

Ecology



"And may we continue to be worthy of consuming a disproportionate share of this planet's resources."

Populations, Communities, Ecosystems

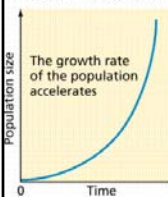
Ecology

- The study of the interactions between organisms, their environments and each other.

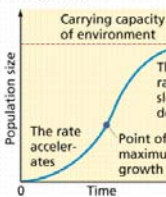
Population Dynamics

- Population size, growth, decline
- Density-dependent & independent factors

(a) Exponential (un-restricted) growth



(b) Logistic (restricted) growth



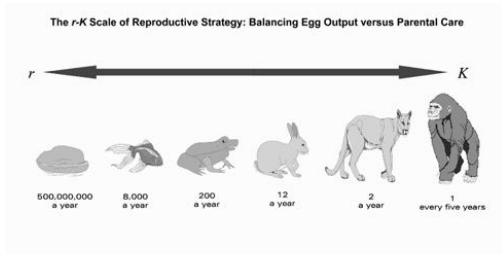
Physical environment:

- food, nutrients
- shelter, space
- water availability
- sunlight, soil

Biological factors:

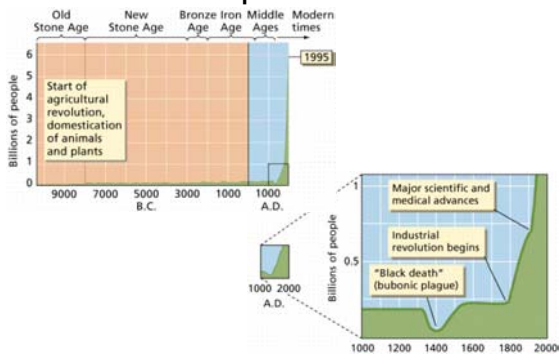
- competition
- predation
- symbiosis

r- selected & k- selected species



Oysters are an example of a very r-strategy. They produce 500 million fertilized eggs a year and provide no parental care. The great apes are an example of a very K-strategy. They produce one infant every five or six years and provide extensive parental care.

Human Population Growth



Communities

A group of interacting species living in the same location.

- Structure
- Interactions
- Succession

Community Structure

- Ecological dominants
- Keystone species
- Biodiversity (species, distribution, alleles)



Community Interactions

- Habitat
- Niche
- Food webs



Community Interactions

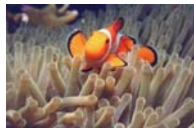
- Competition
- Predation/parasitism
- Mutualism
- Commensalism



Red-Tailed Hawk with a ground squirrel

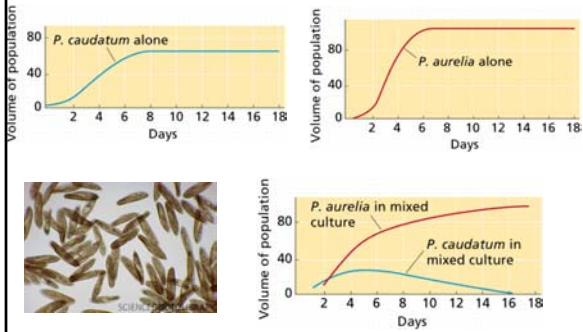


Leucochloridium paradoxum infected snail

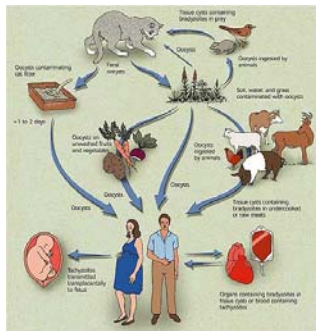


Clownfish and Sea anemones

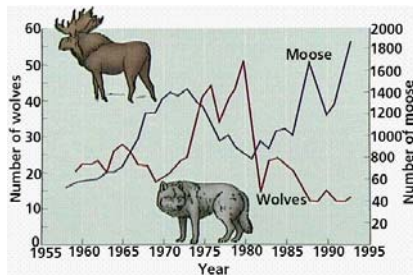
Competition



Toxoplasma gondii



Predator-Prey Relationships



Mutualism & Commensalism

- Mutualism is beneficial to both organisms
- Commensalism is beneficial to one and the other is indifferent.

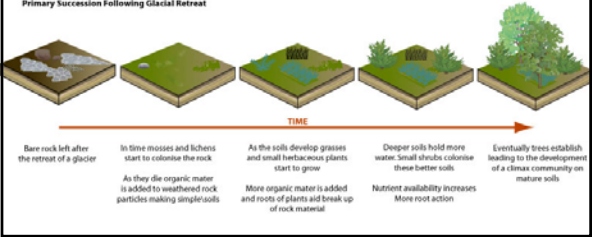


Pyrrsonympha spp.

Succession

- **Primary succession:** no soil or life present
- **Secondary succession:** natural habitat disturbed, but not devoid of life

Primary Succession Following Glacial Retreat



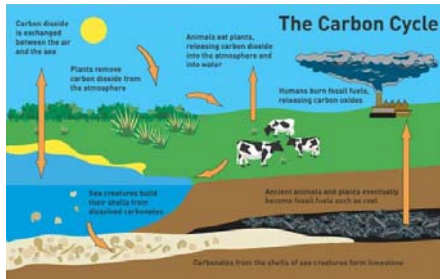
The Ecosystem

Abiotic factors

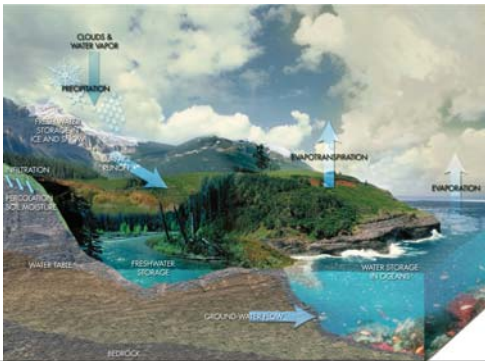
- Nutrient & Energy cycling
- Physical conditions of the Earth
- Biomes

Nutrient & Energy Cycles

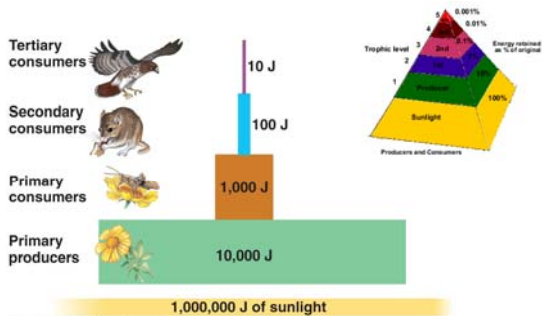
- Carbon
- Nitrogen
- Water
- Energy



Water Cycle

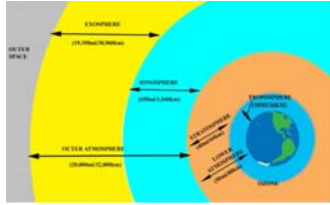


Energy Cycle - Trophic Levels



Physical Conditions of the Earth

- Atmosphere
 - Troposphere
 - Stratosphere
- Climate
 - Precipitation
 - Temperature

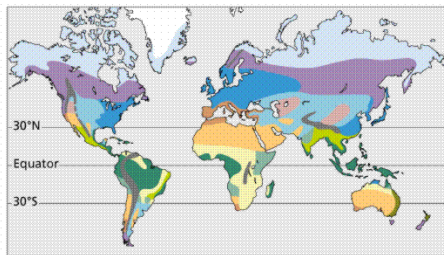


What is a Biome ?

The world's major communities, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment

Campbell, N.A. 1996. *Biology*, 4th Edition. The Benjamin/Cummings Publishing Company, Inc., Menlo Park, California.

Biomes



- | | | |
|---------------------------|----------------------------|----------------------------|
| Tropical evergreen forest | Chaparral | Boreal forest |
| Tropical deciduous forest | Cold desert | Tundra |
| Tropical thorn forest | Temperate grassland | Alpine |
| Savanna | Hot desert | Temperate evergreen forest |
| Polar ice cap | Temperate deciduous forest | |

http://www.blueplanetbiomes.org/world_biomes.htm

Tundra

<http://www.ucmp.berkeley.edu/glossary/gloss5/biome/tundra.html>

Tiaga Forests

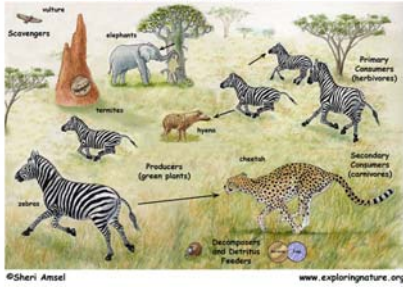
- Boreal (northern) Forests

Temperate Forests

Deciduous Forest Biome

Grassland

- Savannah
- Prairies/steps



Chaparral "Mediterranean"



Desert



Tropical Rain Forests



Freshwater Biomes

- Less than 1% salt
- Ponds & Lakes
 - Stratified
- Rivers & Streams
 - Moving one direction
- Wetlands
 - Standing water



<http://www.ucmp.berkeley.edu/exhibits/biomes/freshwater.php>

Pond & Lake Ecology



Wetlands



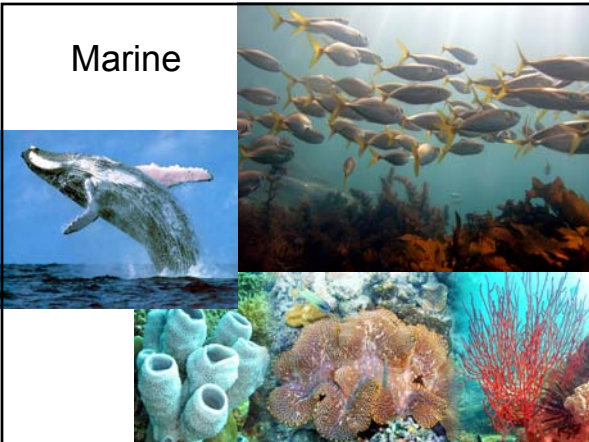
Wetlands: includes marshes, bogs, swamps, seasonal ponds. Among richest biomes with respect to biodiversity and productivity. Very few now exist as they are thought of often as wastelands.

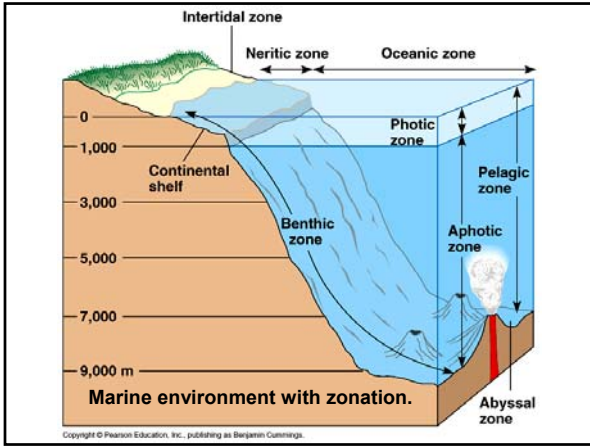
Estuary

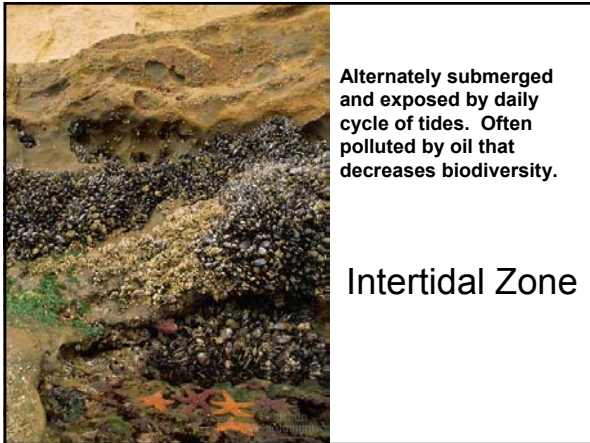


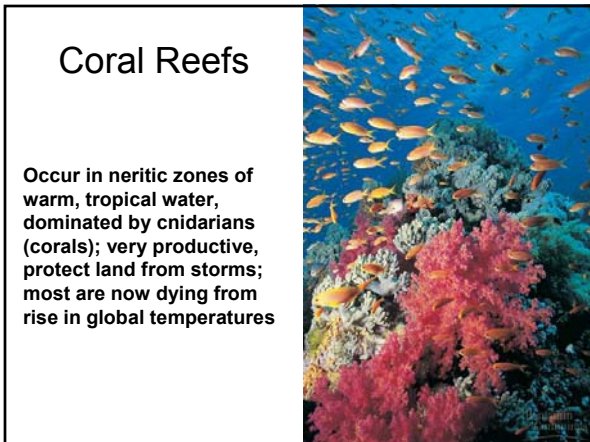
Place where freshwater stream or river merges with the ocean. Highly productive biome; important for fisheries and feeding places for water fowl. Often heavily polluted from river input so many fisheries are now lost.

Marine









Deep Sea Vents



Estuaries & Deltas

