

Option C
Ecology and Conservation
C.1- Species and Communities

Essential idea:

- Community structure is an emergent property of an ecosystem.

Remember 1.1 Notes Emergent Properties

- Multicellular organisms have properties that emerge from the interaction of their cellular components.

Remember 4.1 Notes Understandings

- A community forms an ecosystem by its interactions with the abiotic environment.

Nature of science:

- Use models as representations of the real world
 - zones of stress and limits of tolerance graphs are models of the real world that have predictive power and explain community structure. (1.10)

Applications and Skills

- Application: Distribution of one animal and one plant species to illustrate limits of tolerance and zones of stress. (DBQ 607-608)

Theory of knowledge:

- Random samples are taken in studies involving large geographical areas or if limited time is available.
- Is random sampling a useful tool for scientists despite the potential for sampling bias?

Remember 4.1 Notes Applications and Skills

- Skill: Testing for association between two species using the chi-squared test with data obtained by quadrat sampling. (Field work pg 207-208, DBQ 209)
 - Plot-based (quadrat) methods are often used to study populations of different species within a certain area
 - Quadrats are generally square sample areas marked out using a framed structure.

Applications and Skills

- Skill: Use of a transect to correlate the distribution of plant or animal species with an abiotic variable. (DBQ 605-606) (Transect Mapping Lab)

Understandings

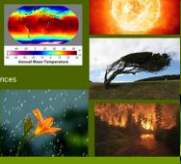
- The distribution of species is affected by limiting factors.
 - The factor that is in least supply
 - Abiotic and Biotic factors influence tolerance zones for plants and animals

Abiotic Influences

Nonliving chemical and physical components

For Plants:

- Temperature
- Water
- Light
- Wind
- Soil pH
- Salinity
- Mineral nutrients
- Periodic disturbances



Abiotic Influences

For Animals:

- Temperature
- Water
- Breeding sites
- Food Supply
- Territory



Understandings

- Community structure can be strongly affected by keystone species.
 - The effects of keystone species on the ecosystem are disproportionate relative to their abundance in the ecosystem
 - When they are removed from the ecosystem, the ecosystem often collapses.



Understandings

- Each species plays a unique role within a community because of the unique combination of its spatial habitat and interactions with other species.
 - A niche is the role a species plays in its community
 - Includes where it lives (spatial) and what it does in the habitat



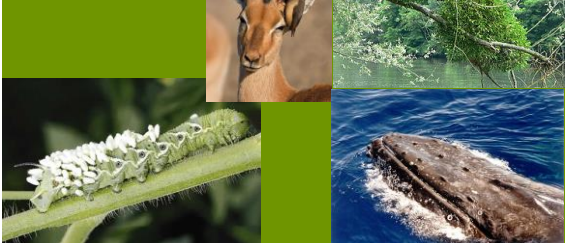
Understandings

- Interactions between species in a community can be classified according to their effect.
 - Competition (inter and intra)
 - Herbivory
 - Predation (consumer and consumer)



Understandings

- Interactions between species in a community can be classified according to their effect.
 - Parasitism
 - Mutualism
 - Commensalism



Applications and Skills

- Zooxanthellae* and reef-building coral reef species.
 - A mutualistic photosynthetic algae
 - Provide coral with glucose and amino acids
 - Coral provides habitat and stable substrate for photosynthesis



Applications and Skills

- Application: Local examples to illustrate the range of ways in which species can interact within a community.
 - Competition: Creosote bush produces toxins to other plants
 - Herbivory: Desert tortoise and cacti
 - Predation: Western diamondback and desert kangaroo rat



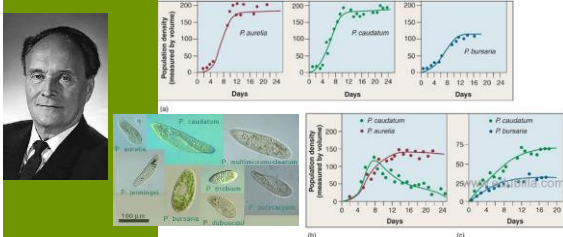
Applications and Skills

- Application: Local examples to illustrate the range of ways in which species can interact within a community.
 - Parasitism: Tarantula Hawk Wasp and tarantulas
 - Mutualism: White-lined Sphinx Moth and desert flowers
 - Commensalism: Cactus Wren and the various Cholla cacti



Understandings

- Two species cannot survive indefinitely in the same habitat if their niches are identical.
 - Georgii Frantsevich Gause (Russian, 1932)*wrong scientist in text
 - Competitive Exclusion Principle
 - o Two species of Paramecium grown with yeast (only one can survive)



Applications and Skills

- Skill: Analysis of a data set that illustrates the distinction between fundamental and realized niche. (DBQ 609-610)

