

GRADE 6

ALIEN INVADERS!

PRE-VISIT LESSON

Introduced and Invasive Species

ALIEN INVADERS!

PRE-VISIT OVERVIEW

Alien invaders don't just come from outer space! An invasive alien species can be any species on earth that moves from its native ecosystem into a new ecosystem and then causes or is likely to cause economic or environmental harm or harm to human health. In January, 2007 quagga mussels were found in Lake Mead, the first discovery of these invasive mussels in western United States. Quagga mussels are an aquatic species that are native to Eastern Europe and were introduced into the Great Lakes in the late 1980s.

In the "Alien Invaders!" program, students use the Forever Earth vessel to investigate how quagga mussels might affect Lake Mead. Students collect water quality data such as clarity, pH, and temperature to determine whether current habitat conditions would allow quagga mussels to survive and thrive. Students learn about the consequences the quagga mussels could have on the lake and its living and non-living resources. Using the knowledge they've gained, students create their own management plans to prevent the spread of quagga mussels to other waterways.

Two pre-visit activities have been designed to prepare students for this on-site experience. The first activity (described here) involves students in the concepts of introduced and invasive species. The second activity (Water Characteristics) gives students an opportunity to explore water quality conditions as they relate to the habitat needs of an organism. Once students understand the purpose of each test, they will gain experience using testing equipment and performing data collection and analysis.

THEME

Introduction of an invasive species upsets the balance of an ecosystem.

KEY QUESTIONS

What effect can an invasive species have on an environment? What, if anything, can or should be done to prevent or control the introduction of an invasive species?

GOAL

Students will demonstrate an understanding of the tradeoffs of introducing new species to an ecosystem.

OBJECTIVES

Students will:

- describe what is meant by introduced species and invasive species;
- discuss the advantages and disadvantages of introducing new species into an ecosystem; and
- make predictions based on evidence.

NEVADA STATE STANDARDS CORRELATION

- N.8.A.1.** Students know how to identify and critically evaluate information in data tables and graphs.
- N.8.A.2.** Students know how to critically evaluate information to distinguish between fact and opinion.
- N.8.B.1.** Students understand that consequences of technologies can cause resource depletions and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation, and make new resources economical.
- L.8.C.3.** Students will evaluate how changes in environments can be beneficial or harmful.
- L.8.C.4.** Students know that inter-related factors affect the number and type of organisms an ecosystem can support.

CLARK COUNTY SCHOOL DISTRICT OBJECTIVES (GRADE 6)

Students will:

- make predictions based on data;
- make inferences based on observations or data;
- evaluate explanations based on evidence;
- discuss the costs and benefits of human-caused changes in the environment; and
- use examples to describe how inter-related factors influence the number and type of organisms an ecosystem can support.

SNAP CONSERVATION EDUCATION AND INTERPRETATION THEME CORRELATIONS

The pre-visit grade 6 activities support the following guiding themes developed by Clark County-based educators:

- Increasing human activity on highly sensitive and easily damaged lands has profoundly altered the natural environment of Southern Nevada, affecting native biota including threatened and endangered species and requiring active management of native and non-native species.
- Maintaining growth and quality of life, and protecting watershed, water quality, and adequate water supplies for all life in both developed and natural communities challenges people to resolve the issue of long-term sustainability.

PREREQUISITE CLASSROOM EXPERIENCES

Lessons and discussions on the:

- definition of a species;
- study of ecology;
- advantages and disadvantages (also called tradeoffs); and
- use of the terms “invasive” and “introduced.”

Small group application in problem solving:

- using observations and data to make inferences and predictions;
- formulating and analyzing problems;
- listing costs/benefits or advantages/disadvantages; and
- using evidence in decision making.

VOCABULARY

- | | | |
|-----------------|----------------------|--------------------|
| • advantages | • environment | • pros and cons |
| • debate | • extinction | • re-establishment |
| • disadvantages | • habitat | • species |
| • ecology | • introduced species | • survival |
| • ecosystem | • invasive species | • trade-offs |

PRE-VISIT LESSON: Introduced and Invasive Species

Part 1 ▶ Introduction

In this introductory discussion activity, students learn about the definitions of “introduced” species and “invasive” species.

1. The following questions are displayed, and students are asked to write their responses in their journals:

Identify at least two organisms that we see in the Las Vegas area that do not “belong” here. Why do you think they don’t belong here? What are the trade-offs of introducing new species into an environment?

2. Students share their answers and discuss briefly. The teacher initiates the lesson on introduced species by asking provocative questions listed in the student textbook, Science and Life Issues, p. E-4. Questions: *Have you ever thought that it would be cool to have parrots flying around in your backyard? Or wished that there were hippos in a nearby lake? What happens when you introduce an organism into a new environment?*

Part 2 ▶ Concept Development

In this activity, students explore a case study where a fish species was introduced into an African lake and destroyed the native fish populations.

TIME 10 minutes

MATERIALS

Student notebooks or journals
Questions on overhead or board

TIME 70 minutes

MATERIALS

Student Text: Science and Life Issues

1. Students open their texts to p. E-4. Volunteers read “Fishing on Lake Victoria.”
2. Students are asked to dig a little deeper by locating Lake Victoria on a map of the world. Maps are available at the following Internet sites:
www.worldlakes.org/uploads/victoria_index.jpg
http://encarta.msn.com/map_701514012/Victoria_Lake.html
3. The teacher displays photos of cichlids and Nile perch. Photographs are available at the following Internet sites:
www.issg.org/database/species/ecology.asp?si=89
http://en.wikipedia.org/wiki/Nile_perch
http://animaldiversity.ummz.umich.edu/site/accounts/information/Lates_niloticus.html

Students discuss physical characteristics of the two types of fish:
How are they the same? How are they different?

4. Students complete **Student Worksheet: Gathering Evidence** as they continue to read Activity 72 in their textbooks. This reading can be done alone, in groups, or with the entire class.

After reading Activity 72 and a short class discussion of the reading, students also complete **Student Worksheet: Predictions Based on Evidence**.

Students complete the analysis questions on p. E-9; students may work alone or in small groups. Students discuss their answers to the analysis questions. The teacher explains the difference between “introduced” and “invasive” species and asks if all “introduced species” are “invasive.” (Answer: Not necessarily. Introduced species become invasive only if they are introduced in an area with excellent conditions for their survival such that they can reproduce and negatively impact their new ecosystem.)

Part 3 ▶ Presentation of Findings

Students debate the pros and cons of introducing new species into an environment.

Computer with Internet
and LCD projector
or overhead projector and map
transparencies
or printed and photocopied
maps

**Student Worksheet:
Gathering Evidence**

**Student Worksheet:
Predictions Based on
Evidence**

TIME 60 minutes

The class is split into two groups. One group is assigned to be “pro” and one group to be “con.” The teacher explains that it is important to learn both sides of an issue using evidence and to see all sides of an issue even if one has strong beliefs on one side of the issue.

The two groups use the evidence they have gathered in the discussion and reading to debate the tradeoffs of introducing new species into an environment.

Part 4 ▶ Linkage and Closure

After the class debate, students write summary essays that demonstrate understanding of introduced species, invasive species, and the impacts of introducing new species into an ecosystem.

TIME 45 minutes

EXTENSIONS

- Students investigate other invasive species, especially those in Southern Nevada.
- Students prepare a poster that visually illustrates the trade-offs of introducing species into a new ecosystem.

RESOURCES

Student text book: Lab-Aids/SEPUP (2001). Science and Life Issues. Ronkonkoma, NY: Lab-Aids.

Maps of Lake Victoria:

http://encarta.msn.com/map_701514012/Victoria_Lake.html

www.worldlakes.org/uploads/victoria_index.jpg

General information on Lake Victoria:

http://encarta.msn.com/encyclopedia_761565118/Victoria_Lake.html

www.worldlakes.org/lakedetails.asp?lakeid=8361

Information and pictures of Cichlids of Lake Victoria:

www.agiweb.org/geotimes/apr03/WebExtra042503.html

Information and pictures of Nile perch:

http://animaldiversity.ummz.umich.edu/site/accounts/information/Lates_niloticus.html

http://en.wikipedia.org/wiki/Nile_perch

www.issg.org/database/species/ecology.asp?si=89

www.megapesca.com/nileperch.html

ADAPTATIONS FOR DIVERSE LEARNERS

- Consult with Forever Earth project manager prior to field trip to discuss specific needs of the class or individuals; decide which aspects of the program content or delivery to appropriately alter for culturally/linguistically, behaviorally, and cognitively diverse learners and for the gifted and talented.
- Allow peer readers or writers.
- Allow students to work in groups to answer questions.
- Pre-write topic sentence and sentence starters for essay.

ASSESSMENT

The teacher carefully listens to the debate; consider whether key concepts are included and represented accurately or whether there are misconceptions in the presentation. Groups are assessed according to ability to function and to self-monitor for task completion.