasitism. Parasites have evolved in such a way that they harm, but usually do not kill the host species. If the host died, the parasites also would die unless they can quickly find another host.

Parasites can be characterized as **ectoparasites** – including ticks, fleas, leeches, and lice – which live on the body surface of the host and commonly cause diseases; or **endoparasites,** which may be either intercellular or intracellular.

Intercellular- inhabiting spaces in the host's body.

Intracellular- inhabiting cells in the host's body (ex: bacteria or viruses)



virus

lice

Competition

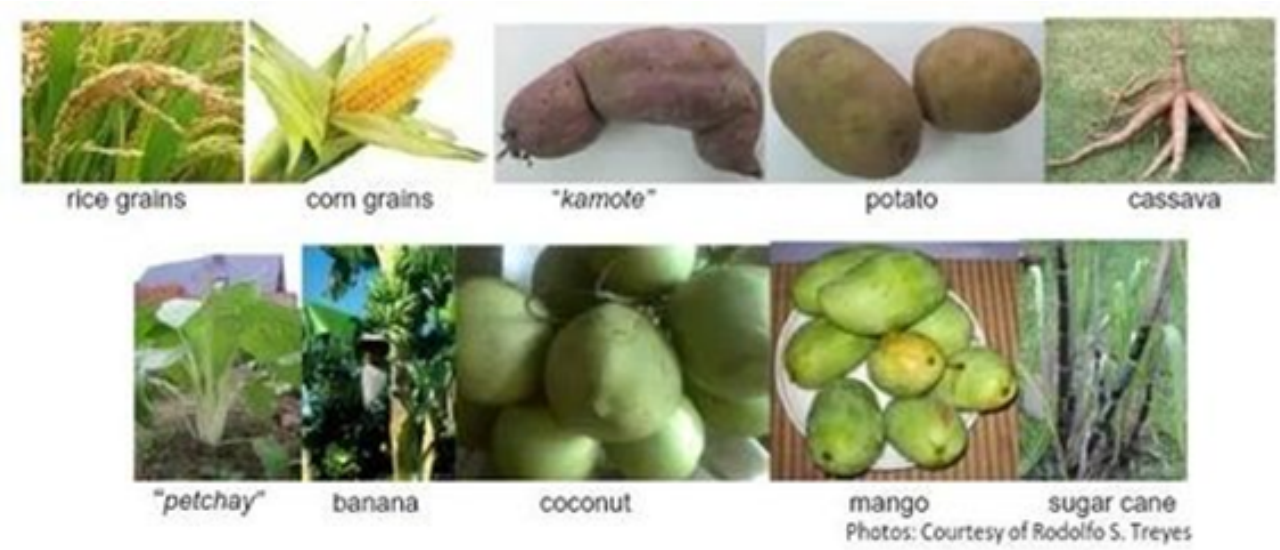
Competition is a powerful form of interaction in the organization of communities, but it differs from other forms of antagonistic and mutualistic relationships in that no species benefits from one interaction. In **competitive interactions, species evolve either to avoid each other, to tolerate the presence of the other, or to aggressively exclude the other.**

Learn More:

ENERGY TRANSFER IN THE ECCOSYSTEM

Plants, animals, and microorganisms must obtain energy to enable them to move, grow, repair damaged body parts, and reproduced.

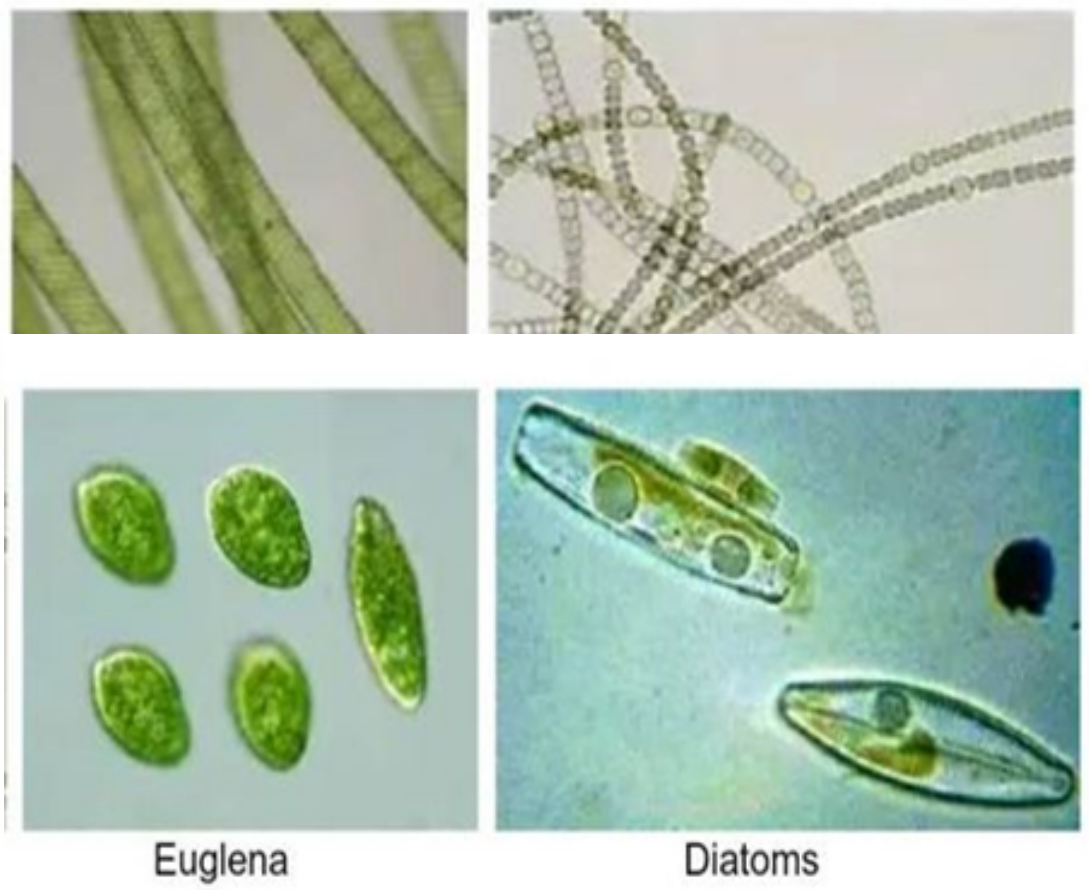
Plants are capable of converting energy from the Sun into chemical energy in the form of glucose (food). The process is called photosynthesis; it uses water, carbon dioxide, and sunlight. Most plants make much more food each day than they need. Excess glucose is converted into starch by the plants and is stored either in the roots, stem, leaves, tubers, seeds, or in fruits.



Different plant parts that store chemical energy in the form of starch of sugar. Sugar cane is an example of plant with high sugar content.

There are also microorganisms that can photosynthesize.

Examples:



*These photosynthetic microorganisms are present in ponds, in rice paddies, or any fresh water ecosyste*m.

Humans and other animals are not capable of making their own food. They are dependent on the organic matter made by photosynthetic organisms. These organisms that include the plants and some microorganisms are considered as producers.

Animals and humans must eat either plants or other animals to obtain energy. Organisms that feed on other organisms are called consumers. Those that get their energy by eating plants only are called first order consumers.

Goats eating grass

Cows eating grass

Caterpillar eating a leaf

Mouse eating corn

The first-order consumers are the animals that eat plants.

Some energy in the first-order consumer is not used by the consumer itself. This energy is made available to another consumer. A consumer that eats the plant-eaters for energy is called the second-order consumer.

Example:

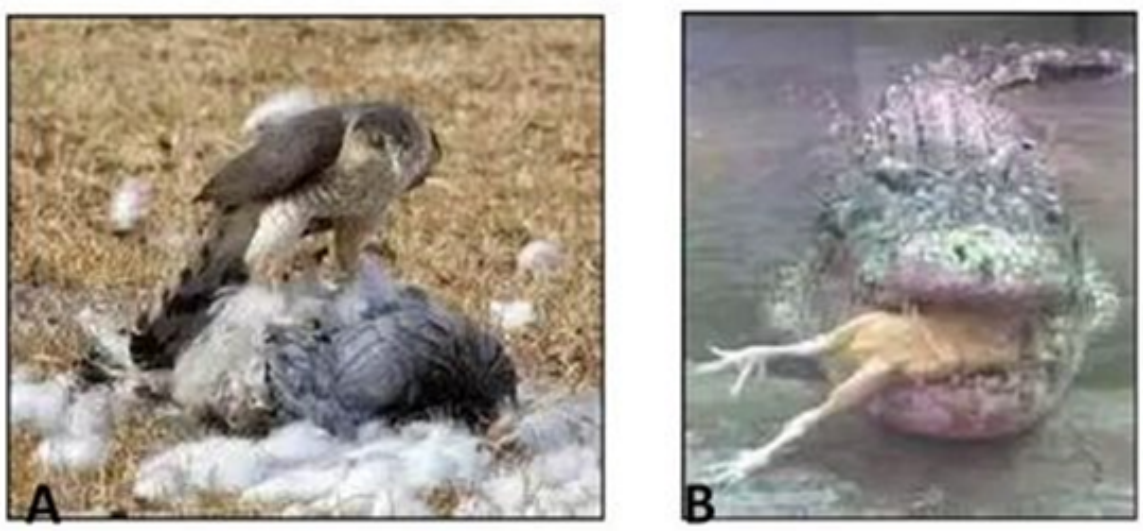
Snake eats corn-eating mouse

Chicken eats caterpillar

The second-order consumers are the animals that eat plants.

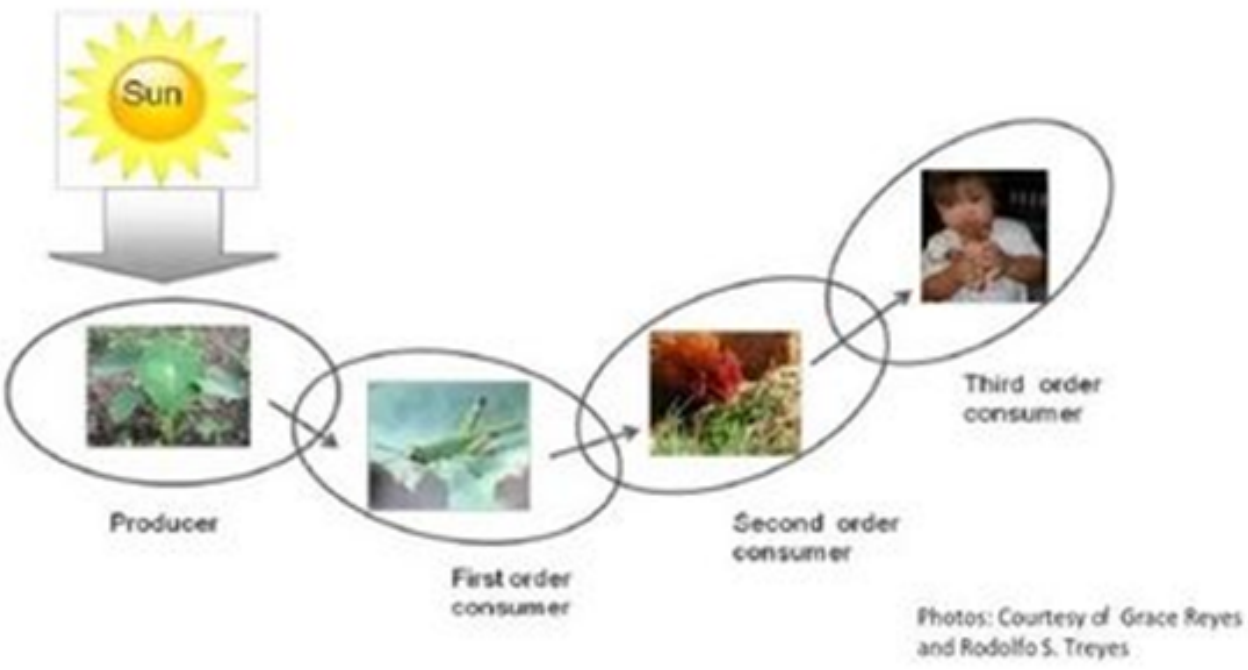
A second-order consumer gets only a fraction of energy from the first-order consumer that it fed upon. A part of this energy is stored and may be passed on to another consumer. A consumer that eats second-order consumer is called a third-order consumer. A human-beings are a third-order consumers.

Examples:



Third-order consumers are organisms that eats second-order consumers. (A) A hawk eats a chicken; and (B) a crocodile eats a chicken, too.

The transfer of energy can be sequenced. The sequence of energy transfer among organisms to obtain energy and nutrients is called a **food chain.** A food chain **starts at energy source, the Sun**. The next link in the chain is the group of organisms that make their own food – the **photosynthetic organisms (producers)**. Next in the sequence are the organisms that eat the producers; they are the **first-order consumers**. The next link in the chain is the group of animals that eat the first-order consumers; they are the **second-order consumers**. These organisms, in turn, are eaten by larger animals – predators; they are also called, **third-order consumers**. Each food chain ends with a top predator – an animal with no natural enemies.



A transfer of energy is shown in a food chain. The "gabi" plant produces its own food through photosynthesis. Grasshopper eats the leaves of the "gabi" plant to get their energy and nutrients. The chicken eats the grasshopper. Then the chicken is eaten by humans.

When plants and animals die, the energy from their bodies can be transferred to another group of organisms. Consumers that look for and eat dead animals or plants are considered scavengers.

House flies, cockroaches, maggots, and ants are scavengers. Earthworms feed on dead grass and leaves if they are above ground. They also feed on fruits, berries, and vegetables. If they are under the soil, earthworms may feed on algae, fungi, and bacteria.

Photos: Courtesy of Rodolfo S. Treyes

Common scavengers: houseflies, earthworms, ants, and cockroaches.

Once the scavengers are done with eating a dead organism, the decomposers (microorganisms) take over and consume whatever was left by the scavengers. Decomposers consume any dead plants and animals.

There are different kinds of decomposers performing different functions in the ecosystem. Some groups of bacteria prefer breaking down meat or waste from the consumer that eat meat.

A group of bacteria.

Fungi are decomposers that prefer to grow on starchy food, fruits, vegetables, and dead plants.

Photos: Courtesy of Rodolfo S. Treyes

Fungi growing on left-over rice and bread, fruit and dead trunk of a tree.

Microorganisms that include bacteria and fungi break down proteins, starches, and other complex organic substances that were once part of living things. During the process of decomposition, decomposers release nutrients from the organic material back into the soil, making the soil available to plants and other producers.

Energy transfer in an ecosystem follows a process. The ultimate source of energy for all living things is the Sun. The producers of the ecosystem take energy from sunlight and convert it to chemical energy. This energy is passed on to consumers and then to decomposers. The energy flows only in one direction and is not cycled back.

In contrast, the materials in the form of nutrients needed by living things are cycled between organisms and the environment. These materials are used up by the producers to make other forms of materials that are cycled among the consumers and finally returned to the environment by the decomposers. Energy flows and materials are cycled in the ecosystem. We live in a dynamic world, indeed!

ACTIVITY 3:

REFERENCES

Images:

https://tinyurl.com/5fbb7356
https://tinyurl.com/msasb2kr
https://tinyurl.com/59fyxecy
https://tinyurl.com/59fyxecy
https://tinyurl.com/2szm77np
https://tinyurl.com/mrxm8nkc
https://tinyurl.com/395znu6w
https://tinyurl.com/yzhuetjm
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https://tinyurl.com/2p9yyhxw
https://tinyurl.com/3w9xfk4k
https://tinyurl.com/mr2bre47
https://tinyurl.com/pa575z6p

Science 1st and 2nd Quarter for Grade 7.
https://www.scribd.com/doc/148498816/Science-first-and-second-quarter-for-grade-7?fbclid=IwAR2mMSWzrUy_ENdcfCAls_Y5IY_zrt9VcjqKJbpyS5s7WREBi35AUV8byRA

Science 2nd Quarter Module (PIVOT).
https://grade7.modyul.online/science-7-second-quarter-module-pivot/

Abiotic and Biotic Components.
https://www.slideshare.net/cikgushaik/811-biotic-abiotic-components?fbclid=IwAR3KAkwAlktjcLK4Sh76XDjsG0qL2EvsSml1mw94xY3HhhYpYyfQ69lbeCg

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