

Name: \_\_\_\_\_

Unit 5: ECOSYSTEMS

NOTES: 6.01

**FOCUS:** Habitat, Niche, & Population

**ESSENTIAL QUESTION:** Can you identify the needs that must be met by an organism's habitat? Can you explain what factors cause changes in population size and what factors may limit population growth?

Can you identify the needs that must be met by an organism's habitat?

- Every living organism within an ecosystem has five basic needs that must be met within their habitat:
  - 1) Food: provides energy for life and nutrients for growth
  - 2) Water: provides a medium in which nearly all life-giving chemical reactions occur
  - 3) Air: provides CO<sub>2</sub> for photosynthesis and O for cellular respiration
  - 4) Shelter: provides protection from the elements (optional)
  - 5) Space: provides room for growth and access to resources with less competition
- Each species is unique in satisfying all of their basic needs.  
 In other words, each species occupies its own niche.
  - What exactly is a niche?
    - The role and position a species has within its ecosystem.
    - How a population meets its needs.
    - How a species survives.
    - All of an organisms' interactions with the biotic and abiotic (living and nonliving) parts of its habitat.
    - How a population responds to the changing balance of its resources and its enemies.
  - Are niche & habitat the same thing?
    - No.
    - You can think of an organism's habitat as its ecological "address" and its niche as its ecological "occupation".
- An organism's niche depends on what is available in its habitat.

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**EXAMPLE: Rainforest Plants**

- Rainforests are organized into four layers, with plants in each layer occupying a different niche.

○ **EMERGENT LAYER:**

- tallest trees, up to 200 feet
- smallest leaves
- Direct access to sunlight

○ **CANOPY:**

- Thick mass of trees with broad leaves.
- Trees provide homes for 90% of the life in the rainforest, including many Commensalist plants (Vines, mosses, ferns, orchids)



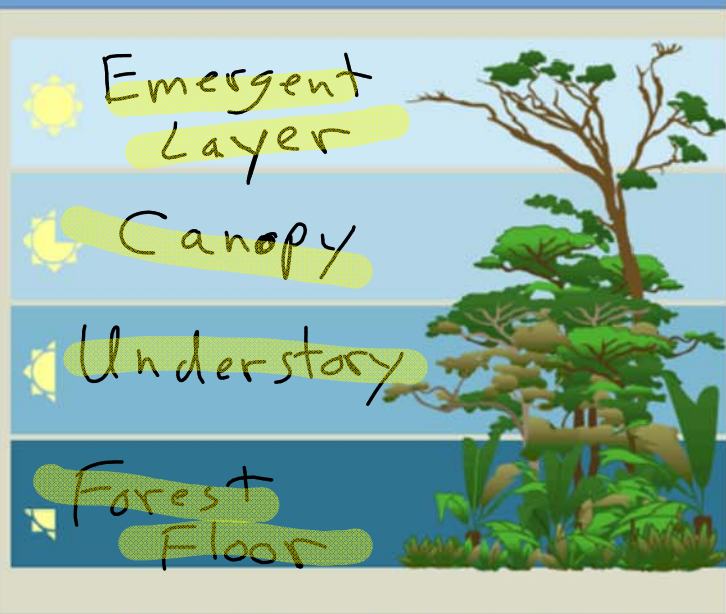
○ **UNDERSTORY:**

- Short trees with very broad leaves that can tolerate low sunlight.

○ **FOREST FLOOR:**

- Home to very few green plants. Occupied mostly by decomposers.
- A leaf that might normally take a year to decompose in a temperate forest will decay in 6 weeks in a rainforest.

Four levels of vegetation in tropical rainforest



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Can you explain what factors cause changes in population size and what factors may limit population growth?

- The main factor that limits population *size* and *growth* is Competition.

○ Competition is: the struggle between 2 or more species for access to limited resources



- Species compete for food, water, air, shelter, and space.

- Changes within and between populations can be explained by the...

Competitive Exclusion Principle: No two species can coexist if they occupy the same niche.

▪ **Results:**

- One species will out-compete the other for resources.
- The inferior species will either go extinct or adapt to a new niche.

- If one of the two competing populations can slightly change its niche, then the two populations can coexist.

- Coexistence: the ability of two species to occupy the same habitat, but in different niches, allowing both populations to survive

- Example: Coral reef communities



