

LESSON TITLE - Pollution in a Freshwater Ecosystem



Suggested Grade Level(s): 5th



Overview:

Students have been introduced to freshwater ecosystems and how aquatic and tertiary ecosystems are interrelated. Every ecosystem students set up in class has changed in some way. In this lesson, students will observe changes within their ecosystem and think of what may cause these changes. What might happen if the ecosystem was polluted?



Duration: Approximately 2-3 Weeks (30-40 mins./day) April 2022-May 2022



Academic Standard Alignment:

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.



Objectives: Students can:

- Observe and identify changes within a freshwater ecosystem caused naturally and by human activities
- Develop a model of a pond ecosystem
- Think of ways humans pollute waterways
- List ways fertilizers, pesticides, herbicides and salts may harm the ecosystem
- Research and graph waterways in The United States most negatively affected by pollution



Environmental Justice Tie In:

Environmental Justice Guiding Questions:

1. How can we ensure that everyone has access to a healthy environment to live, learn, and work in?
2. What environmental injustices exist in my community?
3. How can we ensure everyone has a voice in the conversation about sustainability and protecting the environment?



Computational Thinking Competencies and Practices:

Students will:

- Analyze and Communicate with Data and graphing
- Understand Systems
- Decompose
- Create Computational Models
- Recognize patterns in human behavior that affects aquatic ecosystems
- Test and experiment a model pond ecosystem



Essential Questions (Unit/Lesson):

- What caused changes in your ecocolumn?
- If you wanted to set up a pollution experiment, which ways humans pollute could you duplicate in a class ecosystem to study?
- Vinegar replicates acid rain. How does acid rain affect your ecocolumn?
- How can fertilizer and salt hurt an environment?
- How long do you think it will take to notice changes when we add chemicals to our ecosystem?
- Which pollutants caused damage? How long did it take?
- What can we do to limit or prevent negative human effects such as pollution in our waterways?



Materials for Students:

- Empty Pepsi Bottles with labels removed
- Water
- Chlorine/Chloramine drops

- Small piece of fiberglass screen
- Rubber band
- Lab Journals
- Laptop/Chromebook
- Table Salt
- Miracle Grow
- Apple Cider Vinegar
- Water
- Potting Soil
- Aquarium Gravel
- Mustard seeds, alfalfa seeds, and rye grass seeds
- Duckweed
- Elodea or other freshwater plant



Students Prior Knowledge:

- Aquatic and tertiary ecosystems are interdependent
- Abiotic and Biotic factors are also interrelated
- Food web and food chains (energy)
- The definition of pollution
- 5 Kingdoms of living things
- The life processes
- Watersheds carry soil and other materials to our waterways
- The process of erosion and deposition



Student Artifacts/Evidence:

(IN PROGRESS)



Additional Resources for Teachers and Students

- NSRC - Science and Technology for Children Student Book
- Delta Science - Foss Science Stories - Ecosystems
- Google Classroom
- <https://www.ourendangeredworld.com/eco/most-polluted-rivers-in-us/>
- <https://www.environmentbuddy.com/environment/the-most-polluted-rivers-in-the-us/>
- <https://nrtwq.usgs.gov/nwqn/#/>