

## 7<sup>th</sup> Grade Ecology and the Environment

### Chapter 1: Populations and Communities

#### Lesson 1 (Living Things and the Environment)

**organism** – a living thing (plant, animal, bacteria, protist, fungi)

- Different types of organisms are suited for different types of environments.

**Example:** A frog cannot live in a desert and a rattlesnake cannot live in a marsh.

**habitat** – the specific environment that provides the things an organism needs to live, grow, and reproduce.

- One area may contain many habitats that support different forms of life.

**Example:** A rainforest has the damp soil, surface, undercover (low plants), and treetops (canopy) as habitats that provide different requirements for different organisms.

An organism interacts with both the **living** and **nonliving** parts of its habitat.

**biotic factors** – the living parts of an organism's habitat

**Examples:**

plants in the area  
other animals that share the area  
insects  
predators in the area  
organisms in the soil  
(worms, fungi, bacteria)

All depend on  
each other as  
they interact.

**abiotic factors** – nonliving parts of an organism's habitat

**Examples:**

**water** – required by **all** living things for life processes

**sunlight** – needed by plants for photosynthesis, many organisms depend on plants

**oxygen** – most living things depend on oxygen for cellular respiration (even plants)

**temperature** – determines what can live in an area

**soil** – a mixture of rock fragments, nutrients, air, water, and decaying remains

- Not all soil types have the same amount of these things.

- The soil type determines the plant types in an area, therefore the animal types in the area.

**species** – a group of organisms that are physically similar and can mate with each other to produce offspring that can also mate and reproduce

**population** – all the members of one species in a particular area at the same time

**Examples:**

all the pigeons in a city

all the bees in a hive

all the bass in a lake (not all the fish)

all the red oaks in a forest (not all the trees)

**community** – all the different populations that live together in an area and interact with one another (act upon or influence one another)

**Examples:**

all the plants in an area  
all the animals in an area } Together they form a community that depends on each other, or share resources.

**ecosystem** – a community of organisms interacting with each other and with their surroundings

**Examples:** prairie, ocean, forest, desert, swamp, city

**ecology** – the study of how organisms interact with their environment

## Lesson 2 (Populations)

### Determining Population Size:

**direct observation** – count all of its members

**Indirect observation** – observe signs of organisms, such as nests

**Example:** If there are 120 nests for a certain bird in an area, and each nest averages four fledglings, the result is about 720 birds of that species.

$$\text{parents (2)} + \text{offspring (4)} \times 120 = 720$$

**sampling** – making an estimate in areas where there are too many to count

- Count the number of individuals in a small area. Then multiply to estimate the number in a large area.

**mark and recapture** – captured organisms are “tagged”, then released

- Later, organisms are captured again and the number of tagged individuals (recaptures) are compared to the untagged captures.
- A mathematical formula is then used to estimate total population.

### Changes in population size:

**Birth rate > death rate** (population sizes increases)

**Birth rate < death rate** (population size decreases)

**immigration** – moving into a population (increases population size)

**emigration** – leaving a population (population size decreases)

**population density** – the number of individuals in a specific area

$$\text{population density} = \frac{\text{number of individuals}}{\text{unit area}}$$

**Example:**

If you count 100 grasshoppers in an area that is 5 meters by 5 meters (25 m<sup>2</sup>), the density would be 100 grasshoppers per 25 square meters, or 4 grasshoppers per square meter.

**limiting factor** – an environmental factor that prevents a population from growing or makes a population smaller

**Examples:**

food  
water  
space  
weather conditions } All control the size of a population.  
(cold, wet springs can kill young organisms)

**carrying capacity** – the largest population that an area can support

**Lesson 3** (Interactions Among Living Things)**natural selection**

- a process by which individuals that are better adapted (suited) to their environment are more likely to survive and reproduce than others of the same species
- Individuals with beneficial characteristics tend to survive and produce offspring.
- Offspring that inherit that beneficial characteristic also live to reproduce.
- Soon that trait is very common in that species throughout the population.

**adaptation** – a behavior or physical characteristic that allows an organism to survive or reproduce in its environment

**niche** – the role of an organism in its habitat, or how it makes its living

**Examples:**

- A hawk's niche is to control the rodent population.
- A zebra's niche is to provide food for predators.
- A fungi's niche is to decompose dead material.

**Types of Organism Interactions:**

1. **competition** – when 2 organisms try to fill the same **niche** ( role or purpose ) in a community.

- Some resources may be limited and they compete for the same resources.
- Organisms best adapted ( best able to compete ) will survive.

**Examples:**

- Plants in a community need the same soil nutrients. ( If nutrient supply is short, some will not survive – or will be “out-competed”. )
- Predators in a community compete for the same prey.

2. **predator/prey relationship (predation)**

- One organism (predator) kills another organism (prey) for food.
- Populations of predators and their prey rise and fall in cycles.

3. **cooperation** – organisms of the same species work together to ensure their survival.

**Examples:**

- Certain individuals in a bird flock sound an alarm call when danger approaches, helping everyone survive.
- Wolves hunting in packs.

4. **symbiosis** – a close association or relationship between members of two or more species.

( There are 4 types of symbiotic relationships. )

**Symbiotic Relationships:**

a. **mutualism** – a symbiotic relationship between 2 species in which both species benefit.

**Examples:**

*Bees get nectar from flowers, and flowers get their pollen (stuck to the bees) carried to other flowers.*

*Birds feeding on insects on an animal's back – both benefit.*

b. **commensalism** – a symbiotic relationship between 2 species in which only one species benefits and the other species is neither harmed nor benefited. ( is not affected )

**Examples:** moss on a tree  
a bird nesting in a tree

c. **parasitism** – a symbiotic relationship in which one organism (called a **parasite**) lives on or in another organism (called a **host**) and harms it, but does not kill it.

**Examples:** tapeworm, heartworm (dogs)  
mosquitoes, fleas, ticks,  
bacteria, leeches, ringworm,

d. **mimicry** – a species closely resembles ( or mimics ) another species to help it survive.

**Example:** A harmless snake may look like or imitate a deadly snake to fool predators.

#### Lesson 4 (Changes in Communities)

**succession** – the process of change in which one community is slowly replaced by another

- Succession is also when a new environment becomes populated. ( example: a new lake forms and organisms populate it over time. )
- Succession is also when an ecosystem recovers from disasters, such as fires, flooding, or volcanic eruptions.

**primary succession** – the series of changes that occur in an area where no soil or organisms exist

**pioneer species** – the first species to live in a new ecosystem

- are often carried to the area by wind or water

**Examples:**

**the first plant species to sprout**

**the first animal that feeds on that plant**

***lichens*** ( can live in barren or bare environments )

**lichens** – organisms made up of algae and fungus living together

- They produce acids that can break down rocks into soil. ( important in areas with a recent volcano )
- are often pioneer species

**secondary succession** – the series of changes that occur in an area where the ecosystem has been disturbed, but where soil and organisms still exist (after fires, hurricanes, farming)

#### **Steps of Succession:**

1. Pioneer species appear in a new ecosystem.
2. This changes conditions so other new species can grow.
3. As the new species grow, reproduce, and increase in numbers, they cause even more changes in the environment. ( Makes it suitable for even more species of plants and animals )
4. Changes may make conditions **unsuitable** for some original species and they disappear.
5. When changes are complete, and all plants and animals are well adapted to the conditions, it becomes a **climax community**.

**climax community** – the final stage in succession in which the plants and animals of a community are well adapted and make up a balanced ecosystem.

**Example:** a mature forest

**diversity** – presence of many different species within a community.

- Diversity of species is necessary for succession to proceed.
- Diversity helps ecosystems recover from volcanic eruptions, fires, and floods and is an important factor in succession.