



Interdependence of Organisms

Objective

To explain patterns of interdependence of organisms.

Activity

Brainstorm:

1. A list of different types of organisms that compete with one another for basic requirements needed for survival.
2. A list of competitive, mutually helpful, and parasitic relationships involving different organisms that may cooperate or depend on one another for the survival of one or both of the organisms (can be good or bad relationship).
3. Using the information below, have students identify the kind of relationships shown by the various pairs of organisms.

Organisms

Need

Interdependent Relationships: Mutually Beneficial (Mutualism)

- | | |
|------------------------------------|--|
| 1. Pets and owners | <i>pet</i> - food, H ₂ O, shelter, love. <i>owner</i> - companionship. |
| 2. Ratel and honey guide bird | <i>ratel</i> - furry mammal in Africa that follows honey guide bird to bees' nest and breaks it open, eats honey and beeswax. <i>honey guide bird</i> - locates bees' nest and chirps loudly for ratel to follow; can't break open bees' nest but will feed on honey and wax after ratel has done it. |
| 3. Herons and poisonous snakes | <i>poisonous snake</i> - lives at base of tree where heron is nesting, feeds on scraps of food from herons, keeps predators away from eggs and nestlings. <i>heron</i> - nest protected from predators (raccoons and others) by snake. |
| 4. Honey bees and flowering plants | <i>honey bees</i> - visit flowers to get food (nectar). <i>flowers</i> - pollen (yellow grains) sticks to bees' bodies and is taken from flower to flower; helps in fruit production. |
| 5. Birds and plants | <i>birds</i> - eat fruits of flowering plants for energy. <i>plants</i> - seeds of fruit are dispersed in waste of birds; plants are then scattered not concentrated in just one area. |
| 6. Lichens (algae and fungi) | The fungus species attaches the lichen structure to the log, rock, or brick wall it lives on and absorbs nutrients from the environment. In addition the fungus forms a protective envelope for the algae preventing the algae from drying out. The algae uses the nutrients absorbed by the fungus and the carbon dioxide produced for photosynthesis. The sugars and oxygen produced by the algae are used for food by the fungus. |

Interdependence of Organisms *(continued)*

leaves are their favorite diet. The trees they feed on are weakened and become more susceptible to other stresses such as drought, diseases and other insects. By late June or early July, the larvae are finished feeding. After two weeks in the pupa stage the adults emerge; they do not feed! Insecticides are often sprayed from airplanes in late spring to destroy the larvae.

Interdependent Relationships: Competition

- | | |
|---|--|
| 13. Zebra mussels competing with native mussels | Taking the Great Lakes by storm since invading in 1986, the zebra mussel is a pest organism. These small (2-3 cm long) bivalve (sea shell) creatures attach themselves to each other, other organisms and man-made objects. They have drastically reduced the populations of all native mussels in western Lake Erie, clogged water intake pipes, and eliminated many small organisms in the Great Lakes food chain. They are quickly spreading to inland lakes and rivers as they easily attach to boat bottoms and go along for the ride. They are foreign invaders of the worst kind. Nothing in the Great Lakes naturally preys on them. They have no natural control. |
| 14. Squirrel vs. chipmunks | food (nuts) |
| 15. Cardinal vs. sparrow | food (seeds) |
| 16. Tall tree vs. smaller tree | Sun (light for food making - photosynthesis) |
| 17. Zebra vs. gazelle vs. lion | water |
| 18. Ground hogs vs. fox | shelter (burrow in ground) |
| 19. Rabbit vs. gardener | food (garden vegetables and flowers) |
| 20. Weeds vs. garden plants | living space, nutrients, water, sunlight |

Note: #1-6 are all beneficial to each other. #7-8 are beneficial to at least one organism but *not* harmful to either. #8-10 describe relationships where one organism is helped but the other is harmed. This is parasitism. The organism that is helped is called the parasite. The organism that is harmed is called the host. #13-20 are competitive relationships.

Interdependence of Organisms *(continued)*

Interdependent Relationships: Commensalism

7. Whale and barnacle *whale* - gets nothing! *barnacle* - tiny, crusty looking animals that attach to whale to get a free ride that increases chance of finding food.
8. Egret and cow *cow* - gets nothing. *egret* - as the cow grazes in the field it stirs up insects that the egret catches for food. "Fast food!"

Dependent Relationships: Parasitism

9. Sea lamprey and lake trout *sea lamprey* - bloodsucking primitive fish that attaches itself to body of trout for food (takes the trout's blood). Small fish often die; larger fish are weakened.
- Sea lampreys were introduced to the Great Lakes through the St. Lawrence Seaway (approx. 1930) and have no natural predators in our waters so their population soared. In a 10-year period, the take of lake trout from the Great Lakes fell from 100,000 tons to 10,000 tons. Lake trout today are constantly being restocked from fish hatcheries. Their population has never recovered.
10. Mosquitoes and animals (including people!) *mosquito* - blood sucking insect (generally female) that needs blood for egg production and survival; can spread disease (malaria for people, heartworm for dogs), ruin a family outing, and cause much discomfort.
11. Cowbird and robin (sparrow or other song birds) *cowbird* - female cowbird will lay her eggs in the nest of another bird and leave; the robin female will incubate all eggs by sitting on nest. When the eggs hatch, the cowbird hatchlings are larger than the robin hatchlings. They get food, attention, and nest space. Robin nestlings will die; cowbird nestlings survive.
12. Gypsy moths and trees The gypsy moth, specifically the larvae, is one of the most destructive insect pests to invade the U.S. Introduced 100 years ago, it is a threat to the health of our forests, trees, and shrubs. After wintering in the egg stage in tan-colored masses, the larvae emerge. They are only 1/8" long and they climb to the tops of trees. They are not picky - over 500 species of trees and shrubs have been invaded. They feed voraciously until they reach a length of 3 inches. Oak