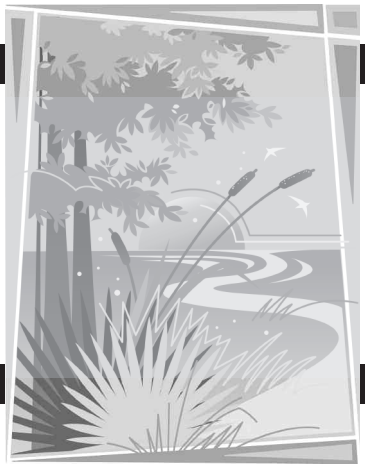
Adaptations
Teacher's Guide



There is an amazing diversity of life on earth. Scientists estimate 40 to 80 million species of plants and animals live on earth, with most of them not yet identified. Illinois has about 54,000 identified species. A quick review of any one particular group of organisms reveals a wide array of subtle differences within the group. For instance, there are more than 200 fish species in Illinois, each with a distinct body shape, coloration, feeding habits and reproductive strategy.

These subtle differences are adaptations. An adaptation is an adjustment, often hereditary, that an organism goes through to live in a particular environment. Adaptations to the environment allow different plants and animals to fill different niches, or roles, in the environment. This partitioning minimizes competition for the same habitat requirements (food, water, cover, space). Adaptations develop over long periods of time and may be either physical features or specialized behaviors.

Because water covers about 75 percent of earth's surface, many adaptations are directly related to water. All around the world, water is in motion. The movement of water and the changes that occur, either through natural or human processes, can make water a very difficult habitat to live in: gravity, the sun's energy and earth's rotation cause rivers to rush downstream or plunge over ledges to create spectacular waterfalls; they induce lakes and ponds to swirl below their surfaces and draw the ocean waves to shore. Gravity causes all free-running water to flow downhill. Wind also contributes to the movement of water. Currents can be weak or strong, water volume fluctuates, streams can dry up or flood, oxygen levels in water change with temperature changes, water density near the surface is different than at greater depths, water temperatures fluctuate according to depth, water freezes and pollution is easily spread. Not all plants and animals can live in water. Only those that have developed the special adaptations that enable them to withstand the inconsistency of water will survive.

Animal Adaptations

Adaptations increase an animal's chances of surviving in a particular environment and with a particular lifestyle. Animal adaptations may be a body shape to allow them to swim faster, a mouth shape to permit eating a particular type of food, a shape of the feet or legs to permit standing in a watery area or the manner of reproduction to insure increased survival of their young.

Plant Adaptations

Plants adapted for life in the aquatic environment can live in water-saturated soil that has low oxygen levels. While most plants absorb some oxygen from the soil through the roots, aquatic plants have developed adaptations to increase oxygen absorption. Cattails get oxygen to the roots through hollows in the stem and leaves. One way to kill cattails is to mow them very short and then flood them above the mowed stems, suffocating the plants. Baldcypress trees have developed knees to aid in oxygen absorption by the roots. Duckweeds have adapted to the aquatic environment by floating on the water's surface, with their roots dangling in the water to absorb nutrients and minerals.

Annual plants that survive on mud flats have developed adaptations that allow survival in conditions where water levels fluctuate. Seed production is tied to day length, and plants rush to produce seeds before winter sets in. Some plants have delayed seed germination which allows them to build up seed banks in the soil until sufficient moisture is present.

Changing to Survive

Some species develop very specific adaptations to a habitat or feeding style. When changes occur in an organism's environment it must move or adapt, or it will die. Sudden changes (flood, earthquake, water quality change) do not allow sufficient time for organisms to adapt. Those organisms that have developed very narrow ranges of habitat requirements are extremely vulnerable to changes and probably will not survive. Some specific adaptations of organisms found in Illinois aquatic habitats are outlined in the "Living in Water" lesson in this *Aquatic Illinois* unit.

References

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