

ActionBioscience.org lesson

To accompany the peer-reviewed position statement by the Union of Concerned Scientists:
“World Scientists’ Warning to Humanity” (November 1992)
<http://www.actionbioscience.org/environment/worldscientists.html>

Natural Resources: Getting a Fair Share? (January 2004)

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Grades & Levels:

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

Time Recommendations:

- 1 class period for review of position statement and discussion
- up to 1 week for project assignments
- 1-2 class periods for simulation activity

NSES (USA) Content Standards, 9-12:

- NSES 4.4. Life Science: interdependence of organisms
- NSES 7.2. Science in Personal & Social Perspectives: population growth
- NSES 7.3. Science in Personal & Social Perspectives: natural resources
- NSES 7.4. Science in Personal & Social Perspectives: environmental quality
- NSES 7.5. Science in Personal & Social Perspectives: natural and human-induced hazards
- NSES 7.6. Science in Personal & Social Perspectives: sci. & tech. in local, nat’l, & global challenges

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>

Lesson Objectives: Students will...

- describe the impact of human behavior on key components of the environment (e.g., atmosphere)
- consider human population factors and their impact on the environment
- examine how their own personal decisions impact the environment
- explore possible solutions to the current ecological crisis humans have generated

Key Words Include:

biodiversity, deforestation, demographic fatigue, ecology, environment, natural resources, overpopulation, ozone depletion, population growth, soil productivity, species extinction, water resources

Preparation

Position Statement Discussion (handout 1 or 2):

- Distribute or ask students to download and read the position statement by the Union of Concerned Scientists (UCS) at: <http://www.actionbioscience.org/environment/worldscientists.html>
- Follow the reading with questions about the UCS statement (listed on page 2). Students can answer questions orally in class, brainstorm answers in groups, or complete questions as a written assignment.

Student Handouts (handout 1 or 2):

- Follow position statement discussion with assignments suggested in the handouts. Assignments are divided into projects (which can be done individually or in small groups) and a simulation activity (which requires whole class participation).
- Refer students to "useful links for student research" in the "Educator Resources" section at the end of the position statement. These links help students with their activities and provide a source for research information.

Scavenger Hunt Simulation Activity (handout 1 or 2):

Both handouts employ the same simulation but apply its results in different ways. To perform the activity, you will need two things:

- First, you will need a supply of small objects that can be easily hidden around the classroom, e.g., pennies, but anything about the size of a large paperclip will do. These objects will represent natural resources in this simulation and, right before class, you will need to randomly hide 100 of them around the room for the scavenger hunt portion of the simulation.
- Second, you will need to mark a set of index cards, one card for each student in your class. You will need to write either the letter "I," "D," or "U," according to the following percentages: 10% should be marked "I," 25% should be marked "U," and the remaining 65% should be marked "D." Thus, for instance, if you have 20 students in your class, you will have 20 index cards with 2 marked "I," 5 marked "U," and 13 marked "D." These cards and percentages represent the approximate proportion of people living in the Industrial, Developing, and Underdeveloped nations. The exact percentages are available through Population Connection's web site (see "useful links for student research" in the "Educator Resources" section at end of the article posting).
- Pre-Simulation activity suggestion: Have students brainstorm what types of natural resources could be represented by the objects and create a list, for example, wood products, natural gas.

For Educators: Position Statement Discussion

About the statement by the Union of Concerned Scientists:
"World Scientists' Warning to Humanity"

Content Questions

1. What six components of the environment are currently suffering the most stress?
2. What is happening to the stratospheric ozone and what are the consequences?
3. What does the depletion of groundwater endanger?
4. What dangers do our oceans face?
5. What is happening to our soil and forest resources?
6. What is the impact of human population growth on biological diversity?
7. How is population growth a factor on environmental stress?
8. Which nations are the largest polluters?
9. What practical solutions do the authors propose overall?
10. What is the objective of this position statement?

Extension Questions

1. This paper was issued over a decade ago, and little that the scientists called for has taken place. Why do you think this is so?
2. What cultural and social forces a) have allowed industrial nations to slow their population growth? b) have kept the developing and underdeveloped nations steadily increasing in population?
3. How could industrial nations interact with developing and underdeveloped nations to reduce the critical stress humans are placing on Earth's environment?
4. How can you, as an individual, make a difference to help the environment?

Natural Resources: Getting a Fair Share?

Student Handout 1

A. Projects

1. “State of the Environment” Speech

Each year, the leaders of many nations are required to give a speech letting their citizens know how their country is doing. In a similar vane, pick one of the topics below and write a “State of the _____” speech, informing your classmates about the current status of your environmental topic.

- atmosphere
- water resources
- oceans
- soil
- forests
- biodiversity

2. Rating My Nation

Is your nation environmentally friendly? Find out how it rates.

- Prepare a chart for your research notes.
- Choose one of the practical solutions offered by the Union of Concerned Scientists in their position statement in the section “What we must do.”
- Research current data and statistics on the Internet to find out what your nation is doing to address the issue. Keep a journal on your searches.
- After research is complete, give your nation a rating that shows how well or how poorly it is doing.
- Explain your rating to the class.

B. Scavenger Hunt Simulation

Introduction

All organisms maximize the use of their available natural resources, including humans. We, though, are unique in that we have the conscious ability to redistribute those resources (sometimes fairly, sometimes not) with the actions and choices we make. In this simulation of today’s world, each of you is going to represent a portion of all the people living everywhere. You have each been given a card that tells you in which part of the world you are living (**I** = industrial countries such as United States or Japan; **U** = underdeveloped countries such as Bangladesh or Republic of Congo; and **D** = developing countries such as Brazil or India). It is important at the start of the simulation not to share this information with any of your classmates.

Simulation Steps

1. Your teacher will show you a small object that is going to symbolize the natural resources people use to live (e.g., water), drive cars (e.g., oil), build homes (e.g., wood), and so on. 100 similar objects have been hidden in your classroom. You are to search the room to find and collect as many of these objects as you can in the five minutes allotted.
2. When your teacher says “stop” at the end of the hunt, add up the total number of individual “resources” you were able to collect.
3. Now it is time to make known what card you were given before the start of the simulation. All individuals with the same letter (“I”, “U”, or “D”) should gather together in their own group (use three different parts of the room). The number of people in each of the three groups represents the approximate proportion of people living in the Industrial (10%), Underdeveloped (25%), and Developing (65%) nations.

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Student Handout 1 (cont.)

4. As a group, you need to combine your “resources” and count how many you have in total. You should then report this group total to the class. (So, for example, the “I” group might have found 16 “resources,” the “U” group 20, and the “D” group 44 for a grand total of 80 objects.)
5. Take the total number of “resources” the entire class was able to find and multiply that number by the following percentages: 35%, 5%, and 60%. These percentages represent the approximate consumption of available natural resources by people living in the Industrial, Underdeveloped, and Developing nations, respectively. Round any decimals to a whole number.
6. Redistribute “resources” according to the percentages you determined in step 5. [Continuing with the example in #4 of 80 total objects found, the “I” group would now have 28 (35%); the “U” group, 4 (5%); and the “D” group, 48 (60%).] As you redistribute the “resources,” take note of how many objects each group gains or loses.

Analysis & Discussion Questions

1. Which group gained the most “resources” from the other two groups? Which gained the most per person on average?
2. Which group lost the most “resources” to the other two groups? Which lost the most per person on average?
3. If these had been real natural resources (food, water, clothing, etc.), how do you think the “U” group would have felt toward the “I” group? How do you think the “D” group would have felt toward the “I” group? Which group would you have wanted to belong to?
4. How could the different groups have altered the distribution of the “resources?”
5. Which group was in the position of most power with respect to the “resources?”
6. How might people in the different groups treat each other or act toward one another?
7. What kinds of cultural and historical events do you think might have caused the way the “resources” were distributed?
8. What kinds of cultural and historical events do you think have been the result of the unequal way the “resources” have been distributed?

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Student Handout 2

A. Projects

1. Report on Population Dynamics

You've been called to address a regional development meeting on the subject of population dynamics.

Prepare a presentation to:

- explain the difference between the three major patterns of population growth in organisms (J-curve; S-curve; and demographic fatigue curve)
- describe how each of the following factors influences these patterns: prodigal (r-selected) reproduction; prudent (k-selected) reproduction; mortality rates; and age distribution

2. Rating Nations

From the perspective of a supporter of the position statement written by the Union of Concerned Scientists (UCS), research the current environmental practices of two nations and rate their effectiveness.

- Choose two nations – your own and one other. If you live in an industrial nation, choose a developing or underdeveloped nation, or vice versa.
- Choose one of the practical solutions offered by the UCS in the section “What we must do.”
- Research current data and statistics on the Internet to find out what the nations are doing to address the issue. Keep a journal on your searches.
- Prepare a chart to illustrate your findings. Your chart should include a column to rate each nation's efforts in addressing the issue.

Note: You may want to bind charts produced by all students into one document and send it to the UCS.

3. When Culture and Biological Knowledge Collide

From the list below, pick one of the major advances in our understanding of the life sciences and one of the cultural/historical episodes and explain how, together, they have interacted to help cause the current population crisis in the human species:

Advancements in Biology	Episodes in History
✓ germ theory of disease	✓ Industrial Revolution
✓ vaccination	✓ 19 th century Western imperialism
✓ discovery of antibiotics	✓ World War I & II
✓ anesthesia & the development of modern surgery	✓ Invention of the mechanized plow

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Student Handout 2 (cont.)

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1. Your teacher will show you a small object that is going to symbolize the natural resources people use to live (e.g., water), drive cars (e.g., oil), build homes (e.g., wood), and so on. 100 similar objects have been hidden in your classroom. You are to search the room to find and collect as many of these objects as you can in the five minutes allotted.
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Analysis & Discussion Questions

1. Present your group’s observations about the gain and loss of “resources.”
2. What kind of population growth curve would you expect to find in each group?
3. What kinds of mortality patterns would you expect to find in each group?
4. What kinds of age distribution would you expect to find in each group?
5. What kinds of social behaviors and cultural institutions might you expect to develop among members of each group in response to your answers to questions 2-4?
6. What kinds of cultural and historical events do you think might have caused the current distribution of resources?
7. What kinds of recent cultural and historical events do you think have been the result of the unequal distribution of resources?

Concluding Position Statement

In the simulation, there were only 100 possible “resources” to reflect the fact that in the real environment, the amount of water, food, clothing, land, and so forth is finite. Once all 100 “resources” are found, there are no more. Any redistribution of “resources” from those in the “U” and “D” groups to those in the “I” group would, therefore, be a redistribution of ever dwindling amounts. Those in the “I” group would keep getting steadily more; those in other groups, steadily less. Given that those living in the industrial societies currently have the most control and power over finite resources in this world, answer the following question by group in a brief position statement: “*What should those living in the industrial societies do with their power?*” Compare the three groups’ position statements.