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# WHAT WOULD YOU DO...?

**Grade Level:** 6th–12th grades

**Overview**

Managing aquatic exotics is a tough business. Prevention efforts must target many different avenues of introduction, some related to important economic resources. Controlling existing invasions is very difficult and often involves choosing between the lesser of two evils. This activity is designed to have students employ role-playing in an effort to examine the real-life tradeoffs involved in managing natural resources. They must first learn about the species and the issues surrounding it (such as its affect on native habitat or species, alterations in ecosystems, a change in resources for the community as a result of an introduction, etc.). They then must work in a group to try to address the problems that have arisen.

**Background**

Although species have been transported from one region to another for hundreds of years, recent technology has increased the speed and frequency of transportation. More and more species are able to survive transportation, and become established in new areas. Some species have been deliberately introduced for certain perceived positive benefits. While many introductions are unsuccessful, a small but critical number can be highly damaging to the new environment. Often, the effects of an introduction cannot be foreseen. It is only through modification of human actions that natural resource managers and others concerned about exotics can moderate the impacts caused by these species. In making decisions about how to control invasives, there are significant trade-offs. This lesson is designed to have students consider some of these trade-offs and come to some decisions regarding management of exotic species.

**Setting**

Classroom

**Objectives**

1. Consider different options for managing invasions of exotic aquatics.
2. Exercise critical thinking skills and learn about difficult choices facing natural resource managers.

## ***Geographic Standards***

Standard 14. How human actions modify the physical environment

Standard 15. How physical systems affect human systems

Standard 16. The changes that occur in the meaning use, distribution and importance of resources

Standard 18. How to apply geography to interpret the present and plan for the future

## ***Keywords***

Nonindigenous species, natural resource management, indigenous, exotic, habitat, ecosystem

## ***Materials***

Scenario cards or worksheets

## ***Schedule***

Two to three classroom periods. One class period should be used for presentation of relevant materials and information. One period would be used for the group activity, possibly two including presentations by the group to the whole class.

## ***Prerequisite Skills***

Basic research skills and knowledge of how to use library and Internet

## ***Curriculum Connections***

Ecology, Biology, Environmental Science

## ***Procedure***

One class period (at a minimum) should be used to introduce the concept of invasive species and the related issues. Students are then divided into groups of five or six, and each is presented one of the below scenarios. The students in each group can be assigned a particular role they will play or interest that they will defend within the group as it tries to make its decisions. Each group then tries to reach a consensus on the problem presented. Time should be allotted to allow the students to do some research on the issue they have been assigned. Each group then reports back to the entire class with their problem and their conclusions, followed by class discussion. If done as a roleplay, the students can portray their different characters in the scenario and come up with a skit to illustrate their discussion in front of the entire class. A written paper should also be turned in, summarizing the group's decision and the basis for it.

### ***SOME POSSIBLE SCENARIOS:***

1. An invasive algae from France is transforming marine intertidal habitats in your state, reducing the diversity of native species and ruining popular tidepool areas. A snail that feeds exclusively on this alga in France is available to import to your state as a possible biological control. It is unknown whether this snail will feed on native species.

*Possible role-play characters:* Manager in charge of import permit, marine environmental educator, beach community resident, French shellfish farmer, local environmental group leader.

2. You are a scientist at a local marine lab, and want to conduct research on an exotic crab that has not yet invaded your state, but may in the future. Your experiments may lead to new control tools, but you'll have to import and keep live specimens, which creates a potential for escape.

*Possible role-play characters:* Research scientist, marine lab director, state invasive species manager, local environmental group leader, local shellfish farmer, invasive species manager from another state where the species has already invaded.

3. An economically valuable non-native clam has been introduced into the bay where you live. However these clams are harming native shellfish populations. A local fisherman has proposed to commercially harvest these clams as a way to reduce their populations and stimulate the area's poor economy. However, people in neighboring states fear that this will create an incentive for the clam to be illegally introduced into their bays.

*Possible role-play characters:* Local fisherman, local environmental group member, state invasive species manager, invasive species manager from neighboring state, local economic development council leader.

4. Your state is developing a new law to help prevent invasions by aquatic exotics. Most states have developed a "red list" approach, which lists prohibited species and allows any unlisted species to be imported without a permit. Some in your state are calling for a "green list" approach, which lists species that appear to be safe, and does not allow any others to be imported unless safety can be demonstrated. The green list approach will slow down imports, particularly for pet stores that are always looking to stock new, interesting fish.

*Possible role-play characters:* State invasive species manager, leader of state environmental group, leader of aquarium club, owner of aquatic plant nursery, pet store owner.

5. After years of suffering chemical pollution from nearby factories, recent restoration efforts are reviving the health of a local estuary. Local shellfish growers are finally able to market their products. However, a new threat has just emerged in the form of an exotic saltmarsh plant. Where it has become established in other regions, this plant displaces native species, including several necessary for the survival of endangered birds. The only method that has shown some success controlling the exotic plant involves use of an aquatic herbicide while the infestation is still small. People living along this estuary are concerned about the invader, but are also now very sensitive to any chemical pollution.

*Possible role-playing characters:* President of local Audubon Society chapter, state invasive species manager, shellfish grower, regional representative of herbicide supplier, county water quality agent, president of local environmental group.

### ***Teacher Notes***

Education is a large part of reducing impacts from aquatic invasions. Students might also develop and conduct a survey to learn the extent that others in their school or community are aware of aquatic exotics. Students could develop educational posters on a particular non-native species in their state and if/how it is being managed.

### ***Applications***

This unit will introduce students not only to the problem of exotic species, but to the difficulties that are faced in the "real world" when trying to make management decisions about natural resources. It will foster cooperative work and consensus building.

### ***Evaluation***

Oral presentation from each group will be the basis for evaluation, as well as synopsis turned in to teacher.

### ***Resources***

Sea Grant Nonindigenous Species:

<http://www.signis.org>

Exotic Aquatics on the Move:

<http://www.ag.ansc.purdue.edu/EXOTICSP/>

Washington Sea Grant Program

Nonindigenous Species Educational materials, including Pathways fact sheet,

Mitten Crab fact sheet, European green crab fact sheet, Bio-Invasions booklet, or "Least Wanted" brochure. Also available on-line at <http://www.wsg.washington.edu>  
<http://www.nbii.gov>

***Credit***

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