

# Watershed Decisions

## Grade Level(s)

4<sup>th</sup> and 5<sup>th</sup>

## Estimated Time

30 minutes

## Purpose

An inquiry-based approach to discussing water quality issues surrounding watersheds and the decision-making processes that go into improving those water quality issues.

## Materials

### Links:

Website: [www.linncoag.com](http://www.linncoag.com) -2020/21 virtual learning- drop down tab- February

Instructional video: [Watershed Decisions! - YouTube](#)

Iowa Ag Today Issue 3

[https://www.iowaagliteracy.org/page/file?path=Files%2Fwebsite%2Fiowa-ag-today%2FIALF\\_IAT\\_issue3\\_digital%20FINAL.pdf](https://www.iowaagliteracy.org/page/file?path=Files%2Fwebsite%2Fiowa-ag-today%2FIALF_IAT_issue3_digital%20FINAL.pdf)

Watershed experiment video: <https://www.youtube.com/watch?v=jMxCFhP0uxk>

### Other:

- Watershed map (1/student)
- Situation news release (1/instructor)
- Set(s) of water test result cards (1/group)
- Food coloring – green, red, blue (1 of each/group)
- Clear plastic cups (8/group)
- Dice
- Secchi disk (1/student)
- Water

## Vocabulary

- **Secchi disk**- used to measure water transparency or turbidity in bodies of water.
- **BMP** (best management practice)- term used in the United States and Canada to describe a type of water pollution control.
- **Nitrate**- a salt or ester of **nitric acid**, or any compound containing the univalent group – ONO<sub>2</sub> or NO<sub>3</sub>.
- **Turbidity**- cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye, similar to smoke in air. The measurement of turbidity is a key test of water quality.

- **PPM** (parts per million)- often used describing dilute solutions in chemistry, for instance, the relative abundance of dissolved minerals or pollutants in water.

### **Interest Approach – Engagement:**

OPTIONAL: Watershed quick demonstration: If possible, play the game on a slope. Also, playing the game outside is more fun and realistic. Lay out the cards in order with the first card being at the top of the slope and the last card at the bottom of the stairs or slope. Set the water purification plant off to the side of the watershed cards. Pass out the dice instructions and a dice to each student. Students roll the die, based on the dice key, they physically move to the place the reader tells them to go. When they get to the lake and they get to go to the next step in the watershed, they can choose either the river or groundwater. The goal is to get to the ocean. Once they get to the ocean, the game is over. They go back to the beginning and try to make it to the ocean again. The students continue to play until the teacher decides to stop-usually 10 minutes is enough. Then gather the students together and have a conversation about what they learned from this experience.

### **Background - Agricultural Connections**

We all live in a watershed – the area that drains to a common waterway, such as a stream, lake, estuary, wetland, aquifer, or even the ocean – and our individual actions can directly affect it. Working together using a watershed approach will help protect our nation’s water resources.

### **Procedures**

1. Watch instructional video and read about resources (cover) and watersheds (inside cover) in the Iowa Ag Mag. Break the class into two or more small groups (about 4 people per group) and add ¼ cup of water to all 8 cups.
2. Present each group with a watershed map and allow them to become familiar with it. Read the news release out loud. Discuss initial reactions: What might be the potential causes for the creek impairment?
3. Present each group with a sealed envelope of the water test results.

4. Students read the results. Place a clear plastic cup on each letter of the map filled with equal amounts of water. Based on the instructions of each card, place the appropriate number of food coloring drops into each cup to represent nitrates, sediment or hazardous substances. Use the secchi disks on the cards to examine water quality.

5. Watch the watershed experiment video (link above). Conclude with a class discussion.

8. Pass out Iowa Ag Today's, turn to the middle of the magazine. What are some additional conservation practices farmers might consider using on their farm?



## Organization Affiliation

Lesson is adapted from Iowa Agriculture Literacy Foundation “Agriculture Decisions” Lesson plan. <https://www.iowaagliteracy.org/lesson-plans/iowa-lesson-plans>

## Agriculture Literacy Outcomes

### Theme 1: Agriculture and the Environment

- Discover how natural resources are used and conserved in agriculture (e.g., soil conservation, water conservation)
- Describe benefits and challenges of using conservation practices for natural resources (e.g., soil, water, and forests), in agricultural systems which impact water, air, and soil quality
- Discuss (from multiple perspectives) land and water use by various groups (i.e., ranchers, farmers, hunters, miners, recreational users, government, etc.), and how each use carries a specific set of benefits and consequences that affect people and the environment
- Describe resource and conservation management practices used in agricultural systems (e.g., riparian management, rotational grazing, no till farming, crop and variety selection, wildlife management, timber harvesting techniques)
- Describe how wildlife habitats are created and maintained by farmers/ranchers and why these habitats are important (e.g., promoting pollinator habitat, insect refuges, creating buffer zones for nutrient management, etc.)
- Identify non-native or invasive species in your state that impact the sustainability and/or economic value of natural or agricultural ecosystems

- Evaluate the various definitions of “sustainable agriculture,” considering population growth, carbon footprint, environmental systems, land and water resources, and economics
- Understand the natural cycles that govern the flow of nutrients as well as the way various nutrients (organic and inorganic) move through and affect farming and natural systems

#### **Theme 4: Science, Technology, Engineering & Math**

- Identify specific technologies that have reduced labor in agriculture
- Discuss how technology has changed over time to help farmers/ranchers provide more food to more people
- Provide examples of science and technology used in agricultural systems (e.g., GPS, artificial insemination, biotechnology, soil testing, ethanol production, etc.); explain how they meet our basic needs; and detail their social, economic, and environmental impacts
- Identify science careers related to both producers and consumers of agricultural products
- Identify current and emerging scientific discoveries and technologies and their possible use in agriculture (e.g., biotechnology, bio-chemical, mechanical, etc.)
- Evaluate the benefits and concerns related to the application of technology to agricultural systems (e.g., biotechnology)
- Discuss population growth and the benefits and concerns related to science and technologies applied in agriculture to increase yields and maintain sustainability

#### **Iowa/ Common Core Standards**

4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.