

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)
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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 members of a cohort that are still alive at each age

	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

EXPONENTIAL GROWTH

equation: $dN/dt = r_{max}N$

symbols: dN ~ change in population size

dt ~ change in time

r_{max} ~ rate of increase (max)

N ~ population size

shape: J

LOGISTIC GROWTH

equation: $dN/dt = r_{max}N [(K-N)/K]$

symbols: K ~ carrying capacity

shape: S

Ecosystem Terms

primary producers (autotrophs) support all other levels/photosynthetic

primary consumers (herbivore) eats plants & other autotrophs

secondary consumers a carnivore that eats herbivores

tertiary consumers a carnivore that eats other carnivores

detritivores (decomposers) consumer that gets its nutrients from nonliving organic material

primary productivity amount of light energy converted to chemical energy

gross primary productivity (GPP) total primary production/ chemical energy

net primary productivity (NPP) $GPP - R_A$ (autotrophic respiration)

secondary productivity energy converted to a consumers biomass (GSP & NSP)

production efficiency % of energy stored (used for growth in consumers)

trophic efficiency % of production transferred between each trophic level (10%)

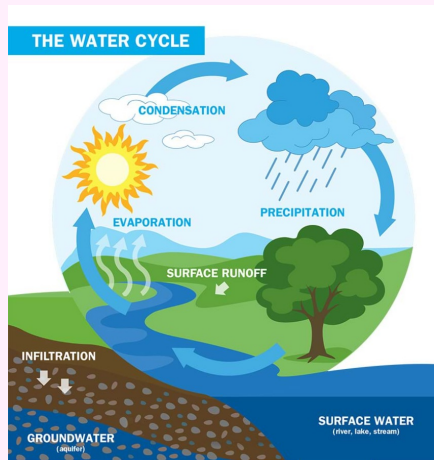
net ecosystem production (NEP) $GPP - R_T$ (total respiration)

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

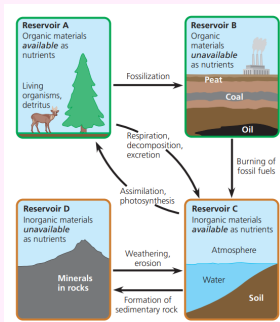


evaporation: liquid to gas

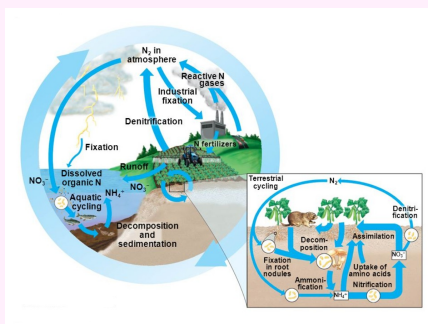
condensation: gas to a liquid

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)

parasitism one organism benefits at the expense of the other

mutualism both participants benefit

commensalism 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

Asexual

1. no pollinator
2. pass all genetics (suitable environment)
3. stronger offspring

Sexual

1. dispersal of offspring
2. variation (unstable environment)
3. growth suspended