Learning Objectives 35 & 36

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35 Ecology

35.1 What Is Ecology?

35.1.1 Describe the six levels of organization of organisms, and discuss how environmental challenges impact the range of organisms. Populations

1. Populations: Individuals of the same species that together.
2. Species: All the populations of a particular organism.
3. Communities: Populations of various species that live in the same space.
4. Ecosystems: A community and non-living factors that interact.
5. Biomes: Large areas of plants, animals, and microorganisms that occur together.
6. The Biosphere: All of the worlds biomes.

35.2 Population Range

35.2.1 Identify and describe five key characteristics of populations.

1. Population Range: The area wherin a population occurs.
2. Population Distribution: The pattern of spacing of individuals.
3. Population Size: Number of individuals a population contains.
4. Population Density: Number of individuals per area.
5. Population Growth: Rate of growth or shrinkage of the population.

35.3 Population Distribution

35.3.1 Describe three ways in which individuals can be distributed.

1. Randomly Spaced: Individuals are randomly spaced, and do not interact strongly with one another. Rare in nature.
2. Uniformly Spaced: Individuals are uniformly spaced. This often comes about from competition for resources.
3. Clumped Spacing: Individuals are clumped together. This is often because of micro-habitats and or social structures.

35.4 Population Growth

35.4.1 Contrast the intrinsic versus the actual rate of population increase and exponential versus logistic growth curves.

The intrinsic growth rate is the growth rate without limits placed upon it: $growth\ rate = r_i N$

The actual accounts for deaths and migration: $r = (b - d) + (i - e)$

35.5 The Influence of Population Density

35.5.1 Differentiate between density-dependent and density-independent effects on population growth.

Density Dependent Effects are dependent upon the population and act to regulate the populations growth. Density independent factors such as weather act to regulate growth as well, but are independent of the size of the population.

35.6 Life History Adaptations

35.6.1 Contrast r- and K-selected adaptations.

r-selected adaptations are adaptations for quick growth–sort of like rabbits with young births of large numbers. k-selected adaptations are those that help an organism to survive in resource scarce times.

35.7 Population Demography

35.7.1 Explain how the growth rate of a population is influenced by its age structure, fecundity, and mortality. How Competition Shapes Communities

The fecundity is the rate of birth of a cohort. The mortality is the death rate. The difference is the death rate for that cohort or age group.

35.8 Communities

35.8.1 Contrast individualistic and holistic concepts of community.

The individualistic concept of community holds that a community is merely a group of species, whereas the holistic concept holds that the community is something more due to emmergent properties.

35.9 The Niche and Competition

35.9.1 Contrast the fundamental and the realized niche.

The fundamental niche is the niche an organizm could occupy without competitino and the realized is the niche the organism occupies in the precense of competition.

35.9.2 Explain why niche overlap may lead to character displacement.

When two similar species occupy the same niche, they tend to divert more from their own natural niche to avoid the competition that would naturaly exist.

35.10 Coevolution and Symbiosis

35.10.1 Describe the three major kinds of symbiotic relationships.

Mutualism: a symbiotic relationship between organisms that is beneficial to both.

Parasitism: a symbiotic relationship that could be considered predator-prey, and is beneficial to one but harmful to the other.

Commensalism: a symbiotic relationship that is beneficial to one and neither good nor bad for the other.

35.11 Predator-Prey Interactions

35.11.1 Discuss the ways predators can affect prey populations.

Predators can regulate a poplulation, and cause a predator-prey cycle.

35.12 Mimicry

35.12.1 Contrast Batesian and Mllerian mimicry.

Batesian Mimicry occurs when an edible species mimics an inedible prey.

Mullerian Mimicry occurs when a species that protects itself is mimiced by a species that doesn't.

36 The Energy in Ecosystems

36.1 Energy Flows Through Ecosystems

36.1.1 Distinguish among community, habitat, and ecosystem, and between autotroph and heterotroph.

Community–all the animals, plants, fungi, and microorganisms that live together.

Habitat–the place that the community lives.

Ecosystem–The sum of the Habitat and the Community.

Autotroph–Those that get their energy from the sun-typically plants. Heterotroph–Those that get their energy from other organisms.

36.1.2 Trace the path of energy through the trophic levels of an ecosystem.

Trophic 1: Plants get energy from the sun.

Trophic 2: Primary Consumers of plants.

Trophic 3: Secondary Consumers that eat the primary.

Trophic 4: Tertiary Consumers that eath the secondary.

Finally, decomposers that turn dead mass into dirt. Bacteria and Fungi.

36.1.3 Define primary productivity and explain how it is measured.

Primary productivity is the total amount of energy gained from photosynthetic organisms. It is measured in calories gained per calories of potential energy.

36.1.4 Explain why wetlands and rain forests have different net primary productivities.

Wetlands may gain more energy from sunlight due to algae that doesn't have to waste as much energy building structure as plants. Biomass to energy is much lower in the wetlands.

36.2 Ecological Pyramids

36.2.1 Explain why a population's pyramid of numbers may not resemble its pyramids of biomass and energy.

In some cases, the trophic level below another can be consumed so quickly that the levels are inverted. Still, the energy present at the upper trophic level is less than that of the lower level.

36.3 The Water Cycle

36.3.1 Contrast the environmental and organismic water cycles.

The environmental water cycle works through evaporation.

The organismic cycle cycles water through the stomata of plants and transpiration.

36.4 The Carbon Cycle

36.4.1 Contrast the effects of respiration, erosion, and combustion on the water cycle.

Respiration is the creation of CO_2 in the breakdown of food for energy.

Erosion is the natural cycle of CO_2 in the ocean where crustacieans use carbon in the building of their shells.

Combustion is the burning of material releasing carbon.

36.5 Soil Nutrients and Other Chemical Cycles

36.5.1 Compare the nitrogen and phosphorus cycles.

Sulfur is a gas and cycles much more readily than phosphorus. Phosphorus is often found in dirt, and returns to dirt when organisms decompose.

36.6 The Sun and Atmospheric Circulation

36.6.1 Explain why all the earth's great deserts lie near 30N or 30S.

The earths rotation and inclination causes these parts of the earth to get more sun year round than other places.

36.7 Latitude and Elevation

36.7.1 Describe a rain shadow and explain its cause.

A rain shadow is a place that is particularly arid due to the moisture absorption capability of the air. This is caused because the clouds of rain rise at the mountain, and cause it all to precipitate.

36.7.2 Explain why changes in latitude and elevation often have similar effects on ecosystems.

These have similar effects because they both relate to how much sun is recieved.

36.8 Patterns of Circulation in the Ocean

36.8.1 Explain how patterns of oceanic circulation are created and how they affect adjacent lands.

Oceanic circulation is created from winds and solar energy. This affects adjacent lands by distributing various nutrients such as phosphorus.

36.8.2 Describe El Nio and explain its cause.

El Nino is a shifting of weather due to ocean and wind cycling. This occurs every two to seven years.

36.9 Ocean Ecosystems

36.9.1 Compare the marine communities that occur in shallow water, open-sea surfaces, and deep-sea waters.

36.10 Freshwater Ecosystems

36.10.1 Contrast oligotrophic and eutrophic lakes.

Oligotropic Lakes have scarce organic matter and nutrients. These lakes are more succeptible to pollution.

Eutrophic lakes are the opposite.

36.10.2 Differentiate the littoral, limnetic, and profundal zones of a lake.

Littoral: close to shore.

Limnetic: offshore and open to light.

Profundal: underwater and less affected by light.

36.10.3 Explain the cause of the spring and fall overturns that occurs in large lakes.

Stratification causes sprint and fall overturns. This is due to the density of water at different temperatures.

36.11 Land Ecosystems

36.11.1 Identify 10 terrestrial biomes and briefly describe each of them.

1. Rain Forests: Lush and dense. Supports most of earths species.
2. Savanas: Dry Tropical Grasslands are open and seasonal.
3. Deserts: Burning hot and sandy. Dry with low vegitation.
4. Grasslands: Temperate, fertile lands.
5. Deciduous Forests: Rich hardwood forest with mild climates.
6. Taiga: Long cold winters, with little rain.
7. Turndra: Home to large grazing animals, cold, and open.
8. Chaparral: Evergreens, spiny shrubs, and low trees. Dry summer.
9. Polar Ice Caps: Cold, no precipitation, and windy.
10. Tropical Monsoon Forest: Occurin higher lattitudes, mostly deciduos trees.