

GHSGT Review: Biology (Day 9)

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OBJECTIVE: Explains the structure of an ecosystem.

ECOSYSTEMS

Life on earth extends from the ocean depths to a few kilometers above the earth's surface. The area where life exists is called the biosphere. The biosphere can be more easily understood by breaking it into smaller components called ecosystems.

An ecosystem is a physically distinct, self-supporting unit of interacting organisms and their surrounding environment. It is made up of biotic and abiotic interactions. The biotic factors of an ecosystem are the living organisms in the area. The abiotic factors are the non-living, or physical, components of the area like light, soil, water, temperature, wind, and nutrients. The essential factors that make an ecosystem successful are a source of energy, a storage of water, and the ability to recycle water, oxygen, carbon, and nitrogen.

Ecosystems must maintain an ecological balance. This can be helpful or harmful to the members that make up the community depending upon whether they are predators or prey. A predator is an animal that feeds on other living things. The animal it feeds upon is the prey. Lions (predator) hunt down and kill antelope (prey).

Each of the biotic organisms in an ecosystem interrelate with the others. A symbiotic relationship between two members of a community is one in which one or both parties benefit. Commensalism is a relationship in which one member is the host, but causes no harm to the other organism (barnacles on whales). Mutualism is a relationship in which two living organisms live together in dependency on each other (the protozoa in the human intestine). Parasitism is a relationship that involves a host organism which is harmed by the presence of the other organism (fleas on dogs and cats).

COMMUNITIES

An ecosystem's biotic factors interact with each other and compose a community of living things that coexist. Each community is composed of populations. A population is a group of small individuals of a single species that occupy a common area and share common resources. The number of populations within a community varies. A tropical rain forest community may have thousands of populations while a desert community may have very few.

Just like communities are made up of populations, each population is composed of interacting individuals. Each individual organism lives in a specific environment and pursues a particular way of life. The surroundings in which a particular species can be found is called its habitat. An organism can inhabit an entire ecosystem like a woodpecker might occupy the whole oak forest. But the spider may only inhabit the trunk of one of the oak trees.

The way of life that a species pursues within its habitat is called its ecological niche. An organism's niche is composed of biotic and abiotic factors. Some niches can be very broad (rats) while others can be very limited (panda).

THE FLOW OF MATERIALS

Each ecosystem has its producers, consumers, and decomposers. They make up a cycle called a food chain. Food passes from one organism to another in the food chain. Energy is used up by each consumer in the food chain. Plants make food, animals eat plants, some animals eat other animals, and some animals eat plants and other animals. Herbivores are animals that eat only plants. Carnivores are animals that eat only other animals. Omnivores are animals that eat both plants and animals. A Saprophyte is an organisms that feeds on dead organisms.

There are many food chains in an ecosystem. The least amount of energy consumed is the item highest in the food chain. In the preceding example that would be the human. All the food chains in an ecosystem make up the food web of the area. Most food chains overlap because many organism can eat more than one type of food.

All organisms need certain chemicals in order to live. The most important ones are water, oxygen, carbon, and nitrogen. The continuous movement of chemicals throughout an ecosystem is called recycling.

ECOLOGICAL SUCCESSION

An ecosystem goes through a series of changes known as ecological succession. Succession occurs when one community slowly replaces another as the environment changes. As succession in a community continues, it finally reaches a climax community. A few organisms establish themselves and become the dominant species in the area. The complete process of succession may take anywhere from a hundred to thousands of years, depending upon the communities.

POPULATIONS IN ECOSYSTEMS

The population of an area is affected by the new offspring produced in the area. New plants and animals moving in from other places increase the size of the population. The death of organisms and animals moving out of the area decrease the size of the population. There is a direct relationship between the number of plants and animals in an area which is in ecological balance. If the number of one of them is increased or decreased, it will affect the numbers of the other. During deer season, the number of deer is reduced by man. The plants that the deer eats will increase during this season. A change in populations may be helpful or harmful to the community. If insects are killed by insecticide, the animals that depend on them for food must move elsewhere.





OBJECTIVE: Lists and describes the major biomes of the world.
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BIOMES

Communities are members of a larger ecological unit called a biome. A biome is an extensive area of similar climate and vegetation. A biome's abiotic (non-living) factors determine what plants and animals live there. The major influences are temperature, light intensity, and patterns of rainfall, which determine the availability of water. There are six basic biomes on earth: tundra, taiga, grassland, deciduous forest, desert, tropical rain forest.

Biomes that are closest to the poles experience the coldest weather conditions for they are furthest away from the sun due to the tilting of the earth.

Biome Summary

 Arctic Tundra			
Moisture: dry season, wet season	Temperature: cold all year	Vegetation: shrubs, grasses, lichens, mosses	Animals: birds, insects, mammals
 Deciduous Forest			
Moisture: low, distributed throughout year	Temperature: warm summers, cold winters	Vegetation: trees, shrubs, herbs, lichens, mosses	Animals: mammals, birds, insects, reptiles
 Desert			
Moisture: sporadic, highly localized	Temperature: great daily range	Vegetation: trees, shrubs, succulents, forbs	Animals: small mammals, birds, reptiles
 Taiga			
Moisture: moderate, varies throughout year	Temperature: cold winters, cool summers	Vegetation: evergreens, tamarack	Animals: birds, mammals



Tropical Rainforest

Moisture:
wet season, short
dry season

Temperature:
hot

Vegetation:
trees, vines,
stranglers, fungi

Animals:
small mammals,
birds, insects



Tropical Savannah

Moisture:
wet season, dry
season

Temperature:
hot

Vegetation:
tall grasses,
shrubs, trees

Animals:
large mammals,
birds, reptiles

OBJECTIVE: Assesses the impact of man's activities on the environment and explores ways to help solve ecological problems.

ECOLOGICAL PROBLEMS

Natural resources are necessary for human survival and the making of necessary products. The natural resources are water, air, soil, wildlife, and forests. Problems that are now being faced are related to erosion, soil depletion, species extinction, deforestation, desertification, and water shortages. Efforts to reverse these problems and their environmental damages are found in the planned programs of reforestation, captive breeding, and planned farming through efficient plowing and planting procedures.

Disruptive changes can easily upset the stability of an ecosystem. Destructive acts of nature can occur. A forest fire can destroy all plant and animal life in a forest, along a river, and around the shore of a pond. It can also pollute a pond with ash.

Humans are unique in our ability to modify our ecosystem. Pollution from human acts can also affect an ecosystem. A chemical spill or pesticides sprayed overhead can kill all plant and animal life with which it comes in contact with. A housing development along the bank of a river or on the shore of a pond can bring both garbage and noise pollution, in addition to direct physical destruction of these habitats.

Pollution is damaging to both the ecosystems and living organisms. Air, soil, and food resources are being affected by pollution. Pollutants include automobile exhaust, fertilizers, pesticides, industrial wastes, radioactive wastes, and household wastes. Pesticides like DDT become absorbed by the animal and concentrated in their bodies. Acid rain forms from the exhausts of automobiles which emit sulfur and nitrogen oxides. These combine with water in the air to form sulfuric and nitric acids.

The growing population and modern conveniences greatly contribute to the problems of pollution. Government regulations, community efforts, and changes in habits of industries and individuals are necessary to solve pollution problems.