

## Instructor Notes

# The East Fork Project

This activity is based on an actual situation in southwestern Ohio. After a discussion on water pollution and environmental health hazards, participants will be asked to identify possible sources of health risks, types of exposures, routes of exposure, and populations that could be affected. Participants will then conduct a mock zoning board meeting to decide what should be done regarding future development in the area. Interested participants could attend an actual Planning Commission meeting and then later present what they learned to the rest of the class.



*The activity is written for workshop participants and may need modification for classroom use.*

### Suggested Background Readings

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- An Introduction to Groundwater Hydrology
- Principles of Environmental Site Assessment

### National Science Education Standards for Grades 5–12

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#### Science as Inquiry

- Abilities Necessary to Do Scientific Inquiry

*Identify concepts that guide scientific investigations. Students assess an actual land development project to determine possible methods of monitoring water quality, appropriate chemicals and pathogens to test for, and good indicator species to use in an environmental health risk evaluation of the proposed development area.*

*Formulate scientific explanations and models using logic and evidence. Students use watershed maps to identify possible sources of environmental health risks, classify contaminants into point and nonpoint pollution sources, determine possible routes of exposure, and conclude which populations of people could be at risk from these sources.*

*Communicate and defend a scientific argument. By assuming roles during a mock zoning board meeting, students learn to review information, express concepts, use language appropriately, speak clearly and logically, construct a reasoned argument, and respond appropriately to critical comments.*

#### Life Science

- The Interdependence of Organisms

*Human beings live within the world's ecosystems. Students learn that modifications humans make to their ecosystem as a result of population growth, technology, and consumption threaten current global stability. Local governments use environmental*

*health risk assessments as a basis for evaluating specific land development situations and their potential impact on the ecosystem.*

### **Science in Personal and Social Perspectives**

- Natural and Human-Induced Hazards

*Human-induced hazards present the need for humans to assess potential danger and risk. By evaluating an actual land development project, students learn that changes humans make to the environment not only bring benefits to society, but also cause risk. Students discuss the costs and trade-offs of various health and environmental hazards and determine that the scale of adverse events and the accuracy with which scientists and engineers predict these events are important considerations.*

### **Materials**

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Per group

- U.S. Geological Survey (USGS) topographic maps of the East Fork watershed

### **Procedure Notes and Outcomes**

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#### **For Part 1**

Go over the necessary background information before starting the activity. Participants should be familiar with the following concepts: types and sources of water pollution, point source and nonpoint source pollution, routes of exposure, populations, methods of water quality monitoring, water quality tests, and indicator species.

Divide the class into groups of 3–5 participants, and hand out the maps and Activity Instructions. Allow one period for participants to answer the questions, a period for them to prepare their report, and then time for presentations.

#### **For Part 2**

Divide the class into three groups: zoning board, pro-development, and anti-development. You may wish to assign specific roles to the participants for and against development. Some examples are provided in the following table.

Possible Participant Roles	
Pro-Development	Anti-Development
land developer	boater
construction contractor	fisherman
landowner (wants to sell)	landowner (does not want to sell)
business owner	concerned parent
school board member	EPA official
Chamber of Commerce representative	

Allow at least one class period for participants to research their roles and prepare for their part in the presentation. The two sides should present their cases to the zoning board. The board should convene to discuss the cases presented to them and make a decision. They must be able to explain why they came to their decision.

### For Part 3

Contact the local zoning board or community planning commission to find out what time any applicable hearings or meetings will be held, and allow class members to attend. You may wish to offer this as an extra-credit assignment.

Anyone who attends the meeting should prepare a written or oral presentation about what he or she learned.

### References

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- Berringer, P. Private communication, 1997.
- Clermont County Water and Sewer Website. Clermont County Watershed Management Program. <http://www.oeq.net/water-sewer/xl.htm> (accessed May 22, 2001).
- Dahling, K.; Johnson, J.; Krebsbach, M. "Point Vs. Nonpoint Pollution," *Newsletter of Environmental Geology*. Internet. 13 October 1997.
- Miller, G.T., Jr. *Living in the Environment*, 3rd ed.; Wadsworth: Belmont, CA, 1982.
- Plan For Clermont County, Ohio*; Harza Environmental Services Inc., Balke Engineers, September 1994.
- Russell, P. Private communication, 1997.

## Activity Instructions

# The East Fork Project

The East Fork watershed is located in southwestern Ohio and covers an area of 256 square miles in Clermont, Brown, Clinton, Highland, and Warren counties. The majority of the watershed, 245 square miles, lies in Clermont County.

Clermont County lies approximately 20 miles east of Cincinnati and is one of the fastest growing counties in Ohio. Its population increased 50% from 1970 to 1990 and is currently approximately 178,000. The population is expected to continue growing and reach approximately 206,500 in the year 2020.

The current land use patterns in Clermont County are shown in Table 1.

agriculture and open space	80%
suburban residential	10%
low-density residential	5%
commercial, industrial, and institutional	5%

Ninety percent of the people in the county are served by a piped water system, while the remaining 10% use cisterns and wells. Fifty percent of the population is served by centralized wastewater collection plants, yet 80% of the land has no wastewater collection. The majority of this land is made up of poorly drained soils with a marginal capacity for conventional on-site sewage disposal.

The East Fork River is a tributary of the Little Miami River, a national- and state-designated scenic river. Along the East Fork River is East Fork State Park and the 2,160-acre Lake Harsha. The park has approximately 1 million visitors each year, with over 250,000 of them using Lake Harsha for swimming, fishing, and boating.

The residents within the East Fork watershed in Clermont County are concerned about the environmental health risks associated with the area's rapid growth. They want an environmental health risk evaluation of their area.

### Procedure

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#### Part 1

Your group is to answer the following questions about the watershed and prepare an evaluation of the area for the residents within the watershed.

1. On a map of the East Fork Watershed, draw the boundaries of Clermont County.
2. Identify all possible sources of environmental health risks in the watershed.
3. Identify which of these sources are point sources of pollution.
4. Identify which of these sources are nonpoint sources of pollution.
5. List the possible routes of exposure for each of the sources.
6. Identify the populations of people who could be at risk from these sources.
7. List some methods that could be used to monitor the water quality and determine if these pollutions are present.
8. List the chemicals and pathogens you would test the water for and explain why.
9. List the species that you would select as indicator species and explain why.
10. Using the information you have collected, prepare a short report on your findings.

### **Part 2**

A group of developers wants to build subdivisions in the area of East Fork State Park and Lake Harsha. The land they want to build on is zoned for lots with a minimum size of 43,560 square feet. They want the zoning commission to rezone the area to a minimum lot size of 10,000 square feet so they can build more houses. A group of citizens who are concerned about the environmental impact of rezoning wants to prevent this from happening. Both sides will be permitted to present their case to the zoning commission in a mock hearing.

You will be assigned to the zoning commission, the developer's group, or the citizen's group. Once you have your group assignment, research and prepare for the mock zoning hearing.

### **Part 3**

Attend a local planning commission or zoning commission hearing and report back to the class on what you have learned.