

7th Grade Science Unit 1: A Balanced Biosphere
Pop-Out: Environmental Ethics

Pop-Out Essential Question: *How can humans interact ethically with ecosystems?*

Humans are interacting with environments in increasing amounts. As that happens, humans can change parts of ecosystems, often leading to problems. While scientific discoveries can often give new solutions for problems that were once very difficult to solve, sometimes these scientific discoveries have downfalls that come with their benefits. When a scientific discovery helps some people but negatively impacts an ecosystem, how do we decide what to do?

Engage

At the end of Unit 1, you learned about how different parts of an ecosystem change when one resource is changed. When it is humans that are making the change, this poses an ethical dilemma. The process of deciding what is right or wrong is known as **ethics**. Today, you will be applying your own ethics to a number of different situations.

1. Individually, take a couple minutes to read through the imaginary situation below.

Bacteria are quickly developing resistance to antibiotics (this means antibiotics can't kill the bacteria). This makes it harder and harder for scientists to make medicines that help people with certain bacterial infections. One example of a resistant bacteria is MRSA (a type of bacteria that is immune to most antibiotics and is a big cause of hospital deaths).

Many medicines are made from plants. A scientist just discovered that a certain type of flower in the Amazonian jungle can make an antibiotic that could help save people with MRSA. To make one dose of the medicine, scientists would need to gather 200 flowers.

The flower has important roles within the jungle ecosystem. It is symbiotic with a tree that gives homes to many jungle species. This means the tree and the flower help each other survive. Additionally, the flower provides nectar to three species of birds and gives pollen for many insects. Howler monkeys also need the flowers for food.

2. With your group, discuss the questions below and then use the table to record your opinions. You may be asked to share your ideas in a class discussion.

<p>What are benefits of making the medicine?</p>	
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<p>What are downsides of making the medicine?</p>	
<p>Would you make the medicine? <i>Why or why not?</i></p>	

Explore

The last case was an imaginary case to get you thinking about complicated ethical situations created by scientific discoveries. Now let’s explore a scenario that happened in the real world. You already learned about how ecosystems shift when resources within the ecosystem increase or decrease. Keep that in mind as we dive into a case about a problem caused within the Yellowstone ecosystem and what scientists did to solve it.

1. Individually, read an article and watch a video about the Wolves in Yellowstone. While reading:
 - Use the annotation strategies your teacher gives you to help you learn from the reading.
2. With a partner, discuss the following questions. Record your responses in the table below.

<p>Describe the situation:</p> <ul style="list-style-type: none"> ○ <i>Why were the wolves originally killed?</i> ○ <i>What happened to the ecosystem without wolves? Why?</i> ○ <i>What happened to the ecosystem when wolves were reintroduced? Why?</i> 	
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<p>Describe the people involved in the situation:</p> <ul style="list-style-type: none"> ○ <i>Who wanted to kill the wolves? Why?</i> ○ <i>Who wanted the wolves to stay alive? Why?</i> 	
<p>Reflect on the situation: If you were the President of the United States and could decide whether to protect landowners' rights, protect the wolves, or a combination of the two, what would you do? Why?</p>	

Explain

Part of what makes the case of the wolves in Yellowstone such a topic of debate is that there are many different perspectives on what is best for the ecosystem and the people around it. Now, you'll have a chance to hear your classmates' thoughts and share your own. Listen closely for instructions from your teacher. You will be doing a group discussion, called a Fish Bowl. As you listen to the other group discuss, take notes below.

- *Remember, ethical questions are tough because they have a lot of different perspectives. Be respectful in listening to, and trying to understand, your classmates.*

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Elaborate

Even though the wolves were first re-introduced in 1995, it has sparked a debate that continues today. All around the world, people are having conversations like these about how we can best support ecosystems. One big issue we have been facing over the last century is **invasive species**. Invasive species are new species that we have purposely or accidentally introduced into an ecosystem that are not native to that region. Some of these species “take over” their ecosystem because there are no predators for them in their new ecosystem.

1. Working individually, read the Zebra Mussel Case Study. As you’re reading, think about what led to the introduction of zebra mussels, the reasons to address the situation, and the reasons against addressing the situation. Also think about what you would do to address the problem.

2. Using what you learned, individually answer the questions below. You will be asked to share these with a partner and the class later in the pop-out.

<p>Describe the situation:</p> <ul style="list-style-type: none"> ○ <i>How and why did zebra mussels spread?</i> ○ <i>What are the impacts of the zebra mussels on the ecosystem?</i> 	
<p>What are the positive and negative aspects of zebra mussels in California ecosystems?</p>	
<p>How would you address the problems caused by invasive species?</p>	

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Evaluate and Reflection

You have read, talked, and thought a lot about different perspectives on the ethics of how humans interact with ecosystems. Now use what you have learned to write an argument that answers the following questions:

In these ethical situations, is the answer always black and white? Should we always side with the environment or always side with people? Why or why not?

In your argument, include:

- A clear statement of your opinion on these questions
- Multiple examples from the scenarios and case studies as evidence
- A conclusion statement that explains why it is sometimes challenging to decide what is ethical (right or wrong) in science

7th Grade Science Unit 2: Matter Matters

Pop-Out: Natural Resources, Wealth, and Fairness

Pop-Out Essential Question: *How do natural resources affect the wealth of a region and are they distributed fairly?*

A lot of what you're learning this year relates to Earth's resources: how they are made by Earth processes, how they are used by humans, and how they interact with ecosystems. As you have learned in Units 1 and 2, **natural resources** are resources that come from the Earth, such as oil, water, soil, timber, natural gas, etc. Given that natural resources are distributed unevenly around the globe, in this pop-out, we're going to focus on some big questions: who lives in the areas with the most natural resources? Are these natural resources being shared in a way that is fair?

Engage

Have you ever traveled outside of your neighborhood? If you have, you may have noticed that different communities have different amounts of wealth. More wealth in an area often leads to more privileges, such as access to good schools, updated community spaces, variety of food choices, etc. Some areas have a lot of wealth, some areas have little wealth, and some areas have a medium amount of wealth.

- Below you'll find a map and a set of tables with information about five continents. In partners, use what you know about the continents on Earth to make your best predictions of which set of information describes which continent. Each set of information represents only one continent listed (excluding Antarctica and Australia). Record your ideas and explain why in the chart below.

Continent	Income Per Person (\$)
1	\$5,441
2	\$1,755
3	\$27,242
4	\$9,449
5	\$49,804



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Pop-Out: Natural Resources, Wealth, and Fairness

Continent	Data Set Guess	Explanation
North America		
South America		
Africa		
Europe		
Asia		

With your partner, discuss the following questions. You may be asked to share your responses with the class.

1. What country has the most wealth (highest income per person)? Why do you think this is?
2. What country has the least wealth (lowest income per person)? Why do you think this is?

Explore

You have just seen how different regions can have different amounts of wealth. Now let's explore one reason why this is the case. In this task, you'll be considering two natural resources: water and soil. To represent the quality of water and soil in an area, scientists use an indicator called "agriculture suitability." Explore the data to see if there is a connection between the countries that have high agriculture suitability and the countries that have wealth.

1. As a group, explore the data provided by your teacher. It includes an article, a map, and a website.

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2. As you learn from the data, answer the questions below. You will use the information you gather when you create a comic strip in the next section.

<p>Take a look at the Agriculture Suitability Map and the Wealth Map.</p> <ul style="list-style-type: none"> ○ What do you notice about the countries that can grow food? ○ What do you notice about the countries that have wealth? 	
<p>Think about both maps. Compare and contrast the information from the two maps.</p> <ul style="list-style-type: none"> ○ What is similar between the information on the two maps? ○ What is different between the information on the two maps? 	
<p>Do you think there is a connection between a country's wealth and their ability to grow food? Explain.</p> <ul style="list-style-type: none"> ○ Is this fair? 	

7th Grade Science Unit 2: Matter Matters

Pop-Out: Natural Resources, Wealth, and Fairness

Explain

Now that you have explored the connections between two natural resources (water and soil) and a country's wealth, it is time to bring your ideas together and share them.

1. In partners, make a comic strip that answers the question: Are countries with more water and soil wealthier? Your comic strip should share what you learned from the class discussion at the beginning of the pop-out, information from the data, and what you talked about with your group. Use the notes you took to help you. Remember, you can be creative! Comics do not need to be funny, but they can be. You can include rhymes, color, or an analogy to make your comic strip more interesting.

Elaborate

Earth's distribution of natural resources is not the only thing that affects access to resources. How people choose to share them across communities also affects access. For example, even in the heart of cities in the United States, where food is plentiful in some areas, food can be hard to find in other areas. In this case, we're exploring the connection between poverty and lack of access to food. A **food desert** refers to an urban area where it's really hard or really expensive to find fresh nutritious food. Let's consider how food deserts appear.

1. As a class, watch the video about food deserts in Los Angeles. Then, individually respond to the questions below:

East Los Angeles has an income of \$54,242, compared to the \$132,997 income in Santa Monica. Compare and contrast the two families. *Hint: Where does each family live? What type of food is present in each grocery store?*

Why do you believe some people have access to food while others don't?

Is this fair?

7th Grade Science Unit 3: Mimicking Nature's Design

Pop-Out: How Science Works

Pop-Out Essential Question: *In the scientific process, how does new evidence dispel misconceptions and change scientific knowledge over time?*

Science is a process we go through in order to learn. It teaches us about the world around us. Science taught us that the Earth is round, that Climate Change is connected to humans, and that living things change over time. But many people (including scientists) used to believe that the Earth was flat, that the world's changing climate was not related to people, and that living things stayed pretty much the same. These original ideas would now be called misconceptions, but at the time, these were the best ideas based on the evidence they had available. How does the field of science claim to know something? What can cause this knowledge to change over time? This pop-out will explore the way science makes discoveries, busts myths, and changes over time.

Engage

1. Using what you already know, individually respond to the questions below. We might not have talked about these in class before, and it's okay if you don't know the "right" answer. Do the best you can based on what you know from your life.

True or False:

1. Plants breathe.
 2. Plants only do photosynthesis.
 3. Things just disappear (like rocks from a million years ago, or a sock in the dryer).
 4. When something changes, it just changes – there are not different types of changes.
 5. Plants get everything they need from the soil.
 6. Sunlight helps plants grow by keeping them warm.
 7. Plants need "plant food" to eat.
 8. All rocks are the same, and we can't tell where different rocks came from.
 9. When someone burns a log, the log simply disappears.
 10. Plants are not alive.
2. With your partner, share your responses. If you have evidence for why you picked true or false, share that with your partner. You may be asked to share your ideas with the class.

Explore

You have seen how there are many different ideas about what is true when thinking about the science we have studied in this unit--matter, the cycle of matter, and the flow of energy. But how did scientists discover that these are misconceptions and not scientific truths? Let's roll up our sleeves and use a similar process, but with a non-scientific example. In this task, you will receive a series of checks that you will examine in order to uncover the truth behind a mystery.

7th Grade Science Unit 3: Mimicking Nature’s Design
Pop-Out: How Science Works

2. Individually, write your final scientific explanation with evidence in full sentences below. Remember to be specific and use as many details as possible to explain your ideas.

Final Scientific Explanation	
Claim	
Evidence	
Reasoning	

Elaborate

You have practiced your scientific skills as you used different pieces of evidence to create a claim. Let’s think about what our experience can teach us about the scientific process. With your group, discuss and answer the following questions.

1. Reflect on the activity using the questions below.
 - What information on the checks was valuable in making a tentative explanation? Explain.

7th Grade Science Unit 3: Mimicking Nature's Design

Pop-Out: How Science Works

Evaluate and Reflection

Individually, take some time to read through and think about the reflection questions below. Provide detailed responses using what you learned over the last couple days in class.

1. How do we use evidence to decide what is happening?
 - How does this lead to misconceptions in science?
 - How do scientific ideas change over time?
2. Is it possible to get different ideas from the same pieces of evidence?
 - How does this lead to misconceptions in science?
 - How do scientific ideas change over time?

7th Grade Science Unit 4: Save the Andes!
Pop-Out: Who is At Risk in Natural Hazards?



Pop-Out Essential Question: *Are different groups of people affected fairly by the aftermath of natural hazards?*

Natural hazards are happening more and more – droughts, fires, hurricanes, tsunamis, volcanoes, landslides, avalanches, and earthquakes are taking place across the Earth. In this unit, you learned that we can forecast some natural hazards to help reduce the effects on humans. When natural hazards do take place, this results in Injuries, death, homelessness, lack of access to food, and other problems with general well-being. These people need help from human aid organizations, like government agencies, the American Red Cross, etc. However, the aid is not always given equally to different groups of people.

At-risk populations are people who need extra support in certain situations. Who those people are is often based on socioeconomic status (the amount of money you have), age, race, English proficiency, and health concerns/physical ability. In this pop-out, we are going to explore what happens once a natural hazard has taken place by looking at who gets help and who doesn't get help. We'll ask ourselves why and consider if it is fair.

Engage

When scientists learn about a natural hazard, they warn communities involved. They broadcast warnings, updates, and how to evacuate. In the recent Northern California fires, firefighters wanted everyone in certain communities to evacuate. Almost everyone heard the news, yet some people weren't able to leave.

1. In partners, take a couple minutes to make predictions about what groups of people didn't make it out of their houses.

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Explore

1. Listen carefully to the article your teacher reads aloud. Then, in partners, answer the questions in the table below.

<p>Who wasn't able to evacuate from the fires in time? Why?</p>	
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Pop-Out: Who is At Risk in Natural Hazards?

<p>Why does that population need special support to evacuate from natural hazards?</p>	
<p>Based on what you know about why those people couldn't evacuate, do you think there are other groups of people who weren't able to escape the fires?</p>	

Explain

As you learned in the unit, scientists are often able to forecast when natural hazards, like fires, will hit certain areas and use this information to tell people how and when to evacuate. However, you just heard in the article that this information does not affect all people fairly. First with a partner and then as a class, discuss the following questions:

1. What at-risk populations do you know are unfairly affected during fires and why?
2. You know from the introduction that there are other at-risk populations not mentioned in the *Engage* article. Which of these groups do you think might also be affected during fires and why?
3. There are other natural hazards, such as hurricanes, volcanic eruptions, tornadoes, etc. How do you think these groups might be affected during these types of natural hazards? Why?

Elaborate

The last article talked about how certain groups of people weren't as safe *during* a natural hazard as other groups. Now let's explore what happened to the entire city of New Orleans, LA *after* Hurricane Katrina struck.

1. Pay close attention to the photos your teacher shows you and the video your teacher plays. It shows the timeline that led to Hurricane Katrina arriving in New Orleans, LA.
2. Individually, read through the Hurricane Katrina Situation. While reading:
 - Use the annotation strategies your teacher gives you to help you learn from the reading.
3. With your group, discuss the following questions:
 - What groups of people were significantly affected by the hurricane?
 - What are examples of groups of other people who were not discussed in the reading?
 - Explain what made the hurricane so much harder for these people based on these factors: *Age, Health Concerns/Physical Ability, Socioeconomic Status (how much money you have)*.

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Pop-Out: Who is At Risk in Natural Hazards?

4. Imagine that you had family or friends living in New Orleans when Hurricane Katrina hit. Using what you have learned from the pop-out so far, individually write a letter to the New Orleans Mayor. Your letter should include:
- An overall statement explaining what groups of people are more vulnerable in natural hazards
 - Examples of how certain groups of people were impacted by the hurricane
 - Ideas for how to address the problems in the future

Evaluate and Reflection

Individually, take a few minutes to think about what you learned in this pop-out. Then reflect on the questions below.

1. Which populations are often more at-risk during and after natural hazards? Why?

2. In your opinion, is it fair that some populations are more impacted by natural hazards than others?