

actionbioscience.org lesson

To accompany the peer-reviewed article by Niles Eldredge, Ph.D.:

“The Sixth Extinction” (June 2001)

<http://www.actionbioscience.org/newfrontiers/eldredge2.html>

Extinction: Is It Inevitable? (Apr. 2002)

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Grades & Levels:

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

Time Recommendations: 1-2 class periods for article review and up to 2 weeks for projects

NSES (USA) Content Standards, 9-12:

- NSES 1.2. Unifying Concepts & Processes: evidence, models, & explanation
- NSES 1.3. Unifying Concepts & Processes: change, constancy, & measurement
- NSES 1.4. Unifying Concepts & Processes: evolution & equilibrium
- NSES 2.1. Science as Inquiry: abilities necessary to do scientific inquiry
- NSES 3.4. Physical Science: motions and forces
- NSES 3.6. Physical Science: interactions of energy and matter
- NSES 4.3. Life Science: biological evolution
- NSES 4.4. Life Science: interdependence of organisms
- NSES 7.2. Science in Personal & Social Perspectives: population growth

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...

- describe the geologic history of extinction
- examine the possible causes of extinction
- explain the effects of humans on animal populations and ecosystems
- discuss and suggest solutions to the problems of biodiversity loss

Key Words Include:

Biodiversity, ecosystem, species, phylogeny, mass extinction, biotic turnover, geological time, bolide, (over) exploitation, diaspora, sustainable development

Preparation

Article Discussion:

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

1. Have the students read the article on their own at <http://www.actionbioscience.org/newfrontiers/eldredge2.html>, after which the instructor should pose these questions in class for group discussion.
2. Have the students read the article on their own, and then divide the students into small groups for discussion; give copies of the questions to group leaders.
3. Copy the questions for each student and have them do the reading and complete the content questions on their own. They could then discuss the more complex questions as a large group or in small groups.

Source: <http://www.actionbioscience.org/newfrontiers/eldredge2.html>

Lesson: *Extinction: Is It Inevitable?* by John Ausema ©2002

Student Handouts:

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

For Educators: Article Discussion

About the article by Niles Eldredge, Ph.D.: “The Sixth Extinction”

<http://www.actionbioscience.org/newfrontiers/eldredge2.html>

Content Questions:

1. Describe the estimated rates of species loss cited by the author.
2. Describe the pattern of causes for earlier mass extinctions.
3. Which mass extinction was the most devastating?
4. Which mass extinction is the most famous and why?
5. What is the possible cause of dinosaur extinction?
6. Why is the current extinction different from other major extinctions?
7. In what sense are humans not connected to their ecosystems?
8. What is meant by “carrying capacity” and how does the author illustrate the term?
9. According to Eldredge, what is the first phase of human-caused extinctions?
10. Why does Eldredge describe humans as “bulls in a china shop?”
11. How did humans cause large animals to go extinct?
12. Why did large animals in Africa continue to survive?
13. Describe the second phase of the sixth extinction.
14. How do invasive species contribute to the problem of species destruction?

Extension Questions:

1. Eldredge says, “No system, not even the vast oceans, remains untouched by human presence.” What does he mean, and how is it possible?
2. What solution does the author offer to stop the current extinction? Give some examples of how we can achieve that?
3. Do you agree with Eldredge on the cause of the recent pattern of extinction? Why or why not?
4. Should individual landowners be responsible for protecting species on their own land?
 - a) If so, how should we ensure such responsibility is taken?
 - b) What if protecting species reduces the economic value of the land?
5. How would life on earth be different if humans had not developed agriculture?

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Student Handout 1

Essays on the Article

Write an essay on one of the following topics:

- defend or oppose Eldredge's view on the crisis of biodiversity loss
- explain at least 4 reasons why it is important that we maintain biodiversity

Extinction Chart

Niles Eldredge describes five major extinctions in his article. Interpret his information in a chart or other visual presentation, using a geological-time scale.

La Brea Tar Pit

Write a report or create a visual presentation about La Brea Tar Pit. Describe what it is, when and where it was formed, and the fossils discovered in the pit.

Dinosaur Myths

The top 10 misconceptions about dinosaurs are:

- Dinosaurs represent failure and extinction.
- Dinosaurs and "humans" coexisted.
- Dinosaurs were either all hot-blooded or all cold-blooded.
- The word dinosaur means "terrible-lizard."
- Whatever you read in the latest book or see on T.V. or in the movies about dinosaurs must be true.
- Dinosaurs all lived and died at the same time.
- Mammals arose after the dinosaurs, and helped to eliminate the dinosaurs by eating their eggs.
- The only possibility is that an asteroid (or comet) killed the dinosaurs.
- All big reptiles from the prehistoric past are dinosaurs.
- Archaeologists dig up dinosaur fossils.

Write a short statement of why each of these myths is false.

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Student Handout 2

Extinction and Recovery

Mass extinctions result in major restructuring of the biosphere, whereby some successful species are eliminated and minor groups begin to diversify and expand. Write a report that illustrates this process for each of the five major extinctions mentioned in Eldredge's article.

Debate: Protecting Endangered Species

Suppose that you are a farmer, and that an endangered species of fish lives on your property. In order to protect the fish, you must reduce the amount of water that you use for irrigation. Should you do it?

This scenario describes the most recent debate about protecting endangered species in the U.S. Farmers in the Klamath Basin region of northern California are fighting with environmentalists about the use of water – for irrigation or for the protection of endangered salmon and sucker fish. You can read about the situation in the links listed under “Klamath Basin Crisis” in the “Educator Resources” section at the end of Eldredge's article. Go to these sites and read the background information.

Then, working in groups of 2-4 students, imagine that you are in charge of drafting the regulations for water use in the basin. Write up a position statement, describing what action you would take. Explain your position. Your answer should consist of a concise paragraph with at least three supporting positions. Be prepared to defend your decision in class.

Endangered Species of [name of your country]

Conduct research on three endangered animals and two endangered plants in your country. Write a report or create a power point presentation on the status of these endangered species and efforts to protect them.

Agriculture Overview

Research the expansion of agriculture in your country in the last century. Create a chart or other graphic presentation describing agricultural growth, loss of wild spaces, and depletion of species habitat.