Exploring Science Field Trip
Extension 5: Cooking Up A Pond

Setting: Classroom
Grade: 1st grade – 3rd grade
Time: 15-30 minutes

Overview
Students will understand the relationship between dissolved oxygen and temperature
Students will understand how pollution and shade can impact temperature/dissolved oxygen
Students will become familiar with the tools and methods used to measure temperature and dissolved oxygen
Students will understand human impacts on the temperature and oxygen levels of water

Materials
- Small fish tank or clear container
- Jar with warm water labeled surface runoff with red food color
- Jar with cold water labeled with a tree or shade
- Bubbler
- Sediment
- Rocks
- Cooking Up A Pond worksheet
- Pitcher for water
- Journals

To make this activity more hands-on, double each material and split class into 2 groups

Engagement and Explanation
1. Have a small fish tank set up on a table, with nothing in it.
2. Hand out directions for cooking up a pond to students.
3. Assist students through the directions. Talk through each ingredient of the pond (water, sediment, organic matter, oxygen), have them measure the temperature and dissolved and write it down in their journals
4. Take the ice water and tell students that it represents water that has been collected from a spot under a tree. Ask students “do you think trees help to make the water cooler or warmer? Why?” Have students take the temperature and dissolved oxygen of the water after the cold water is poured in. Ask students if anything has changed? Discuss with students the importance of trees and shade to the water in a pond or stream. Not only
does shade cool the water but vegetation also provides important food to bacteria and macroinvertebrates in the pond. (see “Extension #3 Intro to Macroinvertebrates and the Food Chain” for more on this topic). What kind of species might you find in a pond like this? Students should think about macroinvertebrates that live in cool water that has vegetation and dead leaves as a source of food.

5. Pour the surface runoff jar into the tank. Explain to students that when it rains, water flows off of hard surfaces (like sidewalks and roads) into the streams and ponds. This water is usually warmer than the water in the pond or stream. Ask students about what has happened to the water. Ask students to take the temperature and dissolved oxygen of the water again. Ask students what has changed. What would happen to organisms living in the pond?
   a. How else can surface runoff affect the pond or stream? Often streams and ponds receive runoff from roads, sidewalks, and other impervious surfaces. In addition to this runoff being warmer it can potentially carry salt, nutrients, and litter.

6. What kind of organisms might you find in a pond like this? Students should think about what macroinvertebrates are able to live in warmer water with less oxygen vs cooler water with more oxygen. Think about aquatic macroinvertebrates such as dragonflies and mosquitoes, where might each of these live? Students may also answer with animals they are most familiar with such as fish. Encourage students to think about ALL types of living things such as plants, mammals, reptiles, and amphibians.

7. Ask students how humans might impact the water in a pond. What would happen if trees were cut down? What would happen if there is more runoff into the waterbody? All of these activities will likely increase the water temperature and decrease oxygen levels. Depending on the types of pollution some organisms may be able to survive better than others. Removing trees from around a waterbody will increase water temperature, increase runoff, and decrease inputs of leaves which are important sources of food for bacteria, microorganisms and macroinvertebrates in aquatic systems.

8. Wrap up by noting that it is important that we take care of the bodies of water around us. Additionally, it is important that we take care of the land around a water body (the watershed), everything that happens on the land impacts the quality of water in our streams, lakes and rivers.

**Evaluation**

Ask students if more species can survive in warm water or in cold water. Students should be able to use the probes to accurately measure oxygen and temperature and record these data into their journals. Students should be able to identify that pollution can cause the water temperature to increase and oxygen to decrease. Students should be able to list a few sources of pollution.

**Extension**
We recommend completing Extension 4, before completing this activity, Extension 5

**Resources:**
1. [Hudson River Health](#)
2. [Human-Accelerated Environmental Change](#)
3. [Stream water quality](#)
4. [Dissolved oxygen video](#)
5. [Cooking Up A Pond worksheet](#)

**Standards**

**Science Learning Standards for Elementary School**

**P-2nd grade**

**K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment:**

K-ESS3-3. Communicate solutions that will reduce the impact of humans on living organisms and nonliving things in the local environment.

**2. Interdependent Relationships in Ecosystems**

2-LS4-1. Make Observations of plants and animals to compare the diversity of life in different habitats

**ELA:**

KW6, 1W6, 2W6. Develop questions and participate in shared research and explorations to answer questions and to build knowledge.

**3-5th grade**

**3. Interdependent Relationships in Ecosystems:**

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

**ELA:**

3W6, 4W6, 5W6. Conduct research to answer questions, including self-generated questions, and to build knowledge through investigating multiple aspects of a topic