

Rivers of Illinois: Mississippi, Illinois, Ohio and Wabash Ecology: Interactions

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Ecology: Interactions

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The rivers in Illinois are home to people, plants and animals. Historically, humans chose land close to major waterways to build their communities. Sites close to rivers had much appeal for the many resources and opportunities they presented.

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The four main rivers in the state are the Illinois, Mississippi, Wabash and Ohio.

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The Illinois River runs 332 miles connecting northern Illinois to the Mississippi River.

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Some of the major cities along it include Ottawa,

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La Salle, Peru,

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Peoria, East Peoria

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and Pekin.

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The other three major rivers define much of Illinois' borders. The Mississippi River acts as the 581-mile western border with Missouri and Iowa.

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Major cities along it are Moline, East Moline,

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Rock Island,

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Quincy,

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Alton,

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East St. Louis

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and Cahokia.

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The Wabash River makes up a piece of the eastern border between Illinois and Indiana, and this section is 230 miles long.

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It passes by Palestine

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and Mt. Carmel.

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The border of Illinois and Kentucky is defined by the Ohio River which runs 133 miles along the southeastern part of the state.

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Cities along this river include Rosiclare,

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Golconda,

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Brookport,

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Metropolis

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and Cairo.

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Ecology is the scientific study of relations that living organisms have with respect to each other and their natural environment. Every organism is shaped by, and in turn shapes, its environment. In this podcast we will focus on interactions within and along the rivers.

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Rivers have running water. The four major rivers of Illinois are permanent streams, meaning that they have flowing water year round. Conditions in these rivers constantly change, and the organisms in and around them are adapted to this fluctuating environment.

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Aquatic plants contribute oxygen to water, but the movement of water also aerates it. The amount of oxygen in water is called dissolved oxygen. The dissolved oxygen level in the water varies based upon a variety of factors, including water temperature and speed of current. Cool water can hold more dissolved oxygen than warm water.

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Species are adapted for certain oxygen contents. For example, carp, catfish, fly larvae, aquatic worms and algae can survive in water with low levels of dissolved oxygen. These species tend to live on the bottom and in areas with slow current.

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Gar can come to the surface and gulp air into their swim bladder if the oxygen content in the water is too low for their gills to be effective. Their swim bladder is rich in blood vessels and can function much like a lung.

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Bass require higher levels of dissolved oxygen to survive. These predators move quickly and must supply their large muscles with much oxygen. If the water level in the river is low, the dissolved oxygen may be low as well. Fishes like bass must find deep pools, preferably in the shade, and stay there until conditions improve.

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The flow of water also keeps nutrients and food supplies accessible and moves wastes farther downriver.

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However, moving water can also cause loss of life, such as during a flood. Some organisms can be moved downstream, others into flood plains and away from flowing water and others simply cannot survive the increased flow and velocity of water during floods. Organisms along the rivers, including humans, are affected, too.

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Vegetation that grows next to the rivers provides shade, keeping the water temperature cooler and increasing the amount of dissolved oxygen in the water. These plants also help slow the rate of erosion and reduce the amount of silt flowing into the water because their roots provide support for the soil. Plants along the river may drop their fruits in the water, providing food for some species.

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Moving water carries the seeds of plants. This process helps plants to disperse to new locations, making for a diverse gene pool and growth in population. When trees fall into the river they provide habitat for many organisms including turtles that like to bask in the sun on them, beavers that use them to make lodge shelters and fishes that hide by them or lay eggs in them.

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Species that share resources necessary for growth, survival and reproduction must compete for them in their environments. The main resources for organisms are food, shelter, light, water and space.

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A food chain is a sequence of energy transfer. It starts with the sun, a primary energy source.

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Next are organisms that make their own food by capturing energy from sunlight, usually plants.

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The herbivores receive the sun's energy by eating plants.

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Carnivores are the next link. They feed on herbivores and other animals, and the sun's energy continues to be transferred.

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When organisms die without being preyed upon, they may be eaten by scavengers or broken down by decomposers. Decomposition makes nutrients available in the soil for other organisms to use.

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For example, algae capture the sun's energy by making their own food.

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Algae may be eaten by a tadpole.

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The tadpole could be eaten by a channel catfish (*Ictalurus punctatus*),

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which could be eaten by a North American river otter (*Lontra canadensis*).

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When the river otter dies it may be eaten by a turkey vulture to take the chain a link further or broken down by bacteria, insects and worms.

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A food web represents many interconnected food chains. Food webs show that there is much variety in the paths that energy transfer can take in an ecosystem and that all parts of the web are dependent on the other parts. Equilibrium exists between all of these types of organisms because the availability of resources limits their populations. If a part of a food web is removed, the other organisms in the web are also affected. Here are some examples of how riverine organisms rely on each other.

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Plants and algae make their own food through photosynthesis thanks to sunlight, water and carbon dioxide. The oxygen they release is used by all living organisms. Many animals eat plants in and along the rivers, including fishes, insects and crustaceans.

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Fishes like gizzard shad (*Dorosoma cepedianum*), river carpsucker (*Carpionodes carpio*) and bigmouth buffalo (*Ictiobus cyprinellus*) eat plant materials and plankton, which are microscopic life forms.

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Other fishes, like channel catfish and common carp (*Cyprinus carpio*) are bottom feeders that face into the current waiting for worms or other food items to float by.

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Some fishes like white bass (*Morone chrysops*), black crappie (*Pomoxis nigromaculatus*) and sauger (*Stizostedion canadense*) are predators that eat other fishes, for example spottail shiners (*Notropis hudsonius*).

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Fishes provide much of the food for animals that live in and along the rivers. Birds like bald eagles (*Haliaeetus leucocephalus*) and ring-billed gulls (*Larus delawarensis*) pick up fishes from the surface of the water.

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Great blue herons (*Ardea herodias*) and great egrets (*Casmerodius albus*) wade in shallow water looking for minnows to eat.

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American crows (*Corvus brachyrhynchos*) eat dead fishes that wash up on the banks.

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Other birds like the double-crested cormorant (*Phalacrocorax auritus*) catch fishes while they swim underwater.

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North American river otters (*Lontra canadensis*), turtles, snakes, raccoons (*Procyon lotor*) and large fishes are just a few examples of the other animals that eat fishes. Fishes and many of their predators also eat crustaceans, aquatic insects and mollusks, like snails and mussels, from the rivers.

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Wood ducks (*Aix sponsa*) and Canada geese (*Branta canadensis*) eat plant materials while bank swallows (*Riparia riparia*) eat insects they catch while flying.

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Spotted sandpipers (*Actitis macularius*) and semipalmated plovers (*Charadrius semipalmatus*) are shorebirds that eat small worms, insects, snails and crayfish.

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Beavers (*Castor canadensis*) eat the bark of nearby trees like willows and use their branches to build lodges.

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Muskrats (*Ondatra zibethicus*) dive to collect mussels which they can open with their teeth to eat.

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Many insects depend on the water for reproduction. Dragonflies, mayflies and deer flies lay their eggs in the water. When the eggs hatch the immature forms live in water until they change into their adult forms. These immature forms can be easy prey for other animals. The immature insect stages may be the longest portion of an insect's life.

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Caddisfly larvae use glue that they make to build cases of sand or plant pieces. As they search for food they can go inside the case for protection. When the larvae are fully grown they attach their case to something underwater and seal themselves inside to undergo their transformations. This adaptation helps them to survive by protecting them from predators like fishes.

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When organisms die they may be eaten by animals or decompose. For instance, snapping turtles (*Chelydra serpentina*) and turkey vultures (*Cathartes aura*) eat dead fishes and other animals. Other times when organisms die, bacteria, insects and fungi may break them down into materials that can be recycled for use by other organisms. This decomposition is a process that also takes oxygen from the environment.

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Pollutants can cause great harm to the rivers. Pollution by excessive nutrients, for example nitrogen and phosphorus which are in many fertilizers, can cause rapid growth of weeds and algae in water. These plants then compete with other organisms for oxygen in the water. When these plants die, fungi and bacteria break them down, using even more oxygen.

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Many birds use the large rivers in Illinois as they migrate. The bird migration route through the state is part of the Mississippi Flyway. The rivers and backwater lakes provide food, cover, open water and resting areas. Improved habitat quality along the rivers can lead to more species visiting and living in the state. Birds like the black-necked stilt (*Himantopus mexicanus*) and

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American white pelican (*Pelecanus erythrorhynchos*) have returned to Illinois in good numbers in the past few years. They are using restored and improved wetland and backwater lake habitats along the large rivers, particularly the Emiquon National Wildlife Refuge and Preserve in the Illinois River valley.

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Humans also have important relationships with the large rivers in Illinois. We use their many resources for food, water, transportation, materials and recreation. The rivers greatly impact the economies of local communities. While ferry boats carry people and cars across rivers, huge barges filled with commodities travel all along a river's length.

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Navigation alone on the upper Mississippi River and the Illinois River supports over 400,000 jobs. Commercial fish harvests on the large rivers of Illinois were valued at almost \$1.3 million in 2006. Recreation and tourism in these areas employ 143,000 people and earn \$6.6 billion in revenue annually.

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Humans impact the rivers by building levees, locks, dams and many other structures. Pollution, increased erosion and sedimentation rates and the introduction of nonnative species are also effects humans have contributed to. These impacts change the river from its natural state, and the organisms in and around it must adapt or die.

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For example, the construction of Lock and Dam 19 on the Mississippi River near Hamilton, Illinois, blocked the upstream migration of the skipjack herring (*Alosa chrysochloris*). These fish are the specific host for ebonyshell mussels (*Fusconaia ebena*) and elephant ear mussels (*Elliptio crassidens*). These mussels have a parasitic larval form that must develop inside the skipjack herring. Since skipjack herrings are no longer upstream of Lock and Dam 19, these mussel species are also no longer found upstream from Lock and Dam 19.

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Organisms interact with each other as well as with their river habitat continually. They compete for resources that the rivers provide and also change the rivers themselves with their presence. Rivers of Illinois are truly full of riches.

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