

actionbioscience.org lesson

To accompany the peer-reviewed article by Daniel Simberloff, Ph.D.:

“**Introduced Species: The Threat to Biodiversity & What Can Be Done**” (Dec. 2000)

<http://www.actionbioscience.org/biodiversity/simberloff.html>

Real-Life Aliens: Introduced Species (May 2002)

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Educator’s section: *p. 1-2*

Student handout 1: *p. 3*

Student handout 2: *p. 4*

Grades & Levels:

- **Handout 1:** high school (advanced/AP)
- **Handout 2:** undergraduate (year 1-2)

Time Recommendations:

- 1-2 class periods for article review
- 2 weeks for projects

NSES (USA) Content Standards, 9-12:

- NSES 1.1. Unifying Concepts & Processes: systems, order & organization
- NSES 1.4. Unifying Concepts & Processes: evolution & equilibrium
- NSES 4.4. Life Science: interdependence of organisms
- NSES 4.6. Life Science: behavior of organisms
- NSES 7.5. Science in Personal & Social Perspectives: natural & human-induced hazards

Note: View the NSES content standards on this site to choose other curricular applications for additional activities at:

<http://www.actionbioscience.org/educators/correlationcharts.html>

Learning Objectives: Students will...

- explore the kinds of introduced species and what problems they cause
- examine the various environmental reasons why introduced species can cause problems
- find out about problems with introduced species in their own communities
- discuss the possible solutions to problems of introduced species and the reasons why they are often difficult to implement
- educate their fellow students about the ecological problems with introduced species

Key Words Include:

biodiversity, ecosystem, feral species, human impacts, interspecific competition, introduced species, invasive species, non-native (or alien) species, renewable/non-renewable resources

Preparation

Article Discussion:

Several approaches are possible for using the Article Discussion questions on page 2:

- Have the students read the article on their own, <http://www.actionbioscience.org/biodiversity/simberloff.html>, after which the instructor should pose the questions in class for group discussion.
- Have the students read the article on their own, then divide into small groups for discussion; give copies of the questions to each group.

- Copy the questions for each student and have them do the reading and complete the content questions on their own, perhaps as a short-answer writing assignment. They could then discuss their answers and the more complex questions as a large group or in small groups.

Student Handout 1 or 2:

Refer students to the "Useful Links" section in the *Educator Resources* section found at the end of the Simberloff article. These links help students with their activities or provide a source for research information.

For Educators: Article Discussion

About the article by Daniel Simberloff, Ph.D.:

"Introduced Species: The Threat to Biodiversity & What Can be Done"

<http://www.actionbioscience.org/biodiversity/simberloff.html>

Content Questions:

1. What are the different ways that introduced species affect our environment?
2. Describe the kinds of species that have been introduced around the world, causing problems with local species.
3. What things can we do to limit the spread of introduced species?
4. How does the problem of introduced species compare to other environmental problems that we face today?
5. Why is change of an entire habitat the greatest impact of introduced species?
6. Which introduced species can cause problems in land/terrestrial habitats? In water/aquatic habitats?
7. What is hybridization or cross-breeding, and which introduced species are causing problems by cross-breeding with native species?

Extension Questions:

1. How have people and their activities helped species move from one part of the world to another?
2. Which introduced species have been beneficial? (think of food, crops, and pets)
3. Why do you think introduced species cost national economies so much? What kinds of costs might be involved? (an example: U.S. costs are \$137 billion per year)
4. Why do you think that some species are beneficial and some are harmful to our environment?
1. Simberloff said that 49% of endangered species are in trouble because of introduced species. What are ways that introduced species could threaten the continued survival of native populations?
2. What are the types of activities of an introduced species that could cause disruption to a local environment?
3. Simberloff mentioned that the North American gray squirrel causes disruption in Great Britain and Italy. Why are they not causing those same problems in their native habitats in North America?
4. The exotic pet business can contribute to the decline of imperiled wildlife populations in their native habitats. How might the exotic pet trade also become a problem of introduced species in a new habitat?
5. How can the simple human activity of fishing contribute to the introduction of alien species?

Real-Life Aliens: Introduced Species

Student Handout 1

Essay on the Article by D. Simberloff, at <http://www.actionbioscience.org/biodiversity/simberloff.html>

Write an essay on one of the following topics:

- Describe one of the 3 types of destruction from introduced species (changing an entire habitat; endangering single species or group of species; more subtle impacts through cross-breeding).
- How can an introduced species cause these changes? Give an example of a species and this type of destruction from the article.
- Explain at least 4 reasons why it is important for us to restrict introduction of species into non-native habitats.

Poster on Introduced Species

What are some of the species in your communities that have been introduced from other countries? Consider plant and animal species. What problems are they causing? Create a poster about these species.

Presentation on Introduced Species

Daniel Simberloff described several introduced species. Research *one* of the species. Give a brief oral report to the rest of the class about:

- where that species came from
- how it traveled to the new habitat
- what problems it has caused
- what steps have been taken to solve the problem

Report on Invasive Species Management

Choose *one* of the following topics for a report:

A. Airport Entry

One common place of entry for introduced species is at major airports. If possible, contact your nearest international airport and ask about their inspection services to limit introduction of pet species. If an airport is not available, check the Internet for the U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS). They have a program called the Beagle Brigade. Write a report on how these dogs are used to check passengers arriving at international airports by sniffing out any prohibited plants, fruits, or meats being brought into the United States.

B. Ballast Water Regulations

Find out how your country deals with ballast water regulations. Write a summary of these rules. If no rules exist, suggest two ways that ballast water can be dumped safely without introducing alien species to your country's ports.

Report on Pet Parrot Trade

Find out the kinds of parrots that are available from a pet store in your community. Write a report on the:

- types of species
- cost of the parrots
- how many are sold in a year
- the parrots' country of origin
- their natural habitats

Conclude your report with a summary of how the parrot trade can contribute to the invasive species problem. In your summary, give an example of a pet trade parrot species that has escaped and established itself in the wild.

Real-Life Aliens: Introduced Species

Student Handout 2

Report on CITES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty in effect since 1975 for the protection of plant and animal species from unregulated international trade. Explore this important treaty on the Internet. Write a report that describes:

- what the treaty does
- how it does it
- how this relates to management of introduced species

Report on Worldwide Invaders

Some invasive species are causing problems in many parts of the world, including these aquatic species:

- the green crab
- toxic dinoflagellates
- zebra mussel

Research *one* of these species. Write a report that includes:

- the species profile
- its native origins and worldwide spread (you may want to include a distribution map)
- the environmental and economic damage it has caused
- efforts to control or eradicate it from areas that are not its native habitat

Write a News Article

In your community, what is the most serious problem caused by an introduced species? Research the species, the problems, and the solutions (if any). Write an article for a newspaper on this species, describing:

- the history of the problem
- the types of destruction caused
- the solutions for solving the problem

Visit an International Airport

If your school is within reach of an international airport, contact airport authorities (in the U.S.: the USDA Animal and Plant Health Inspection Service [APHIS]) for the possibility of observing their procedures for checking passengers entering from other countries for possible import of plant or animal pests. In the U.S., the Beagle Brigade is part of these procedures. Write a summary of your findings.

Research Feral Animals of Australia

In the 1800s, animals and plants were deliberately brought in from other parts of the world so that people would feel more 'at home' in Australia. Eventually these animals escaped or were released into the wild, often becoming destructive to native ecosystems. Create a presentation or write a report about *three* feral species in Australia. Include the following information for each feral species:

- species profile, including life cycle, diet and habitat
- where it came from originally and how it got to Australia
- geographical areas in Australia affected by the species
- the damage it does to the environment and the economy
- an explanation of efforts to control it
- other information and your own comments