

Population Ecology Definitions

| | |
|---------------------------|---|
| microclimate | climate patterns on a very fine scale (ex. under a log) |
| abiotic factors | <i>nonliving</i> properties of the environment |
| biotic factors | <i>living</i> factors in an environment |
| population ecology | study of populations in relation to their environment |
| population | group of the same species that live in the same area |
| community | all the populations of organisms in an area |
| cohort | group of the same age bracket |
| territoriality | animals defend a bounded physical space |

3 Life History Characteristics

1. when they reproduce (age of maturity)
2. how often they reproduce
3. how many offspring are produced

| | |
|--------------------|--|
| k-selection | selection of life history traits that are <i>sensitive to population density</i> ↳ density-dependent selection (high density) |
|--------------------|--|

Population Ecology Definitions (cont)

| | |
|----------------------------|--|
| r-selection | selection for life history traits that <i>maximize reproductive success</i> ↳ density-independent selection (low density) |
| density dependent | characteristic that varies with population density/ % affected is high (biotic) |
| density independent | characteristic that is NOT affected by population density (abiotic) |

3 Dispersal Patterns

1. clumped
2. uniform
3. random

Survivorship Curve

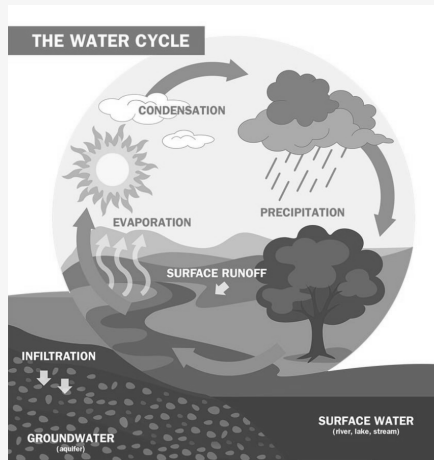
| survivorship curve | Death Rate Of Young | Death Rate of Old | # of Offspring | Example |
|--------------------|---------------------|-------------------|----------------|---------|
| Type 1 | low | high | few | people |
| Type 2 | constant | constant | several | rodents |
| Type 3 | high | low | many | fish |



| Equations | | Ecosystem Terms | |
|---------------------------|------------------------------------|---|--|
| EXPONENTIAL GROWTH | | primary producers | (autotrophs) support all other levels/photosynthetic |
| equation: | $dN/dt = r_{max}N$ | primary consumers | (herbivore) eats plants & other autotrophs |
| symbols: | dN ~ change in population size | secondary consumers | a carnivore that eats herbivores |
| | dt ~ change in time | tertiary consumers | a carnivore that eats other carnivores |
| | r_{max} ~ rate of increase (max) | detritivores (decomposers) | consumer that gets its nutrients from nonliving organic material |
| | N ~ population size | primary productivity | amount of light energy converted to chemical energy |
| shape: | J | gross primary productivity (GPP) | total primary production/ chemical energy |
| LOGISTIC GROWTH | | net primary productivity (NPP) | GPP - R_A (autotrophic respiration) |
| equation: | $dN/dt = r_{max}N [(K-N)/K]$ | secondary productivity | energy converted to a consumers biomass (GSP & NSP) |
| symbols: | K ~ carrying capacity | production efficiency | % of energy stored (used for growth in consumers) |
| shape: | S | trophic efficiency | % of production transferred between each trophic level (10%) |
| | | net ecosystem production (NEP) | GPP - R_T (total respiration) |
| | | limiting nutrient | element that must be present for production to increase in an area |
| | | - factors that affect primary production: | temp./moisture/light/nutrients/etc. |



Water Cycle

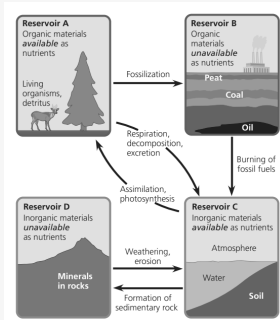


evaporation: liquid to gas

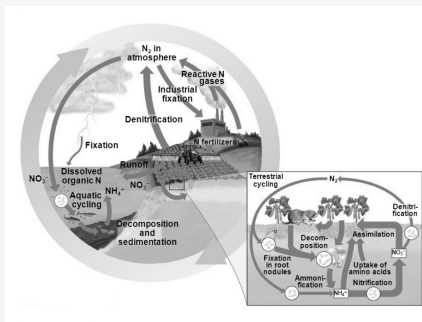
condensation: gas to a liquid

sublimation: solid to a gas

Carbon & Oxygen Cycle



Nitrogen Cycle



nitrogen fixation: N₂ to NH₃

ammonification: break down organic molecules into NH₄⁺

nitrification: NH₄⁺ to NO₂⁻ to NO₃⁻

denitrification: changes fixed N forms back into N₂

Interspecific Interactions

interspecific interactions relationship between individuals of 2+ species in a community

1. COMPETITION

interspecific competition competition for resources between individuals of 2+ species

competitive exclusion species compete for a resource but one will be more efficient & have a reproductive advantage that leads to the elimination of the other

niche species use of biotic & abiotic resources in its environment

resource partitioning division of environmental resources by species such that the niche of each species differs

2. PREDATION

cryptic coloration camouflage that makes species difficult to spot against its background

aposematic coloration bright warning coloration of animals with physical or chemical defenses

Batesian mimicry harmless species looks like a species that is poisonous or harmful

Mullerian mimicry reciprocal mimicry by 2 species that are unpleasant to eat

3. HERBIVORY

↳ organism eats parts of a plant or algae

- plants chemical toxins & spines/thorns

protect

themselves

by...

4. SYMBIOSIS

Interspecific Interactions (cont)

| | |
|---------------------|--|
| <i>parasitism</i> | one organism benefits at the expense of the other |
| <i>mutualism</i> | both participants benefit |
| <i>commensalism</i> | one organism benefits while the other is neither hurt nor helped |

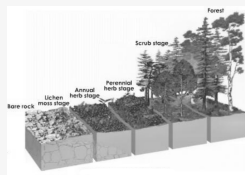
5. FACILITATION

↳ 1 species has a positive effect on the survival and reproduction of another species without intimate association

Diversity

| | |
|---|--|
| invasive species | species that takes hold outside of its native range |
| keystone species | species that isn't abundant yet exerts a strong control on the community |
| species diversity | variety of different kinds of organism that make up the community |
| ↳ two components~ | species richness & relative abundance |
| ↳ 2 benefits of high species diversity~ | increased productivity & stability |
| - latitude & diversity~ | equator = high diversity / poles = low diversity |
| - geographic area & diversity~ | large area = high diversity / small area = low diversity |

Ecological Succession



primary succession: occurs in areas where no organisms are present and no soil has formed

secondary succession: occurs where an existing community has been cleared but leaves soil intact

pioneer species: species that are the first to colonize (ex. lichen)

Plant Adaptations

| | |
|---------------------|--|
| phototropism | growth of a plant towards (positive) or away (negative) from light |
| coevolution | joint evolution of 2 interacting species, each in response to selection imposed by the other |

Pollination

| | |
|----------|--------------------------|
| wind~ | pollen grains |
| insects~ | fragrant & bright colors |
| bats~ | open at night |
| birds~ | bent floral tube |

Germination

| | |
|---------------|--|
| desert~ | after substantial rainfall (soil wet) |
| fire areas~ | after intense heat (vegetation cleared) |
| harsh winter~ | after extended exposure to the cold (long growth season) |
| small seeds~ | after light (poke through the soil) |
| digested~ | after passed through digestive tract (travel distances) |

Dispersal

| | |
|----------|----------------------|
| water~ | buoyant |
| wind~ | winged seeds |
| animals~ | edible fruits & burs |

Advantages of Reproduction

| <i>Asexual</i> | <i>Sexual</i> |
|---|-------------------------------------|
| 1. no pollinator | 1. dispersal of offspring |
| 2. pass all genetics (suitable environment) | 2. variation (unstable environment) |
| 3. stronger offspring | 3. growth suspended |