



## ***Objective 1, Lesson 4***

### **THE CUYAHOGA RIVER TODAY**

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**GRADE LEVEL: Middle Grades**

**GOAL:** A matrix to analyze populations, elevations, distance from the Cuyahoga river and land cover of the entire Cuyahoga River will be produced.

#### **LEARNING OBJECTIVES:**

1. The students will utilize an interactive Flash-based map of the Cuyahoga River containing major tributaries, protected areas, counties, and cities with corresponding data (population, elevation, and land cover) in order to fill out a printable matrix.

#### **STATE OF OHIO STANDARDS**

##### **Earth and Space Science**

##### ***BENCHMARK:***

***Describe interactions of matter and energy throughout the lithosphere, hydrosphere and atmosphere (e.g., water cycle, weather and pollution).***

##### **PERFORMANCE INDICATOR:**

-Analyze data on the availability of fresh water that is essential for life and for most industrial and agricultural processes.

- Describe how rivers, lakes and groundwater can be depleted or polluted becoming less hospitable to life and even becoming unavailable or unsuitable for life.

## **Life Science**

### **BENCHMARK:**

***Describe the characteristics of an organism in terms of a combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species.***

### **PERFORMANCE INDICATOR:**

- Explain how variations in structure, behavior or physiology allow some organisms to enhance their reproductive success and survival in a particular environment.

## **Technology**

### **BENCHMARK:**

***Give examples of how technological advances, influenced by scientific knowledge, affect the quality of life.***

### **PERFORMANCE INDICATOR:**

- Explain how technology influences the quality of life.
- Explain how decisions about the use of products and systems can result in desirable or undesirable consequences (e.g., social and environmental).
- Describe how decisions to develop and use technologies often put environmental and economic concerns in direct competition with each other.
- Recognize that science can only answer some questions and technology can only solve some human problems.
- Examine how science and technology have advanced through the contributions of many different people, cultures and times in history.

- Examine how choices regarding the use of technology are influenced by constraints caused by various unavoidable factors (e.g., geographic location, limited resources, social, political and economic considerations).

## **Scientific Inquiry**

### **BENCHMARK:**

***Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations and appropriate tools.***

### **PERFORMANCE INDICATOR**

- Explain that there are not fixed procedures for guiding scientific investigations; however, the nature of an investigation determines the procedures needed.
- Choose the appropriate tools or instruments and use relevant safety procedures to complete scientific investigations.

### **BENCHMARK:**

***Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions.***

### **PERFORMANCE INDICATOR**

- Distinguish between observation and inference.
- Read, construct and interpret data in various forms produced by self and others in both written and oral form (e.g., tables, charts, maps, graphs, diagrams and symbols)

## Scientific Ways of Knowing

### **BENCHMARK:**

*Use skills of scientific inquiry processes (e.g., hypothesis, record keeping, description and explanation).*

### **PERFORMANCE INDICATOR:**

- Describe why it is important to keep clear, thorough and accurate records.
- Identify the difference between description (e.g., observation and summary) and explanation (e.g., inference, prediction, significance and importance).

### **MATERIALS/RESOURCES:**

- Return of the Cuyahoga website
- Matrix
- Maps of Cuyahoga, Portage, Summit, and Geauga Counties
- Rulers

### **PROCEDURES:**

1. Introduction: Ask students what kinds of activities affect the quality of the water in the Cuyahoga River.
2. Create a chart that will be used during the remainder of the project.
3. As a group activity, discuss categories represented in the matrix.

**Cities:** Demonstrate how to find cities on the map.

**Population:** Provided on the flash map.

**Elevation:** Provided by the flash map

**Distance:** Demonstrate how to measure and calculate the distance each city is from the river.

**Land Cover:** Discuss the use of the land near the river. Using “Urbanization in the Cuyahoga Watershed” as a guide, discuss the impact urbanization has on the watershed of the Cuyahoga River. Students should understand the three areas being impacted by urbanization:

Hydrological Impact, Physical Impact, and Water Quality and Aquatic Life Impact.

**Terms to Know:**

Impervious Cover – Surfaces that prevent or reduce the amount of rainwater that soaks into the ground. (ex. rooftops, driveways, parking lots, sidewalks, lawns)

Urbanization – the dispersal of people moving to previously undeveloped land and the related increase in the amount of impervious coverage.

4. Using the Flash map located on the Return of the Cuyahoga River Website, students complete the matrix.

**STUDENT PRODUCT:** Completed matrix

**ASSESSMENT:** Accurate completion of matrix.