

Chapter 14.1 Habitat & Niche

- **Habitat:** all aspects of the area in which an organism lives.
- Include:
 - ✓ biotic factors
 - ✓ abiotic factors

Chapter 14.1 Habitat & Niche

- **Niche:** includes all of the factors that a species needs to survive, stay healthy, and reproduce
 - food
 - abiotic conditions
 - behavior

A habitat is **where a species lives and a niche is **how** it lives within its habitat.

Chapter 14.1 Habitat & Niche

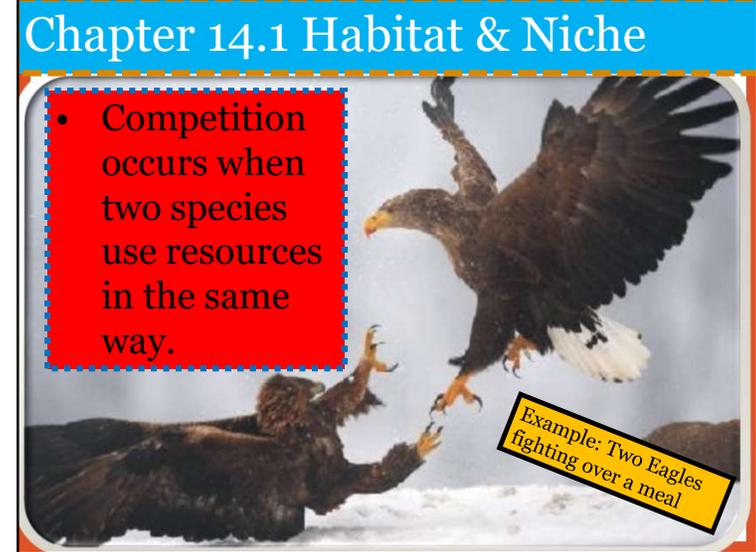
- Resource availability gives structure to a community.
- Species can share habitats and resources.
 - **Example:** Bees & butterflies both use flowers for food, but have different niches.





Chapter 14.1 Habitat & Niche

- Competition occurs when two species use resources in the same way.

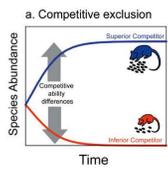


Example: Two Eagles fighting over a meal

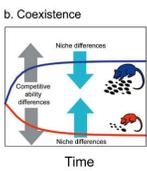
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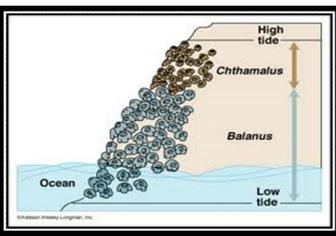
- **Competitive exclusion** keeps two species from occupying the same niche.
 - Has different outcomes.

a. Competitive exclusion



b. Coexistence





Example of Competitive Exclusion

- Two species of barnacles occupy different part of the intertidal zone

Chapter 14.1 Habitat & Niche

- **Competitive exclusion**

1. One species is better suited to the niche and the other will either be pushed out or become extinct
2. **Niche partitioning:** the niche will be divided
3. The two species will become more & more different

Niche will be divided

Niche Partitioning in Warblers



Chapter 14.1 Habitat & Niche

Ecological Equivalents

- Ecological equivalents are species that occupy similar niches but live in different geographical regions.

Madagascar

South America

Chapter 14.2 Community Interaction

Main Idea: Organisms interact as individuals and as populations

Chapter 14.2 Community Interaction

- Competition** occurs when organisms fight for the same limited resources

Two types of competition:

- Interspecific:** 2 different species compete for a limited resource
- Intraspecific:** individuals from the same species compete for a limited resource

Chapter 14.2 Community Interaction

- Predation** occurs when one organism captures and eats another

Predator-Eat

Prey-Gets eaten

Doug Perrine / naturept.com

Chapter 14.2 Community Interaction



Symbiosis:
A close relationship between different species that live close together

[Video](#)

3 Types of symbiosis:

- mutualism
- commensalism
- parasitism



Chapter 14.2 Community Interaction

1. Mutualism: both organisms benefit

Organims 1 + Organims 2 +





Example: Bat eats cactus and spreads seeds to new locations



Chapter 14.2 Community Interaction

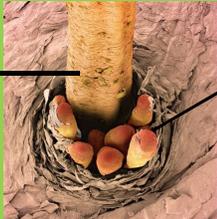
2. Commensalism: one organism benefits, the other is unharmed

Organims 1 

Organims 2 

Organism is not affected

Human Our eyelashes are home to tiny mites that feast on oil secretions and dead skin. Without harming us, up to 20 mites may be living in one eyelash follicle.



Organism benefits

Demodix Eyelash mites find all they need to survive in the tiny follicles of eyelashes. Magnified here 225 times, these creatures measure 0.4 mm in length and can be seen only with a microscope.

Chapter 14.2 Community Interaction

Parasitism: one organism benefits, the other is harmed

Organims 1 

Organims 2 

Organism is harmed

Host

Hornworm caterpillar
The host hornworm will eventually die as its organs are consumed by wasp larvae.



Organism benefits

Braconid wasp
Braconid larvae feed on their host and release themselves shortly before reaching the pupae stage of development.

Chapter 14.3 Population Density & Distribution

POPULATION DENSITY

Population density: the number of individuals that live in a certain area
Scientists can calculate population density

$$\frac{\text{\# of individuals}}{\text{area (units}^2\text{)}} = \text{population density}$$

POPULATION DENSITY



Example:

- 200 deer in an area of 10 square kilometers

$$\frac{200}{10} = 20 \text{ deer per sq. km}$$


Chapter 14.3 Population Density & Distribution

Population Dispersion

• **Population dispersion:** the way in which individuals of a population are spread out

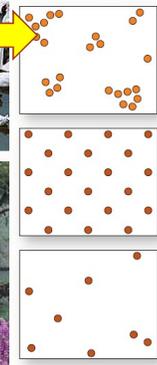
- 3 types of dispersion patterns
 - clumped dispersion
 - uniform dispersion
 - random dispersion

Chapter 14.3 Population Density & Distribution

Population Dispersion

1. Clumped Dispersion

- Individuals live close together in groups for mating purposes, protection, or food resources



Chapter 14.3 Population Density & Distribution

Uniform Dispersion

- Individuals live at specific distances from one another

Chapter 14.3 Population Density & Distribution

Random Dispersion

- Individuals are spread randomly within an area

Try This.....

- What type of population dispersion are shown in pics?

Random →

Uniformed →

Clumped →

Chapter 14.4 Population Growth Patterns

4 Factors determine the size of a population

1. Immigration: movement of individuals into a population	2. Emigration: movement of individuals out of a population	3. Births: increase the size of a population	4. Deaths: decrease the size of a population
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Chapter 14.4 Population Growth Patterns

Population growth is based on available resources

2 types of population growth

- 1) Exponential growth
- 2) Logistic growth

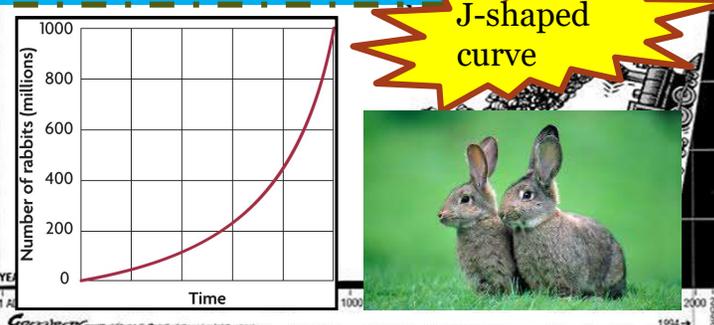


Chapter 14.4 Population Growth Patterns

Exponential Growth

- Population grows rapidly due to abundant resources

J-shaped curve

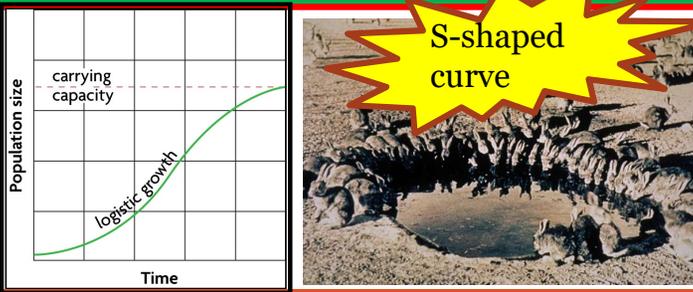


Chapter 14.4 Population Growth Patterns

Logistic Growth

- Population begins with slow growth followed by exponential growth then levels off due to limited resources

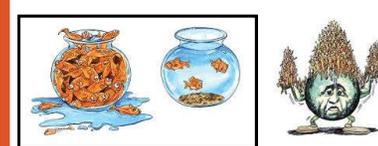
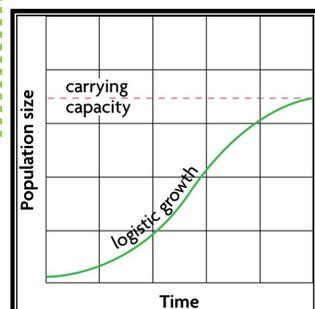
S-shaped curve



Chapter 14.4 Population Growth Patterns

Carrying Capacity

- The maximum amount of individuals that an environment can support

Chapter 14.4 Population Growth Patterns

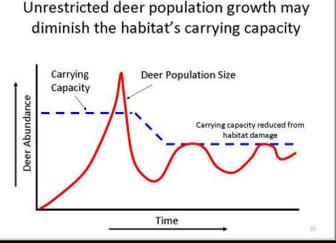
Population Crash

- Dramatic decline in the size of a population over a short period of time

- May be due to weather, scarce food supply, disease, etc.



Unrestricted deer population growth may diminish the habitat's carrying capacity



Chapter 14.4 Population Growth Patterns

Ecological factors limit population growth

- Limiting factor: something that keeps the size of a population down

- 2 types of limiting factors
 1. density-dependent
 2. density-independent

Chapter 14.4 Population Growth Patterns

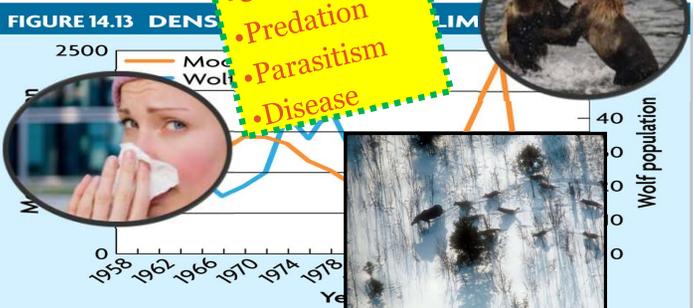
- Density-dependent limiting factors are affected by the number of individuals in a given area.

- Competition
- Predation
- Parasitism
- Disease





FIGURE 14.13 DENSITY DEPENDENT LIMITING FACTORS



Chapter 14.4 Population Growth Patterns

- Density-independent limiting factors limit a population's growth regardless of the density.

- Unusual weather
- Natural disasters
- Human activities







Chapter 14.5 Ecological Succession

- Ecological Succession:
 - sequence of changes that create a new community or re-build a damaged community

2 Types:

- primary succession
- secondary succession



Chapter 14.5 Ecological Succession

Primary Succession

- Development of an ecosystem in an area that has been uninhabited
- Started by **pioneer species**: first organisms to live in an uninhabited area Ex.(mosses, lichens)



Simple plants like mosses and ferns can grow in the new soil



Lichens break down rock to form soil.

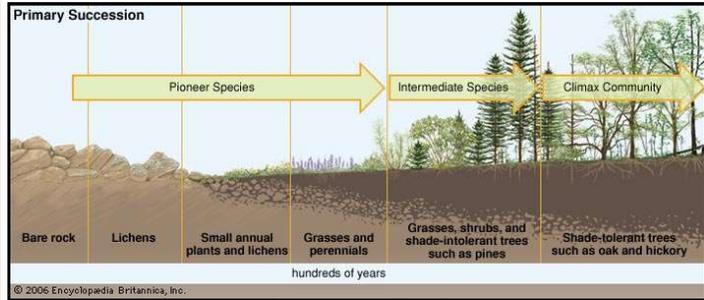


Low, growing moss plants trap moisture and prevent soil erosion

Primary Succession

1. Bare rock is broken down by wind, rain, ice, etc. 
2. Moss & lichens grow on rock and break it up even more 
3. Grasses, weeds, shrubs begin to grow 
4. Small trees take root (pines) 
5. Different tree species (hardwoods) begin to grow and eventually shade out the original trees 

Primary Succession



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Primary Succession

The diagram illustrates the stages of primary succession over time:

- Bare rock**: The initial state.
- Lichens**: The first pioneer organisms.
- Small annual plants, herbs**: Early successional species.
- Perennial herbs, grasses**: Intermediate successional species.
- Grasses, shrubs, shade-intolerant trees**: Late successional species.
- Shade-tolerant trees**: The final climax community.

Arrows indicate the progression from **Pioneer stages** to **Intermediate stages** to the **Climax community**.

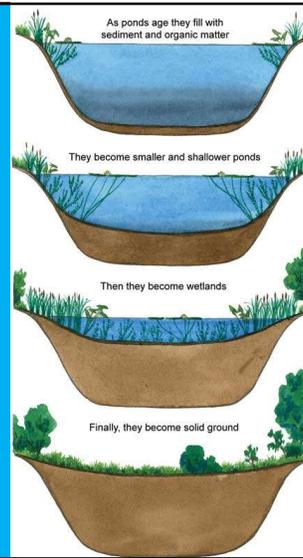
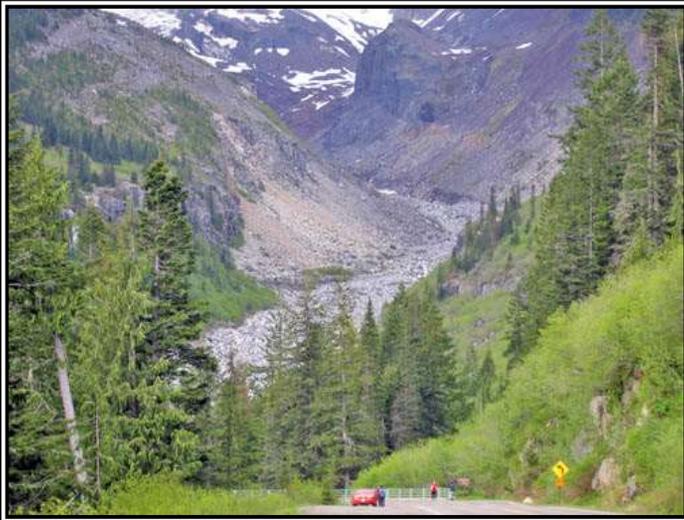
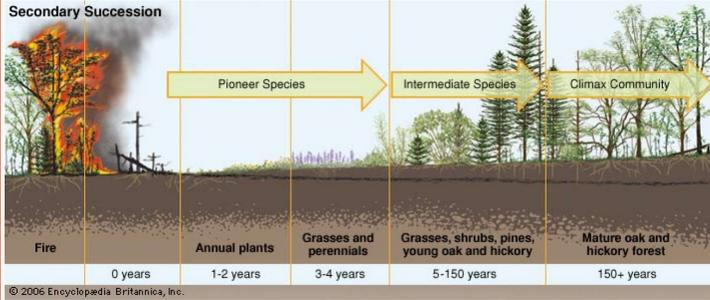
Chapter 14.5 Ecological Succession

Secondary Succession

- Does not begin with bare rock
- Occurs after a disturbance (fire, hurricane, etc.)
- Begins with remaining species where soil was left intact
- Occurs frequently and does not end (small disturbances like fallen trees start the process over)

Secondary Succession

Secondary Succession

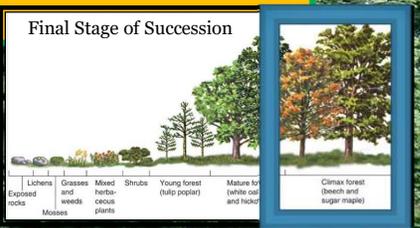
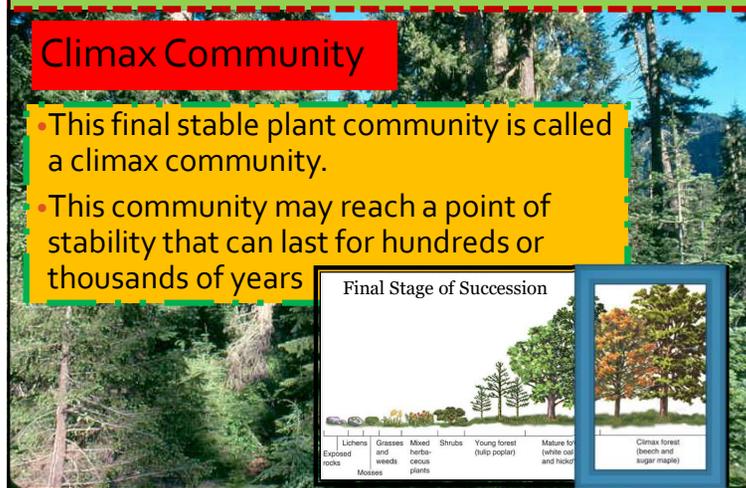


Ecological Succession in an aquatic ecosystem.

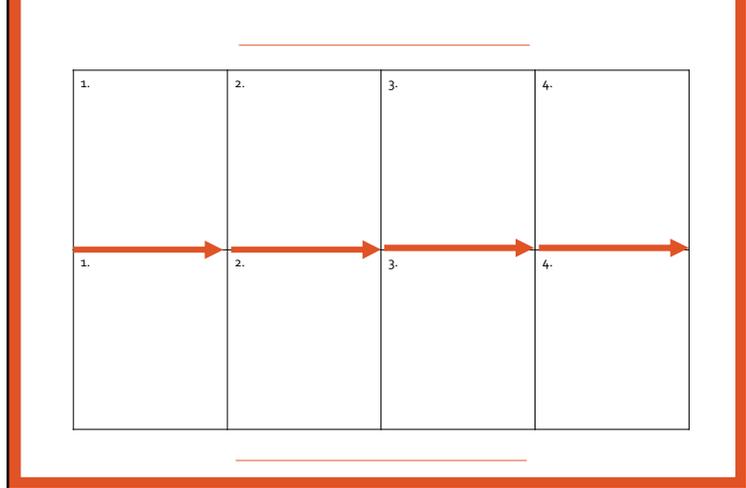
Chapter 14.5 Ecological Succession

Climax Community

- This final stable plant community is called a climax community.
- This community may reach a point of stability that can last for hundreds or thousands of years



Ecological Succession Drawings



[Primary and Secondary Video Clip](#)

[Succession in a Pond](#)

[Ecological Succession Internet Activity](#)