

CLASSROOM ACTIVITY

# The Invasion: A Case Study on the Hudson River

The zebra mussel, a notorious invasive species, has been silently infesting the rocky bottom of the Hudson River since it arrived there in 1991. But researchers from the Cary Institute for Ecosystem Studies, who have closely monitored the river before, during, and after the invasion, are noticing a promising new pattern.

## CLASS DISCUSSION

### Establish Prior Knowledge

Call on students to share what they know about invasive species. Ask them to describe the ways an invasive species can establish itself in a new ecosystem, causing ecological or economic harm. Tell students that zebra mussels are one example. In the Great Lakes region of North America, these invaders have forced out native species, consumed natural resources that other organisms depended on, and threatened important commercial species. Explain that in the video they are about to see, students will learn what happens when the zebra mussel invades the Hudson River.

### Exploration

Have students watch the video and take notes. Use the following questions to guide a class discussion.

- Scientists had been collecting data about the Hudson River years before the zebra mussel arrived. Why is this data valuable?  
*(Answer: It allows scientists to determine how the zebra mussel invasion affected the Hudson River ecosystem.)*
- What physical and chemical factors do scientists test the river for?  
*(Answer: They measure temperature, dissolved oxygen, and turbidity.)*
- Why is measuring turbidity important?  
*(Answer: Turbidity determines how much sunlight can penetrate the water. Phytoplankton, at the base of the food web, needs sunlight to grow. Based on turbidity, scientists can estimate how well phytoplankton can grow.)*
- What happened when zebra mussels arrived?  
*(Answer: Zebra mussels are filter feeders and consume phytoplankton. Mature zebra mussels can consume zooplankton. When the zebra mussels arrived there was an 80% loss of phytoplankton populations and the smaller zooplankton fell by 90% (Overall zooplankton fell by half).)*
- How did the loss of phytoplankton and zooplankton affect the ecology of the river?  
*(Answer: Half the fish food disappeared and fish populations fell.)*
- As scientists continued to study the invasion what did they notice about mussel populations? How did it affect the ecology of the river?  
*(Answer: The larger mussels were dying out after one or two years. Larger mussels eat zooplankton. With the diminished number of large mussels, the zooplankton populations are beginning to come back.)*

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# The Invasion (cont'd)

### Wrap-Up

Use the following question to wrap up your discussion:

- Why do you think the zebra mussels are dying younger?  
*(Answers will vary. There might not be enough phytoplankton to sustain so many zebra mussels. Larger organisms may be preying on large zebra mussels. The mussels could have contracted a disease. The changing conditions of the river could affect their life span.)*
- What do you think the long-term effects of this invasion will be?  
*(Answers will vary.)*

### Extend

Extensive digital classroom resources for educators are also available on AMNH's River Ecology Web site:

<http://www.amnh.org/education/resources/rfl/web/riverecology/>