Chapter 16 --- Biogeographic Patterns & Processes

What is Biogeography?

***Biogeography*» The study of the spatial relationships among biological organisms (primarily plants and animals) and the environment in which they live. This includes historical and modern relationships, as well as projections into the future.**

•distributions»» where plants and animals live, and why
•associations»» what species are found living together, and why
•inter/intra-species dynamics»» how species interact with each other
•responses to disturbance»» fire, flood, wind, avalanche, etc.

What is an ecosystem?

System» A group of interrelated things all working together.

Ecosystem» All of the living and non-living components of a particular region (plants, animals, soil, rocks, air, water, etc.), linked by flows of energy and matter, and functioning together as an interconnected and interdependent whole.

What are the defining characteristics of an ecosystem?

- ✓ Biotic components (plants, animals, bacteria, and fungi)
- ✓ Abiotic components (air, water, and mineral nutrients).
- ✓ A continual exchange of energy and matter within and between these two subsystems.

What is photosynthesis? What is respiration?

- ✓ Plants convert solar energy, water and carbon dioxide into carbohydrates.

What is a food chain?

Flows of energy, water and nutrients through the biosphere are channeled by direct passage from one organism to another in pathways.

- ✓ Animals that feed exclusively on plants are termed ***herbivores***
- ✓ Animals that feed on other animals are termed ***carnivores***
- ✓ Animals that feed on both plants and animals are termed ***omnivores***.
- ✓ Bacteria & fungi are the ***recyclers*** within an ecosystem, breaking down dead plant & animal materials and returning the nutrients to the soil.

What is bioaccumulation?

- ✓ Not do only energy and water move up the food chain, but pollution.
- ✓ DDT in Bald Eagles: *Silent Spring*
- ✓ Mercury bioaccumulation in tuna.
- ✓ Seafood watch: http://www.mbayaq.org/

What are habitats and biomes?

- ✓ Habitat» The collective environmental conditions within a given ecosystem (soil type, exposure, temperature & precipitation regime, etc.) under which organisms carry out their daily lives. (smaller scale)
- ✓ Biome» A large region of uniform defined by climate, vegetation and soil type, in which species live under similar environmental conditions, with only subtle variations in habitat type. *(larger scale)*
- ✓ ***Biomes*** tend to be larger, more generally defined regions; whereas ***habitats*** tend to be smaller, more specific areas that exist within a given biome.
- ✓ Examples of Biomes: Tropical Rainforests, Temperate Rainforests, Desert Scrublands, Chaparral or Mediterranean Woodland Scrub.

What are three primary controls for the distribution of plant & animal species within and between biomes and habitats?

Climate, Soil Type and Water (surface and groundwater)

What is a species?

- ✓ In the textbook each biological organism is identified by two names, the first designates the ***genus***, and the second indicates the ***species***. The complete name, which includes the genus and species, is referred to as the ***scientific name***, and is recognized by scientists world wide.
- ✓ ***Common name***» the vernacular name of an organism that may only be recognized locally. Example: ***Artemesia californica*** is known locally as the **California Sage**

What is biodiversity?

- ✓ Sum or total of all living species and their population numbers. Genetic and population biodiversity

What is extinction and what are the causes of species extinction today?

- ✓ Global extinction.
- ✓ Local extinction.

Many biologists believe that we are in a period of a mass extinction rate, 100 bird and mammal species have gone extinct in the past century. Main causes of extinction?

- ✓ Habitat loss and degradation
- ✓ Pollution
- ✓ Overexploitation
- ✓ Climate change
- ✓ Invasive species

What is symbiosis, and what does that mean for extinction?

- ✓ Symbiosis is the arrangement in which two dissimiliar organisms live together. Three principle forms:
- ✓ Mutualism: involves a mutally beneficial relationship between two organisms. Pollination.
- ✓ Commensalism: Living together with no injury, hanging out.
- ✓ Parasitism: Involves one organism living on or in another, obtaining nourishment from the host, which can be weakened or at worst killed.
- ✓ Cascade effect: When species depend on interactions with other species, extinction can have a ripple effect. The loss of a key species can spark a suite of indirect effects, known as the cascade effect or secondary extinction.

Southern California focus:

- ✓ Mediterranean Climate
- ✓ Mediterranean Woodland Shrub or Chapparal Biome, World's Smallest Biome!
- ✓ Found on western side of continents, at about latitudes 35°N and S.
- ✓ Hotspot California
- ✓ http://www.biodiversityhotspots.org/xp/Hotspots/california_floristic/
- ✓ How plants adapt to climate: wet winters, warm summers.

What does shifting baselines mean?
http://www.shiftingbaselines.org/index.php

Websites FYI (not necessary for exam):
Frog Species Extinction and Global Warming
http://www.npr.org/templates/story/story.php?storyId=5156248

Habitat: Sonoran Desert
http://www.desertmuseum.org/desert/sonora.html

San Diego County: Most Bird Biodiversity in the USA
http://www.bird-friends.com/

Mutualism and Cascade Effect: Sea otter and kelp forests
http://www.sciencenewsforkids.org/articles/20040324/Feature1.asp

Biological Hotspots:
http://www.biodiversityhotspots.org/

Global forest deforestation – Which products to avoid, Mahogony for example for floors.
http://www.illegal-logging.info/index.php