Who Lives in the River?

Chicago River Classroom Activity

Summary
Students will read about the history of the Chicago River. Based on the information presented, students will make inferences about the types of organisms they would expect to see in the river at different locations.

This lesson can be used as a post-lesson after a Chicago River field trip exploration.

Background Information
The water in a river comes from its watershed – the land surrounding the river that drains into the river. Because water flows downhill, watershed boundaries are always located on the top of hills or mountains. Rain falling on one side of the hill will flow into one water body, while rain falling on the other side of the hill will flow into another water body.

Any changes to the land in a watershed will affect the river or lake it drains into. For instance, replacing forests and prairies with housing developments decreases the amount of water that can seep into the ground. More water flows over streets and sidewalks and into street drains that empty into the river (either directly or via a water treatment facility).

Thus, the river tends to flood more often when it rains because so much water is reaching it so quickly. When the river is flooded, the water has a lot of power and is able to erode the banks of the river. All this sediment ends up in the river where it turns the water dark and murky. The sediment clogs the gills of fish, insects and mollusks; makes it hard for fish and insects to hunt; buries invertebrates and fish eggs living on the bottom of the stream; and prevents plants from growing due to the lack of light. While flowing over streets and land, rainwater also picks up pollutants such as salt, oil, sand, fertilizer and pesticides.

Grade Level: 7th – 12th
Duration: One to two class periods.
Objectives:
1. Students will understand that what we do can affect the health of rivers
2. Students will predict what types of organisms could live in the Chicago River based on descriptions of its condition

Materials:
- Copies of the “A Brief History of the Chicago River,” one per group
- Copies of Aquatic Macroinvertebrates – Who can live here? three per group
- Long sheet/s of paper, one per group of students
- Markers, crayons or colored pencils
- Tape or glue stick

Standards:

NGSS:
MS-LS2-3, MS-LS1-4, MS-ESS3-4, RI.8.4, RI.8.10, RF.5.4a-c, RI.8.9
These pollutants can then reach the river. This type of pollution, which is spread across the landscape and cannot, once it reaches the river, be identified as coming from any one particular person or company, is called non-point source pollution. It is one of the major threats to rivers today.

Macroinvertebrates – animals with no bones and large enough to see with the naked eye are often used to determine the health of a river. Some macroinvertebrates are quite tolerant to pollution (such as midges, worms and snails), while others are less tolerant to pollution (such as damselfly and mayfly larvae). Since macroinvertebrates do not move great distances and live in the river at least a year, they give us a sense of how clean or polluted a particular stretch of river is.

**Procedure**

- Ask students if they have ever been to the Chicago River before. If they have, have them describe the river they saw to their classmates.
- Pass out copies of “A Brief History of the Chicago River”. Individually, in small groups or as a whole class read it. Ask students to identify descriptions in the text that indicate how healthy or clean the river is at different points.
- Have students work in groups to draw a map of the entire length of the Chicago River. Students should draw how the river and surrounding land looks at the different locations described in the timeline. You may want to instruct students to reread it as they draw the river.
- Have students examine their river and make note of the items along the banks of and in the river that they think would make the river a good place to live for small animals. Then have students examine their river and make note of items along the banks of the river and in the river itself that they think would make the river a poor place to live for small animals. Have students think about the land around the river and what type, if any, pollution might be coming off the land into the river.
- Let students know that in order to complete the drawings, we need to include the wildlife that is living in the river. Hand out copies of the sheets entitled “Aquatic Macroinvertebrates – Who can live where?” and “Functional Feeding Groups”. Based on the condition of the river (the amount of pollution), and the description of the needs of the different organisms (their functional feeding groups), have students color and paste the organisms where they think they could find them.
- Display students work. Ask students to make an overall assessment of what they think the stream’s health is: excellent, good, fair or poor. Have them explain why. Ask the students what the trend in the health of the river is as one travels from the headwaters (the beginning of the river) to the Chicago Sanitary and Ship Canal. Ask students why they think this is so.
- Have students brainstorm ideas of ways that the Chicago River could be improved.

**Extension**

- Have students research some ways people are making a positive difference to the health of urban streams.
- Organize a field trip to the Chicago River for students to sample and identify the animals that live in the Chicago River. Check our website www.chicagoriver.org/education for more details.
Map of the Chicago River

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A Brief History of the Chicago River

The Early River: 10,000 B.C.-1800
Many different Native American tribes settled periodically along the river, they named it “Chicagoua” after the wild garlic plants that grew on its banks. All water needs (for washing, cooking and drinking) were met by the river. All long-distance travel was done by canoe, via rivers and lakes. Wildlife was plentiful and hunting was a subsistence activity. By 1800, a community of Native Americans and Europeans was built along the Chicago River, in what is now downtown Chicago.

The Growth of a City: 1800-1875
Chicago’s expansion was largely due to its importance as a major port city. Railroads and the I&M Canal (completed in 1848) provided a vital connection to the west. Shipbuilding became a major industry from around 1850 to 1875, and for a while, more ships passed through Chicago than through any other city in America. The population of Chicago went from just several hundred in 1800 to over 50,000 in 1875. Development was great, and wildlife suffered from loss of habitat. Most of the city burned to the ground in the Great Chicago Fire of 1871.

Growing Pollution: 1875-1889
By 1889, Chicago’s population is over 1 million. This population growth of the 19th century has led to more and more pollution. Chicago’s sewage flowed directly into the river, first via trenches in the roads and later through sewer pipes, which dumped directly into the river. Before the river’s reversal, the sewage flows out into the lake and returns in the drinking water supply. Frequent outbreaks of Cholera and yellow fever are common. The river downtown was a smelly and unpleasant mess, unsuitable for animal habitat.

Reversing the River: 1889-1922
In 1889, the State Legislature created the Sanitary District of Chicago to manage wastewater and come up with a solution to the polluted river and lake. Completed in 1900 the Chicago Sanitary and Ship Canal not only kept sewage out of the city’s drinking supply, it flushed the filthy Chicago River with clean Lake Michigan water. However, sewage was not treated; it was simply directed to flow south towards Joliet and St. Louis. Water quality is improved in some areas, and lowered in others. In 1910 the Forest Preserves of Cook County are created, setting aside a lot of open green space for plants, animals and people.

Water Treatment Plants: 1922-1939
In 1922, the Cal-Sag Channel was constructed, reversing the flow of the Calumet river system. Although the water in the Chicago River was not clean enough to drink in the early 1900s, people enjoyed boating, fishing, and swimming in the river. A Supreme Court decree forced the Sanitary District of Chicago to complete construction on its planned water treatment plants. The West Side and Southwest Side plants were joined together to form the Stickney Water Reclamation Plant, which is the largest water treatment facility in the world.

Changing the Tide: 1840-1975
Beginning in the 1840s, Chicago’s poorest residents lived along the river. Wealthy residents preferred the lakefront, and since the riverfront areas had more exposure to industrial pollution, they were left to the poor. In the 1960s, the perceived property value of the riverfront first began to change. In 1970, fewer than 10 species of fish lived in the Chicago River. In 1972, the federal government passed the Clean Water Act, which made it unlawful for any person to dump pollutants into water without permits. After the Clean Water Act was passed, Chicagoans became interested in the potential of a cleaner Chicago River. In 1974, guidelines were set up to ensure that future development along the river would make it more accessible to the public.

A Cleaner River: 1972-present
In 1975 the Metropolitan Water Reclamation District of Greater Chicago began construction of the Tunnel and Reservoir Plan (TARP). Many concerned individuals in Chicago and the suburbs worked very hard to improve water quality. As the river has gotten cleaner, more people have started using it again for recreation. Private boat clubs, canoeing and kayaking, and many other forms of recreation have sprouted up along the Chicago River. Catfish habitat, bat colonies, and turtle habitat project have been successful. The Chicago Riverwalk was completed in 2015.
## Aquatic Macroinvertebrates

### Who can live here?

<table>
<thead>
<tr>
<th></th>
<th>Intolerant to pollution</th>
<th>Moderately intolerant to pollution</th>
<th>Fairly tolerant to pollution</th>
<th>Very tolerant to pollution</th>
<th>Indifferent to pollution</th>
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</thead>
<tbody>
<tr>
<td><strong>Shredders</strong></td>
<td>Stonefly</td>
<td>Caddisfly</td>
<td>Scud</td>
<td>Crawling water beetle</td>
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<td></td>
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<td>Crane fly</td>
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<td><strong>Collectors</strong></td>
<td>Caddisfly</td>
<td>Clam</td>
<td>Black fly midge</td>
<td>Aquatic worm</td>
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<td>Crayfish</td>
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<td>Blood worm midge</td>
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<td>Mayfly</td>
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<td>Rat-tail maggot</td>
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<td>Mussel</td>
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<td>Riffle beetle</td>
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<td>Planaria</td>
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<td><strong>Grazers</strong></td>
<td>Caddisfly</td>
<td>Mayfly</td>
<td>Right-handed snail</td>
<td>Left-handed snail</td>
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<td></td>
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<td>Riffle beetle</td>
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<td>Water penny</td>
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<td><strong>Predators</strong></td>
<td>Alderfly</td>
<td>Damsel fly</td>
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<td>Backswimmer</td>
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<td>Dobsonfly</td>
<td>Dragon fly</td>
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<td>Giant water bug</td>
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<td>Snipe fly</td>
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<td>Predacious diving beetle</td>
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<td>Waterboatman</td>
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<td>Water mite</td>
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<td>Water scavenger beetle</td>
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<td>Water scorpion</td>
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<td>Water strider</td>
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<td>Whirligig beetle</td>
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Functional Feeding Groups and their preferred location in Stream Order

The Upper Reach

The Middle Reach

The Lower Reach

Stream Width
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