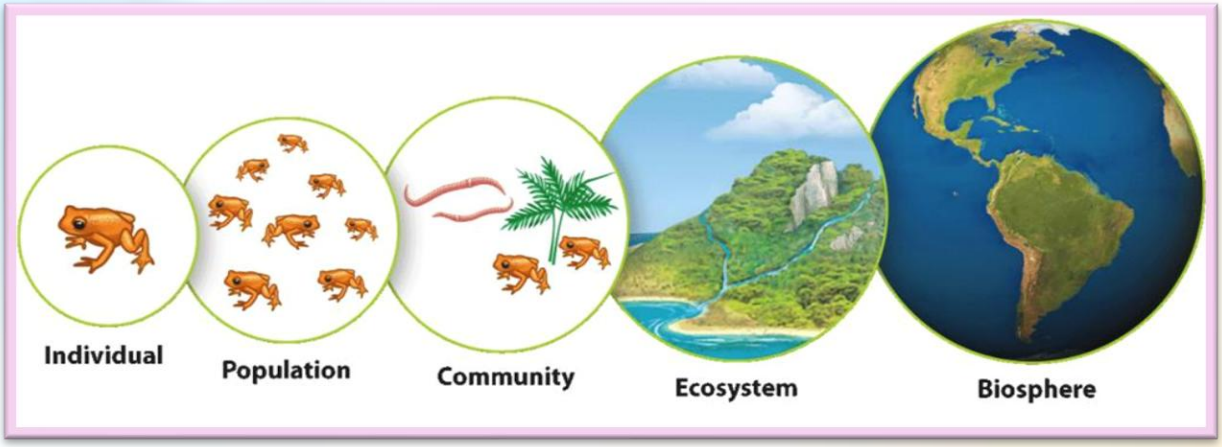
Resources in Ecosystems

Name: ..... Date: .....

The study of ecosystems involves understanding how living things (**biotic factors**) interact with each other and with non-living things (**abiotic factors**) like water, soil, and sunlight.

1. Levels of Organization



Life can be organized into specific ecological levels:

A species is a group of similar organisms that can reproduce.

A population is a group of individuals of the same species living in one area (e.g., all the deer in a forest).

A community includes all the different populations (all the living things) that interact in an area (e.g., the deer, the trees, and the insects).

An ecosystem includes the community plus the non-living environment (e.g., water, air, soil).

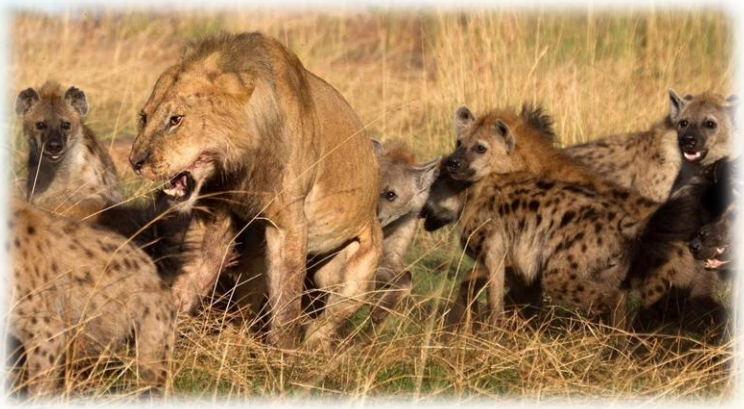
The biosphere is made up of all of Earth's ecosystems combined.

2. Limiting Factors

Organisms need resources like food, water, space, and shelter. **When these resources are scarce, they become limiting factors.**

A limiting factor is anything (resource or condition) that restricts the size or growth of a population.

Examples include drought (water scarcity), limited food supply, disease, and lack of space.



When **resources are limited**, organisms **compete** for what is available, which typically causes the population size to decrease.

3. Population Growth and Carrying Capacity

The maximum growth rate a population could achieve under perfect, unlimited conditions is called its **biotic potential**. (This is rarely, if ever, reached in nature).

Carrying Capacity is the maximum number of individuals of a species that an environment can support over a long period.

As a population approaches its carrying capacity, limiting factors increase, and the growth rate slows down and stabilizes.

Overpopulation occurs when a population **exceeds** the resources available to support it, often leading to a sharp decline in population.

Species at high risk of extinction (often due to habitat loss) are classified as **threatened** or **endangered**.

I. Multiple Choice Questions

Choose the best answer for each question.

1. **Which level of organization includes all the populations of different species living and interacting in a specific area?**

   a) Population

   b) Biosphere

   c) Ecosystem

   d) Community

2. **What is the effect of a severe drought on an ecosystem's population?**

   a) Animals will not be affected by water scarcity.

   b) Animals use the stored food to meet their needs.

   c) Animals distribute water among them equally to stay alive.

   d) Animals compete with each other for the available water.

3. **Which of the following is NOT considered a limiting factor in an ecosystem?**

   a) Disease

   b) Water scarcity

   c) Predator populations

   d) Soil color

4. **The weather could be a limiting factor in an ecosystem because the weather affects:**

   a) The type of food and water.

   b) The availability of air and soil.

   c) The type and quality of soil.

   d) The availability of food and water.

5. **A group of geese living in the same area form a:**

   a) Community and live in the same area.

   b) Ecosystem and have similar characteristics.

   c) Population and share the same resources.

   d) Population and don't have similar characteristics.

6. **Observe a dense growth of trees and plants. Which resource will most likely limit the future growth of the plants in this area?**

   a) Rocks available

   b) Plant population

   c) Predator population

   d) Space

7. **What is a limiting factor in an ecosystem?**

   a) A resource that can support an unlimited number of organisms.

   b) A type of ecosystem that is always changing.

   c) An organism that has no impact on its environment.

   d) A resource that limits the growth of organisms.

8. **How does food scarcity affect the population growth of a specific species?**

   a) Increases the size of the population.

   b) Members will adapt and won't be affected.

   c) Members will change their food type.

   d) Limits the size of the population.

9. **Explain how sunlight could act as a limiting factor in a rainforest ecosystem.**

a) Sunlight leads to a decrease in the amount of water available to plants.

b) Sunlight causes the tall trees to grow taller but far from each other.

c) Sunlight availability affects the survival of small plants growing on the forest floor.

d) Sunlight limits the growth of young plants and increases the rate of photosynthesis.

10. **Sharks feed on small fish. When do the small fish act as a limiting factor that reduces the growth of the shark population?**

a) When the sharks feed on other fish and plant species.

b) When the sharks change the area they live in.

c) When the small fish start feeding on the large fish.

d) When the number of small fish decreases in its ecosystem.

11. **What happened to the rabbit population size when it reached its carrying capacity?**

a) The population size became zero as the ecosystem could no longer support the rabbit population growth.

b) The population size kept growing because the ecosystem remained unchanged.

c) The population size could vary in unknown patterns according to the behaviour of the rabbits.

d) The population size stopped growing as it reached the maximum level an ecosystem can support.

12. How will the shape of the population growth curve vary if there are no limiting factors in the ecosystem (reaching biotic potential)?

a) It will change randomly without a clear direction.

b) It will increase at a high rate first and then start to decrease.

c) It will increase and then stabilize when reaching the carrying capacity.

d) It will increase rapidly over time with no limits.

13. What happens to the population size of a species if the ecosystem has abundant resources and minimal limiting factors?

a) Extinction of the species.

b) Decrease in population size.

c) Species are threatened.

d) Increase in the population size.

14. Why do populations never reach their biotic potential?

a) Because the number of animals is always limited restricting population size.

b) Because resources such as food, water, and shelter are often limited.

c) Because predators, diseases, and weather don’t restrict population size.

d) Because the resources are always plentiful without limiting factors.

15. Which statement is TRUE about carrying capacity?

a) It is constant and doesn't change.

b) It is the same for all species in an ecosystem.

c) It is represented as a curve in the population growth graph.

d) It is influenced by limiting factors.

16. What does the term "carrying capacity" refer to?

a) The minimum population size necessary for a species to survive.

b) The maximum population size reached without limiting factors.

c) The minimum population size must be found to avoid species extinction.

d) The maximum population size that an environment can support.

17. How do limiting factors such as food shortage affect the population size of owls in an ecosystem?

a) The population of owls increases due to more food being available.

b) The population of owls remains stable regardless of the food supply.

c) The population of owls grows because they adapt to survive without food.

d) The population of owls decreases because there is not enough food to support them.

II. Fill-in-the-Blank Questions

Fill in the blank with the correct term.

18. A ..... is a group of individuals of the same species living together in a particular area at the same time.

19. All of Earth's ecosystems make up the .....

20. Populations grow until they reach the ..... of their environment.

21. A limited food supply in an area can increase ..... among individuals, leading to a ..... in population size.

22. A ..... species is at high risk but not yet classified as endangered.

III. Short Answer Questions

Answer the following questions in complete sentences.

23. Explain how the carrying capacity for a deer population can change over time.

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24. Describe two negative impacts of overpopulation on an ecosystem, using the example of the European rabbits in Australia.

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25. Explain the difference between a population and a community.

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Answer Key

1	d) Community
2	d) Animals compete with each other for the available water.
3	d) Soil color
4	d) The availability of food and water.
5	c) Population and share the same resources.
6	d) Space
7	d) A resource that limits the growth of organisms.
8	d) Limits the size of the population.
9	c) Sunlight availability affects the survival of small plants growing on the forest floor.
10	d) When the number of small fish decreases in its ecosystem.
11	d) The population size stopped growing as it reached the maximum level an ecosystem can support.
12	d) It will increase rapidly over time with no limits.
13	d) Increase in the population size.
14	b) Because resources such as food, water, and shelter are often limited.
15	d) It is influenced by limiting factors.
16	d) The maximum population size that an environment can support.
17	d) The population of owls decreases because there is not enough food to support them.
18	population
19	biosphere
20	carrying capacity
21	competition, decrease
22	threatened
23	The carrying capacity for deer is determined by limiting factors. It is not constant and will decrease if resources become scarcer (e.g., habitat loss/deforestation, severe drought) or increase if resources become more plentiful (e.g., a major predator is removed, or a large, high-quality habitat is restored).
24	1. Resource Depletion: The large rabbit population eats native plants quickly, leading to widespread loss of vegetation and eventual starvation for the rabbits themselves. 2. Competition with Native Species: The destruction of plants reduces food and habitat for native animal species that also rely on those same plants, ultimately decreasing the native animal populations.
25	The population is a group of organisms of the same species living in a particular area at the same time (e.g., all the maple trees in a park). A community includes all the different populations (all the different species) that live and interact in that same area (e.g., the maple trees, the squirrels, the birds, and the insects).