

## 7th Grade Science Unit 1: A Balanced Biosphere

### Pop-Out: Environmental Ethics

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

#### **Introduction**

The pop-outs are designed to provide a two to three day pop-out lesson that allows students to apply what they've learned in the unit to delve deeper into larger scientific considerations around diversity, equity, cultural responsiveness, and justice. Such considerations touch on concepts like social justice in resource distribution, complexities and context in science, ethical considerations for scientists, or the role of environmental justice in science. They may be used at any point throughout the unit as the content is intertwined with, yet independent of, the unit concepts; however we offer a timing recommendation for each pop-out.

By the end of Unit 1, students have engaged with various components and aspects of ecosystems. In this pop-out, students will build upon that knowledge base and grapple with the role of ethics in environmental science, sometimes referred to as environmental ethics. Humans interacting with the environment give birth to complex, nuanced ethical considerations. By engaging with a few different cases of environmental ethics, students will consider questions of what is right and wrong and how they make these kinds of decisions. They will work with examples that do not have a straightforward answer, but instead have various pros and cons.

Students will continue building skills in evaluating, analyzing, and interpreting information from a variety of sources. They will use that to write an account of the challenges they face while making ethical decisions in environmental science. Through this process, students examine their own beliefs and consider the role of ethics in environmental science. As these students are poised to become the next generation of scientists, it is valuable for them to consider their role in making ethical choices as they apply to Earth's environments.

We recommend utilizing this pop-out after you have completed Unit 1. Since the final task in Unit 1 explores how changing one part of an ecosystem may affect other parts, it is useful for students to have engaged with that content prior to considering the ethical questions embedded into this pop-out.

#### **Alignment Table**

<p><b>Content</b></p> <ul style="list-style-type: none"> <li>• There are complex ethics embedded into how to alter, or respond to, changing ecosystems.</li> <li>• Considering the role of ethics in science is valuable in understanding the nature of science and a student's role in science.</li> </ul>
<p><b>Understandings about the Nature of Science (from NGSS Appendix H)</b></p> <ul style="list-style-type: none"> <li>• Science depends on evaluating proposed explanations.</li> <li>• Science knowledge is based upon logical and conceptual connections between evidence and explanations.</li> <li>• Science is cumulative and many people, from many generations and nations, have contributed to science knowledge.</li> <li>• Advances in technology influence the progress of science and science has influenced advances in technology.</li> <li>• Scientific knowledge is constrained by human capacity, technology, and materials.</li> </ul>

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- Science knowledge can describe consequences of actions but is not responsible for society’s decisions.

#### Science, Technology, Society, and the Environment (from NGSS Appendix J)

- Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems.
- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.
- The uses of technologies are driven by people’s needs, desires, and values; but the findings of scientific research, and by differences in such factors as climate, natural resources, and economic conditions.

#### Equity and Group work

- Work together to analyze, evaluate, and interpret information.
- Discuss with peers to learn about other perspectives while examining ethically ambiguous situations.

#### Language

- Use annotation strategies to dissect text.
- Communicate ideas verbally in small group discussions.
- Participate in a fish bowl to practice active listening and language production.
- Communicate multiple perspectives within an ethical dilemma in writing.
- Incorporate evidence to support a written argument.

#### Learning Goals

In this pop-out, students will examine multiple perspectives of a couple ethical dilemmas to consider the ethical complexities that accompany scientific advancements. More specifically, the purpose is to:

- Engage students through an imaginary case study.
- Analyze a text and video to examine the various components of reintroducing wolves to the Yellowstone ecosystem.
- Generate an opinion on the wolves in Yellowstone and share their ideas in a fishbowl discussion.
- Apply their learnings to the case of invasive species (zebra mussels).
- Write an argument that evaluates the complexities of ethical situations that involve humans and ecosystems.

#### Content Background for Teachers

Ethics underpin scientific research and the applications of research and technology in society. As humans are increasingly interacting with ecosystems, questions arise of how to effect or reverse change in delicate ecosystems. Often times, there is a complex interplay of society and ecosystems that inform these debates. For more detailed information of a couple such cases, please refer to the student materials. With the rise of climate change, it is increasingly important for students to consider the various aspects involved in human-ecosystem interactions.

#### Academic Vocabulary

- Ethics
- Symbiotic

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- Replicate
- Resistant
- Trophic cascade
- Food chain
- Livestock
- Invasive Species

**Time Needed (Based on 45-Minute Periods)**

3 Days

- Engage: 0.5 period
- Explore and Explain: 1 period
- Elaborate: 1 period
- Evaluate and Reflection: 0.5 period

**Materials**

- Unit 1, Pop-Out Student Version

Explore

- Unit 1, Pop-Out Case Study - Wolves in Yellowstone (1/student)
- Computer or Tablet (1/student or project video as a class)

Elaborate

- Unit 1, Pop-Out Case Study - Zebra Mussels (1/student)

**Instructions**

**Engage**

1. We recommend introducing this pop-out by reading the paragraphs on the student guides aloud. In this pop-out, students will be linking their understanding of ecosystem interactions to cases of environmental ethics. Throughout this task students will ask themselves the question: When a scientific discovery helps some people but negatively impacts an ecosystem, how do we decide what to do?
2. Individually, have students read through the imaginary case about an antibiotic made from a flower in the Amazon.
3. Discussing the questions with their group, have students complete their graphic organizer (see below).
  - We recommend having students discuss their thoughts in partners so they can learn from each others’ perspectives. This pop-out continues the theme of discussing topics in partners or groups to encourage students to engage with a variety of ideas.

What are benefits of making the medicine?	Antibiotics can really help people who are sick with bacterial infections. Antibiotic resistance is increasing, so having a new antibiotic would help people who need it.
What are downsides of making the medicine?	The downsides are that the flower is an important part of the ecosystem (it helps another plant survive, which gives homes to different animals, it feeds three species of birds, insects, and Howler monkeys). Each dose of medicine uses

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	200 flowers. Therefore, making the medicine might negatively impact the ecosystem.
Would you make the medicine? <i>Why or why not?</i>	There is no right or wrong answer, as long as students are thoughtfully constructing a response that uses evidence from the case study to support their views.

- As a class, share ideas from each facilitating question in a class-wide discussion. The use of equity sticks is encouraged for more equitable participation in class-wide discussions like these (See “How To Use This Curriculum” for more details). You can use the questions listed above as a jumping off point. By the end of the discussion, the class should have a general understanding of the benefits and downsides of the medicine, as well as an idea of whether they would make the medicine or not.

**Explore**

- Give each student a copy of the *Unit 1, Pop-Out Case Study - Wolves in Yellowstone* and have them read and annotate it individually. Remind students that their annotation strategies help them learn from the reading.
  - Distribute one computer or tablet per student so they can watch the video after reading the article independently, or you may project the video to show as a class.
- Have students work in partners to discuss and respond to the questions in the table below.
  - Walk around and look at the responses students are generating.
    - Try not to provide any explicit answers, but you may point out parts of the information to focus on if students are struggling.

Possible student responses are included below:

Describe the situation: <ul style="list-style-type: none"> <li><i>Why were the wolves originally killed?</i></li> <li><i>What happened to the ecosystem without wolves? Why?</i></li> <li><i>What happened to the ecosystem when wolves were reintroduced? Why?</i></li> </ul>	The wolves were originally killed because they were killing rancher’s sheep, cattle, and other livestock. Without wolves, the Yellowstone ecosystem changed a lot. For example, there were a lot of deer and they ate vegetation. Once the wolves were reintroduced, scientists noticed smaller numbers of deer, different grasses, and rivers moving in new ways.
Describe the people involved in the situation: <ul style="list-style-type: none"> <li><i>Who wanted to kill the wolves? Why?</i></li> <li><i>Who wanted the wolves to stay alive? Why?</i></li> </ul>	It was primarily the local ranchers and landowners who wanted to kill the wolves because the wolves posed a threat to the people’s livestock. Scientists generally wanted the wolves to remain alive because they feared what would happen to the ecosystem without the wolves.
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?	There is no right or wrong answer to this question, however, it is important that students cite evidence from the case study to substantiate their opinion.

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**Explain**

1. Part of what makes the Wolves in Yellowstone case so valuable is that there are many different perspectives of what is best for the ecosystem and the surrounding stakeholders. Students have garnered sufficient information about the situation. Each student has their own perspective on the situation, so it is important for students to share their beliefs with one another. To these aims, this section elicits student voice and active listening through a Fish Bowl activity.
  
2. Divide the class into two groups of roughly equal size, naming the groups 1 and 2 (or any other naming system you'd prefer). Have Group 1 form a discussion circle, and the 2s form a circle around the 1s. Explain that students in Group 1 will have a discussion, and the students in Group 2 should listen carefully and take notes, but should not contribute to the conversation. Then, the groups will trade places; Group 2 will have a discussion while Group 1 listens and takes notes. Each person in the class will have time to share their ideas. Ensure that you set norms reminding students to be considerate of one another throughout the process.
  - o The purpose of this activity is for students to share their ideas with the class while considering various peer perspectives. It also allows time for students to take notes on new or noteworthy ideas.

**Elaborate**

1. This final situation takes what students have learned and applies it to another ecosystem situation involving human interaction – what should people do about invasive species? Provide each student with a *Unit 1, Pop-Out Case Study - Zebra Mussels*.
  
2. Students should read through the case study individually and then complete the table based on what they read in the article.
  - o This will help students organize their thoughts for the Evaluate task.
  
3. Divide students into partners and ask them to discuss the questions in the table.
  
4. Facilitate a class discussion that allows a variety of students to share their ideas. You may use the questions in the table as a jumping off point.

Possible student answers are included below:

<p>Describe the situation:</p> <ul style="list-style-type: none"> <li>o <i>How and why did zebra mussels spread?</i></li> <li>o <i>What are the impacts of the zebra mussels on the ecosystem?</i></li> </ul>	<p>The zebra mussels spread from place to place by attaching to boats that people use for the transport of materials and recreation. They were able to spread so much because the boats weren't washed when they traveled between different water systems. Zebra mussels reproduce quickly. They clog water systems, have sharp edges that can cut people, and make life harder for other animals in the ecosystem.</p>
<p>What are the positive and negative aspects of</p>	<p>The positive aspects are that zebra mussels might clean water of sediment. The negative aspects are that they</p>

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zebra mussels in California?	affect ecosystems in negative ways and communities have to pay money to manage zebra mussels.
How would you address the problems caused by invasive species?	There is no right or wrong answer to this, so long as students are offering plausible options rooted in the case study.

**Evaluate and Reflection**

1. Since students have engaged with a variety of environmental ethics case studies through the course of this pop-out, the final task presents them with the opportunity to consider if ethical situations in general are always black and white.
  
2. The final task asks students 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?
  - Encourage students to clearly state their opinion, use multiple examples from the pop-out as evidence and offer a conclusion statement that explains the challenges in deciding what is right or wrong in science.
  - Optional: Here are some possible sentence stems to provide students.
    - *Over the last couple of days in class, we talked about...*
    - *One side of the argument is that... first, second, third...*
    - *The other side is that... first, second, third...*
    - *However, I believe...because...*
    - *In conclusion...*
    - *Deciding what is ethical in environmental science is complex because...*
  - Encourage students to consider the learnings (aligned to the questions) from the Engage, Explore, Explain, and Elaborate. Since these are complex, nuanced ethical dilemmas, students may offer answers that show various complex aspects of human interaction with ecosystems.

**Assessment**

1. You may collect the student guide handout and assess using:
  - *Criteria of your choice.* We recommend focusing on the conclusion paragraph from the Evaluate to assess students’ engagement around environmental ethics.
  - This can be a formative tool to look for trends in student demonstrations of skills and practices. You can then use this formative data to inform future instruction.

## Wolves in Yellowstone

### Explore Case Study

#### What Happened?

The wolves in Yellowstone have had a difficult history. In 1915, the United States made it easy for people to hunt and kill wolves around Yellowstone National Park. There were a lot of ranchers living in the land surrounding the park. Wolves posed a threat to the sheep, cattle, and other livestock on the rancher's land. At the time, it was not uncommon for people to kill a couple wolves each month. Killing wolves meant that the ranchers could keep their profitable livestock alive and well. It also meant that there were more "desirable" wildlife in the area for hunters; deer and elk numbers increased as their predators (wolves) were killed. The government thought they were protecting people's livelihood by letting them kill the wolves. But, by the 1940s, the wolves were extinct from the area.



#### The Ecosystem without Wolves

Without wolves, the Yellowstone ecosystem changed a lot. Those changes made scientists nervous. There were huge numbers of deer. The deer ate a lot of the vegetation. With



wolves officially placed on the Endangered Species List in 1974, politicians, scientists, and citizens began efforts to protect the wolves. In 1995-1997, one of the biggest ecosystem experiments took place: Scientists tried to reintroduce wolves into the Yellowstone ecosystem. They moved 31 wolves from Canada to Yellowstone.

#### What Now?

Watch this video to learn about what happened once the wolves became a part of the Yellowstone ecosystem again, and what changed in the ecosystem in response: <https://vimeo.com/86466357>. Reintroducing wolves into the ecosystem has helped the health of the ecosystem in a number of ways: There are fewer deer, the grasses have changed, and the rivers are moving differently. But, since the wolves were reintroduced, they have traveled outside of the National Park. They have killed sheep and cattle in surrounding ranches. Many of those ranchers are unhappy with the situation. There is an ongoing battle over how much to protect wolves vs. allow ranchers to kill wolves.

Sources:

- <https://www.yellowstonepark.com/park/where-is-yellowstone-national-park>
- <https://www.smithsonianmag.com/science-nature/wolves-and-the-balance-of-nature-in-the-rockies-44604810/>
- <https://www.nps.gov/yell/learn/nature/wolf-restoration.htm>
- <https://vimeo.com/86466357>



## The Invasion of Zebra Mussels

### Elaborate Case Study

#### Where did they come from?

Zebra mussels are small mussels that live in water systems. They are native to eastern Europe. Over hundreds of years, the mussels have spread to most of Europe and the Great Lakes in the United States. In 2008, they were found in California. Most scientists believe they spread from place to place by boat. The mussels attach to the bottom of boats or in the boats' water system. If the boats are not cleaned before they travel to a different place, then the mussels spread to new water systems. Most of these boats are needed to transport material goods between places. Some boats are also used for personal recreation.



#### What's the problem?

Zebra mussels replicate very quickly, so the population of zebra mussels in an ecosystem can become very large. The mussels also attach to boats, docks, anchors, and buoys and can be found in huge numbers on beaches.



With a large population, the mussels make a number of problems. First, they clog water pipes and catchment systems. People have to spend time and money cleaning the pipes. Second, given their sharp edges, they can easily cut through skin. People on the beaches and in the water have to be careful. Third, the mussels make it harder for other animals in the ecosystem. The mussels line the bottom of lakes and rivers, so the arthropods (like insects and crustaceans) are not able to burrow into the bottom and make their home. They

also spread avian botulism, a disease that kills birds and changes the ecosystem through the food chain. Lastly, some research shows that the water chemistry (the levels of minerals in water) may change because of the mussels.

#### Is it all bad? What do we do?

There is some hope that zebra mussels actually improve their ecosystem. To eat, zebra mussels suck in water and sediment. This process cleans the water. Despite that, scientists all over are trying to decide how to decrease the number of zebra mussels in California water systems. Some scientists argue that having strict cleaning stations to check that boats are clear will help. Others say that the mussels should be killed by drying out waterways or adding chemicals to the water.

#### Sources:

- [http://cizr.ucr.edu/quagga\\_zebra\\_mussels.html](http://cizr.ucr.edu/quagga_zebra_mussels.html)
- <http://absolutemichigan.com/michigan/michigan-invasive-species-zebra-mussels-quagga-mussels/>

**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?*

**Introduction**

This pop-out builds upon students’ understanding of natural resources to consider questions like: How are resources distributed around the world? Is there a connection between access to natural resources and wealth? Is the distribution of resources fair? Students will engage with a variety of sources about resource allocation around the world. Using that information, students will consider their own perspectives and apply their learning to a resource injustice we face across the nation: food deserts. Students will continue building skills in evaluating, analyzing, and interpreting information from a variety of sources throughout this pop-out. By utilizing equitable group work, the pop-outs will support the development of skills and mindsets cultivated in the units.

Since the pop-out delves into questions of equity in resource distribution, it is useful for students to have an idea of how natural resources are made on Earth prior to engaging with the pop-out. Since students have already engaged with concepts on resource distribution in Unit 1, this pop-out can be implemented at any time during this unit. However, we recommend implementing this pop-out after Task 2 since that is where this content is revisited in Unit 2.

**Alignment Table**

<p><b>Content</b></p> <ul style="list-style-type: none"> <li>● Access to resources, natural or otherwise, is distributed around the world in unjust ways.</li> <li>● There is a correlational relationship between a country’s natural resources and their wealth.</li> <li>● Considering resource distribution through a social justice lens is important for students in understanding a root of injustice.</li> </ul>
<p><b>Understandings about the Nature of Science (from NGSS Appendix H)</b></p> <ul style="list-style-type: none"> <li>● Scientific knowledge is constrained by human capacity, technology, and materials.</li> <li>● Scientific knowledge can describe consequences of actions but is not responsible for society’s decisions.</li> </ul>
<p><b>Science, Technology, Society, and the Environment (from NGSS Appendix J)</b></p> <ul style="list-style-type: none"> <li>● All human activity draws on natural resources and have both short and long-term consequences, positive as well as negative, for the health of people and the natural environment.</li> <li>● The use of technologies is driven by people’s needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.</li> </ul>
<p><b>Equity and Group work</b></p> <ul style="list-style-type: none"> <li>● Work together to analyze, evaluate, and interpret information.</li> <li>● Discuss with peers to make predictions about the connection between wealth, resources, and fairness.</li> </ul>
<p><b>Language</b></p> <ul style="list-style-type: none"> <li>● Engage with a variety of written and verbal resources.</li> <li>● Connect visual representations to verbal and written explanations.</li> </ul>

## 7th Grade Science Unit 2: Matter Matters

### Pop-Out: Natural Resources, Wealth, and Fairness

- Communicate ideas verbally in partner and class discussions.
- Communicate a complex idea in a comic.

#### Learning Goals

In this pop-out, students will engage with a variety of text, visuals, graphic representations, and videos to consider the repercussions of resource distribution on social justice. More specifically, the purpose is to:

- Activate students' prior knowledge through a predictive matching game.
- Analyze a text and graphs to determine the relationship between access to water, soil, and wealth.
- Generate a comic strip explaining their beliefs on the connection between natural resources and wealth.
- Apply their learning to a case study about food deserts.
- Evaluate the challenges of equitable resource distribution.

#### Content Background for Teachers

Understanding the interplay between natural resources, wealth, and power is a vital consideration for scientists. While the global placement of natural resources is largely determined by geology, how humans utilize those resources sheds light on concepts of equity. Given the increasing awareness around resource distribution and the development of technologies to address this, it is important for students to grapple with the interplay between resource distribution, wealth, and equity. Especially as technological advances make way for resource allocation in new ways, this is an increasingly pressing issue.

#### Academic Vocabulary

- Natural resource
- Income
- Wealth
- GDP (might arise from an interactive website in the Explore)
- Agriculture suitability
- Food Desert

#### Time Needed (Based on 45-Minute Periods)

3.5 Days

- Engage: 0.5 period
- Explore: 1 period
- Explain: 1 period
- Elaborate: 0.5 period
- Evaluate and Reflection: 0.5 period

#### Materials

- Unit 2, Pop-Out Student Version

Explore

- Unit 2, Pop-Out Case Study - Water, Farming, and Wealth (1/student)
- Computer or tablet (1/group)

Explain

- Computer paper (1/pair)

## 7th Grade Science Unit 2: Matter Matters

### Pop-Out: Natural Resources, Wealth, and Fairness

- Markers, colored pencils, or art supplies (1 set/pair)

#### Elaborate

- Computer and projector for class-wide video

#### Instructions

#### Engage

1. We recommend introducing the pop-out by reading the introduction paragraphs of the student guide aloud.
2. In partners, have students look at the world map and discuss the data sets that show a continent's wealth. Students then predict which data point matches with which continent and complete the graphic organizer on their student guides to explain their rationale. At this point, there is no correct or specific answer, so long as students explain themselves clearly.
  - This is designed to support students in activating prior knowledge about worldwide wealth distribution and provides them with data to use as evidence later in the pop-out.
  - Sources:
    - <https://www.worldof7billion.org/wp-content/uploads/2014/08/food-for-thought.pdf?forcedefault=true>
    - <http://tunangancincin.com/18180/continent-coloring-pages-02-04-2018/>
3. In a class-wide discussion, take a vote for each data set and have students share their rationales. The use of equity sticks is encouraged for more equitable participation in class-wide discussions like these (See "How To Use This Curriculum" for more details).
4. At the end of the discussion, project the following table. Ask students to record and share their responses to the questions in their student guide: Which continent has the highest income per person? Why do you think that is? Which continent has the lowest income per person? Why do you think that is?

Continent	Data Set	Income Per Person (\$)
North America	5	\$49,804
South America	4	\$9,449
Africa	2	\$1,755
Europe	3	\$27,242
Asia	1	\$5,441

#### Explore

1. Now that students have seen evidence that different areas have different amounts of wealth, they can explore why this is the case. In groups, have students read through the case study and look at the associated online map graphic. It is useful to emphasize to students that they are using observational skills to understand the data (shown in graphs and pictures) and make comparisons between the sets of information.

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**Pop-Out: Natural Resources, Wealth, and Fairness**

2. Assign roles to each group. You may use whatever roles you prefer. We recommend the use of the Materials Manager, Facilitator, Recorder, Harmonizer.
  - Ask Facilitator to read the directions and to make sure everyone understands the task.
  - Ask the Materials Manager to handle any resources (e.g. computers) needed to complete the task.
  - Ask the Harmonizer to make sure that everyone contributes their ideas and that everyone’s voice is heard.
  - Ask the Recorder to make sure the group is taking notes and collecting evidence from their case study.
  
3. Walk around and look at the responses students are generating.
  - Try not to provide any explicit answers, but you may point out parts of the information to focus on if students are struggling.
  - Possible student responses are included below:

<p><b><i>Take a look at the Agriculture Suitability Map and the Wealth Map.</i></b></p> <ul style="list-style-type: none"> <li>○ <b><i>What do you notice about the countries that can grow food?</i></b></li> <li>○ <b><i>What do you notice about the countries that have wealth?</i></b></li> </ul>	<ul style="list-style-type: none"> <li>○ Most of North America and Europe can grow food. Parts of Asia and South America can grow food. Only part of Africa can grow food.</li> <li>○ The wealthiest countries (North America and Europe) have the largest percentage of land that can grow food.</li> </ul>
<p><b><i>Think about both maps. Compare and contrast the information from the two maps.</i></b></p> <ul style="list-style-type: none"> <li>○ <b><i>What is similar between the information on the two maps?</i></b></li> <li>○ <b><i>What is different between the information on the two maps?</i></b></li> </ul>	<ul style="list-style-type: none"> <li>○ Both maps show information about continents. The continents that can grow food are also the continents with more wealth.</li> <li>○ One map shows a continent’s ability to make food while the other map shows a continent’s wealth.</li> </ul>
<p><b><i>Do you think there is a connection between a country’s wealth and their ability to grow food? Explain.</i></b></p> <ul style="list-style-type: none"> <li>○ <b><i>Is this fair?</i></b></li> </ul>	<p>There is no right or wrong answer for this question, so long as students use evidence. However, the evidence presented shows a clear link between countries ability to grow food and their wealth.</p>

**Explain**

1. In partners, students will now use the information they have gathered to generate a comic strip that seeks to answer the question: are countries with more water and soil wealthier?
  - Remind students that they can use pictures, colors, quotes, and specific examples to enhance their comic.
  - We recommend circulating the room to get a pulse of the comic strips students are producing. This is a useful time to gather a formative assessment of students’ understanding of the relationship between natural resources and wealth distribution.

## 7th Grade Science Unit 2: Matter Matters

### Pop-Out: Natural Resources, Wealth, and Fairness

#### Elaborate

1. This last scenario takes what they have learned about the connection between natural resource and wealth and applies it to a current-day scenario that they may encounter in their hometown. In this case, however, we're exploring the correlation between poverty and lack of access to resources.
2. Using the video (<https://tinyurl.com/vm8717e>), students will think about the food deserts in Los Angeles. Using a computer and projector, share the video with the class. It is important to note that the video showcases a simplified case of an affluent white woman and a woman of color from a low-income community. Some of the comments in the video are problematic and reductionist. We encourage you to use the video as an opportunity to highlight some of the ways in which this portrayal is problematic and ask students to share their ideas.
  - Source: <http://maps.latimes.com/neighborhoods/income/median/neighborhood/list/>
3. Working individually, ask students to record their responses in the table below.
  - See below for possible student responses.

**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?**

The Perez family lives in East L.A. The mother works 7 days a week and takes the bus to the grocery store. Most of the food in the grocery store is "junk food". The Stone family lives in Santa Monica. Their grocery store has a lot of fresh, organic food.

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

There is not a right or wrong answer for this; however, student responses should contain some statement explaining the connection between wealth and access to food.

**Is this fair?**

There is no right or wrong answer to this, as long as they have reasoning to back up their decision.

#### Evaluate and Reflection

1. Throughout this pop-out, students have explored the correlation between wealth and natural resources. In the Engage and Explore, students saw that continents with the capacity to grow food tend to be wealthier. In the Elaborate, they saw how low-income communities are more likely to struggle finding healthy food options. At the end of the task, ask students to reflect on what they have learned over the course of this pop-out by responding to the questions in their student guide.
2. Facilitate a class-wide discussion that allows students to share their learning. You can use the questions on the student guide as a jumping-off point.

#### Assessment

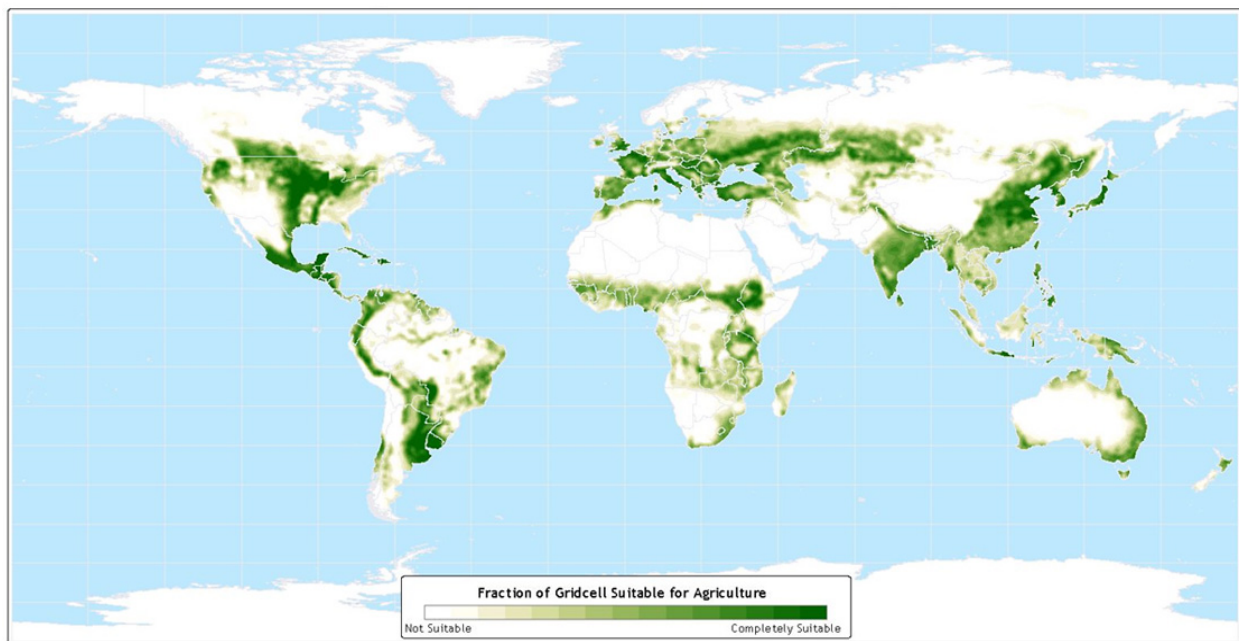
1. You may collect the student guide handout and assess using:
  - *Criteria of your choice.* We recommend focusing on the content in the Evaluate statement to assess students' understanding of impacts of resource distribution.
  - This can be a formative tool to look for trends in student demonstrations of skills and practices. You can then use this formative data to inform future instruction.

## Water, Farming, and Wealth: A Connection?

### Explore Case Study

As you know from learning about the water cycle, water is stored in many different forms. Right now, water is in clouds, rivers, streams, glaciers, ice, lakes, snow, rain, underground water sources, and the ocean. Water is in a lot of places! However, freshwater (that we can drink) is only a small percentage of the water in our world. It takes time for the freshwater we use to go through the water cycle or cleaning centers and return as freshwater we can drink. While western nations (the term often used to describe much of Europe and North America) use vast amounts of freshwater for personal use (like drinking, bathing, gardening, washing), most of western water is used to grow food. In fact, worldwide, farming uses 85% of the Earth's freshwater resources.

# Agriculture Suitability



Data taken from: Ramankutty, N., et al. The global distribution of cultivable lands. Submitted to Global Ecology and Biogeography, March 2001.

CRU 0.5 Degree Dataset (New, et al.)

## Atlas of the Biosphere

Center for Sustainability and the Global Environment  
University of Wisconsin - Madison

Around the world, some places are better suited to grow food than others. Areas with nutrient-dense soil, access to water, and mild climates make much more food than places with nutrient-poor soil, little water, or extreme climates. Imagine trying to plant a garden in the sandy, hot desert. Not much would grow! The same would be true if you tried to grow food on the top of snow-covered Mount Everest. How well a place could grow crops is a term called **Agriculture Suitability**. Take a look at the map (above) to see what parts of the world are more suited to growing food.

Why do certain places have access to water and soil, but other places do not? In Units 1 and 2, you learned that natural processes on Earth distribute different resources to different regions. But how does having access to water and soil affect the wealth of different regions? Go to the website: [https://www.huffingtonpost.ca/2016/07/23/world-map-wealth\\_n\\_11145122.html](https://www.huffingtonpost.ca/2016/07/23/world-map-wealth_n_11145122.html). Click on the “wealth” button on the interactive map. The map shows the size of each country, based on the amount of wealth in the country (instead of the land mass, like in normal maps). Then discuss and respond to the questions in your student guide.

Sources:

- <https://water.usgs.gov/edu/earthwherewater.html>
- <https://www.theguardian.com/sustainable-business/global-water-demand-injustice>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2727435/>
- [https://farmingfirst.org/science-and-innovation#section\\_1](https://farmingfirst.org/science-and-innovation#section_1)
- <https://www.nature.com/articles/s41893-017-0008-6>
- <https://www.nature.com/articles/s41893-017-0008-6/figures/2>
- <http://nelson.wisc.edu/sage/data-and-models/atlas/maps.php?datasetid=19&includerelatedlinks=1&dataset=19>



**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?*

**Introduction**

This pop-out is centered around the nature of scientific epistemology. It seeks to help students explore the underpinning nature of the scientific process: how it works, what it teaches us (and doesn’t teach us), how we classify what we know, and how scientific theories and misconceptions change over time in response to emerging evidence.

In this task, each team receives an envelope containing a series of personal bank checks. As students access increasing amounts of evidence (with each subsequent set of checks), students are able to continuously revise their hypothesis like real scientists. This process also reveals that misconceptions are a natural part of the scientific process; Due to increasing evidence points, science naturally evolves and often reveals that original scientific hypotheses are actually misconceptions.

We recommend utilizing this pop-out at a time of your choice during Unit 2. Since the unit content and skills are related to, but not dependent on, Unit 2, it can be incorporated at whatever point best suits your teaching needs and student learning needs.

**Alignment Table**

<p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Science is the process of building on knowledge using evidence available.</li> <li>• Data can be analyzed in different ways to construct multiple interpretations.</li> <li>• Scientific explanations include a claim, evidence, and reasoning.</li> <li>• There are differences between theories, beliefs, and hypotheses.</li> </ul>
<p><b>Understandings about the Nature of Science (from NGSS Appendix H)</b></p> <ul style="list-style-type: none"> <li>• Science depends on evaluating proposed explanations.</li> <li>• Science knowledge is based upon logical and conceptual connections between evidence and explanations.</li> <li>• Scientific explanations are subject to revision and improvement in light of new evidence.</li> <li>• The certainty and durability of science findings varies.</li> <li>• Science findings are frequently revised and/or reinterpreted based on new evidence.</li> <li>• Theories are explanations for observable phenomena.</li> <li>• Science theories are based on a body of evidence developed over time.</li> <li>• The term “theory” as used in science is very different from the common use outside of science.</li> </ul>
<p><b>Equity and Group work</b></p> <ul style="list-style-type: none"> <li>• Work together to analyze, evaluate, and interpret evidence.</li> <li>• Discuss ideas with groups and the class to share ideas and co-construct a theory.</li> </ul>
<p><b>Language</b></p> <ul style="list-style-type: none"> <li>• Gather information from bank checks.</li> </ul>

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

### Pop-Out: How Science Works

- Communicate ideas verbally in partner, group, and class discussions.
- Write multiple CERs to explain ideas, including a claim, evidence, and reasoning

#### **Learning Goals**

In this pop-out, students engage with an activity designed to experientially address questions of scientific epistemology. More specifically, the purpose is to:

- Engage students through a set of misconception questions related to unit content.
- Provide students with an experiential process of using current evidence to draw conclusions.
- Discuss and generate a revised CER that incorporates all the available evidence.
- Apply learnings to a larger discussion of scientific knowledge (beliefs, theories, hypotheses).
- Reflect on the nature of scientific knowledge.

#### **Content Background for Teachers**

Science is a constantly-changing body of knowledge. It is built on gathering evidence, interpreting evidence, making theories, and continuing the cycle anew. The scientific cannon is responsive to constantly changing information. With evidence emerging, what was once true can fade into a misconception of the past; scientists used to believe that the Earth was located in the center of the solar system but the discoveries of just one scientist revealed that the sun sits in the center of the solar system instead. Misconceptions are a natural part of the scientific process.

#### **Academic Vocabulary**

- Tentative Explanation
- Revise
- Theory
- Belief
- Hypothesis

#### **Time Needed (Based on 45-Minute Periods)**

3.5 Days

- Engage: 0.5 period
- Explore: 1 period
- Explain: 1 period
- Elaborate: 0.5 period
- Evaluate and Reflection: 0.5 period

#### **Materials**

- Unit 3, Pop-Out Student Version

Explore

- A series of 16 checks in an envelope (1/group)
- Important Note: There are 2 check sets to choose from. Pick one set. Check set 1 has a check made out to Planned Parenthood, which may elicit extended discussion on political views. Check set 2 does not have the Planned Parenthood check. Alternatively, an online version is available at [http://www.pbs.org/wgbh/evolution/educators/course/session1/explore\\_a.html](http://www.pbs.org/wgbh/evolution/educators/course/session1/explore_a.html)

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

### Pop-Out: How Science Works

#### Instructions

##### Engage

1. We recommend introducing the pop-out by reading the paragraphs in the beginning of the student guide aloud.
2. Individually, have students answer the true/false questions in their student guide. Emphasize that it's okay if students don't know the answers and that they should do their best to answer the questions using what they know.
  - These are designed to activate prior knowledge and set the stage for exploring scientific misconceptions in the pop-out.
3. Divide students into partners. Ask partners to share what they each wrote for questions 1-10 and discuss the reasons they responded how they did. At the end of the partner discussions, tell students that each of the statements is actually false; however many people have believed in the truth of these statements at different points in the history of science. Share with students that throughout the pop-out, they will be exploring what makes people believe something is true in science, how new evidence emerges and reveals that previous beliefs were misconceptions, and how new ideas are made.

##### Explore

1. Now that students have seen examples of misconceptions, it is time for them to engage in a process that can be used in science to help identify misconceptions like these. In this activity, each team has an envelope containing a series of personal bank checks. Students pick four checks at a time, and the team constructs a plausible scenario that revolves around the evidence gathered from the checks. As students access increasing amounts of evidence (with each subsequent set of checks), students make appropriate revisions to their hypothesis.
2. Divide students into groups. Assign roles to each group. You may use whatever roles you prefer. We recommend the use of the Facilitator, Materials Manager, Harmonizer, and Recorder.
  - Ask Facilitator to read the directions and to make sure everyone understands the task.
  - Ask the Materials Manager to handle any resources (e.g. checks, envelopes) needed to complete the task.
  - Ask the Harmonizer to make sure that everyone contributes their ideas and that everyone's voice is heard.
  - Ask the Recorder to make sure the group is taking notes and collecting evidence from their checks.
3. Give one envelope of checks to each group, but make sure they do not open them yet.
  - Ask each team to draw four checks at random. Students should arrange checks on the desk and develop a tentative storyline/hypothesis to explain why each check was written. Have them record their hypothesis of what happened in the graphic organizer in their student guide.
  - After students have all recorded tentative explanation #1 (approximately 5 minutes), have the students remove four more checks at random, arrange checks on the desk with the previous four checks, and revise the storyline/hypothesis to fit all eight checks. Record tentative explanation

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

## Pop-Out: How Science Works

- #2.
- Repeat this process once more and have them revise and record the storyline/hypothesis to fit all 12 checks.
  - DO NOT allow students to remove the last four checks because students will collaborate with other groups to learn about the final checks in the next activity. This is designed to simulate a community of scientists collaborating.
4. Walk around and look at the responses students are generating.
- Try not to provide any explicit answers, but you may point out parts of the information to focus on if students are struggling.
  - Because each student group will gather different checks throughout the process, there are many viable claims. However, it is important that students use appropriately connected claims, evidence, and reasoning.

**Explain**

1. Since students were not given the last four checks, they will work collaboratively with other groups in the class to gather the information that they are missing. Because each group picks checks randomly, each group may have a different set of 12 checks; however, it is likely that together the class has access to all 16 checks.
  - The primary reason for this is for students to emulate the collective nature of the scientific process through engaging with a community of scientists.
  - The secondary purpose of this time is for students to explain their group's process of collecting evidence, making claims, and explaining the reasoning for their ideas. It also allows for students to see one another's scientific process.
2. As a class, allow time for groups to discuss their storylines. We recommend doing this through a rotating group share. Determine how many groups are in the class. For example, let's say there are six groups. Give each group a number or letter: 1, 2, 3, A, B, or C. Pair 1s with As, 2s with Bs and 3s with Cs. Provide three to five minutes for groups to share their ideas with one another. Then, have the As, Bs, and Cs rotate clockwise to the next group. Repeat this process until sufficient discussion has taken place.
  - By engaging in rotating discussions, students will engage with groups who chose different checks. Since each student group is missing four checks, this process allows for students to encounter diverse pieces of evidence.
3. Give students time to discuss their final explanations in their original groups. Students should then write their final CERs individually. Remind students that they can use evidence from each of their checks as well as anything they learned in the class discussion. Similar to in the Explore section, there are no specific correct claims, so long as students are making reasonable claims, providing viable evidence, and offering sound reasoning.

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

1. This section of the task uses students' experience with the Checks Activity and asks them to apply what they learned to the scientific process. In groups, have students discuss the questions listed in their student guide.
  - These questions serve to simultaneously debrief the learning garnered through the checks activity and apply concepts to the process of scientific inquiry.
2. Optional: Debrief this process in a classwide discussion. You may lead the class discussion using the questions from the student guide or the following questions as a jumping-off point:
  - *How are your tentative claims supported by evidence and reasoning?*
  - *How is your final story supported by evidence and reasoning?*
  - *How are theories formed and changed over time?*

**Evaluate and Reflection**

1. At the end of the task, ask students to individually reflect on what they have learned over the course of this pop-out by writing reflections to the questions in their student guide.
2. Facilitate a class-wide discussion that allows students to share their learnings. You can use the questions on the student guide as a jumping off point.

**Assessment**

1. You may collect the student guide handout and assess using:
  - *Criteria of your choice.* We recommend focusing on the content in the Evaluate section to assess students' understanding of the nature of science.
  - This can be a formative tool to look for trends in student demonstrations of skills and practices. You can then use this formative data to inform future instruction.

Checks

Explore Supplementary Resources

Checks Version #1

Leslie MidBank  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Calif.  
46-274/412  
Aug 20, 92

Pay to the Order of Princeton Univ \$ 750.00  
Seven hundred and fifty DOLLARS  
MEMO Leslie MidBank

PAUL AND LESLIE BARNARD  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Calif.  
46-274/412  
Feb 14, 1991

Pay to the Order of Planned Parenthood \$ 35.00  
Thirty five and 00/100 DOLLARS  
MEMO Leslie Barnard

Leslie MidBank  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Calif.  
46-274/412  
Jan 1, 1992

Pay to the Order of Pauline Ann \$ 150.00  
One hundred fifty and 00/100 DOLLARS  
MEMO MG-S Leslie MidBank

Paul M. Barnalo  
2250 El Cajon Blvd.  
San Diego, California 92104

Bank of the West, Calif.  
46-274/412  
9-12-19 92

Pay to the Order of BEN BRIDGE JEWELERS \$ 175.00  
One hundred seventy-five and 00/100 DOLLARS  
MEMO Paul Barnalo

PAUL AND LESLIE BARNARD  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Calif.  
46-274/412  
June 4, 1991

Pay to the Order of N.O.W. - SD Chapter \$ 100.00  
One hundred and 00/100 DOLLARS  
MEMO Leslie Barnalo

PAUL AND LESLIE BARNARD  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Calif.  
46-274/412  
Mar 21, 1991

Pay to the Order of Hans Bicker, Attorney at Law \$ 500.00  
Five hundred and 00/100 DOLLARS  
MEMO Leslie Barnalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
Nov 18, 19 91

Pay to the Order of Dr. Johnson \$ 875.00  
Eight hundred and seventy five DOLLARS  
MEMO Julie Bahalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
5-28-19 84

Pay to the Order of CHEYEN \$ 167.50  
One hundred sixty-seven and 50/100 DOLLARS  
MEMO Paul M. Bahalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
7-12-19 91

Pay to the Order of San Diego Re-Life League \$ 200.00  
Two hundred and 00/100 DOLLARS  
MEMO Paul M. Bahalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
12-23-19 73

Pay to the Order of GROSSMONT HOSPITAL \$ 1,133.00  
One thousand and thirty three and 00/100 DOLLARS  
MEMO Paul M. Bahalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
10-29-19 75

Pay to the Order of DR. B. D. JOHNSON \$ 560.00  
FIVE HUNDRED-SIXTY and 00/100 DOLLARS  
MEMO Paul M. Bahalo

PAUL AND LESUE BANK  
105 Wander Way  
La Jolla, California 92104

Bank of the West, Ltd.  
46-274/412  
9-4-19 90

Pay to the Order of GODIVA CANDIES \$ 28.50  
Twenty-eight and 50/100 DOLLARS  
MEMO Paul M. Bahalo

PAUL AND LESLIE BABALO  
105 Wander Way  
La Jolla, California 92104

Bank of the West, N.A.  
46-274/412  
July 19 79

Pay to the Order of Bunays Ballet Shop's \$ 30.00  
Thirty and 00/100 DOLLARS  
MEMO Julie Babalo

Leslie Milbank  
105 Wander Way  
La Jolla, California 92104

Bank of the West, N.A.  
46-274/412  
July 19 92

Pay to the Order of Leslie \$ 63.27  
Sixty three and 27/100 DOLLARS  
MEMO Julie Milbank

PAUL AND LESLIE BABALO  
105 Wander Way  
La Jolla, California 92104

Bank of the West, N.A.  
46-274/412  
Sept 5 19 90

Pay to the Order of Helix High School \$ 42.00  
Forty two and 00/100 DOLLARS  
MEMO Julie Babalo

Paul M. Babalo  
105 Wander Way  
La Jolla, California 92104

Bank of the West, N.A.  
46-274/412  
6-20-19 71

Pay to the Order of JESSOP'S JEWELERS \$ 1,275.88  
One thousand two hundred seventy-five and 88/100 DOLLARS  
MEMO Paul M. Babalo

Paul M. Babalo  
2250 El Cajon Blvd.  
San Diego, California 92104

Bank of the West, N.A.  
46-274/412  
2-1-19 92

Pay to the Order of Leslie Milbank \$ 1,200.00  
One thousand two hundred and 00/100 DOLLARS  
MEMO Paul Babalo

Paul M. Babalo  
2250 El Cajon Blvd.  
San Diego, California 92104

Bank of the West, N.A.  
46-274/412  
2-1-19 92

Pay to the Order of Leslie Milbank \$ 1,200.00  
One thousand two hundred and 00/100 DOLLARS  
MEMO Paul Babalo



Checks  
Explore Supplementary Resources  
Checks Version #2

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

Dec 16 19 75 16-66/1220

Pay to the order of Newport Import Motors \$ 18,500.00 <sup>00</sup>/<sub>xx</sub>

Eighteen thousand five hundred ~~Dollars~~

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ William Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4659 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

SEA OTTER

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

Feb 12 19 76 16-66/1220

Pay to the order of A-1 Dry Cleaners \$ 36.57 <sup>57</sup>/<sub>xx</sub>

Thirty six and 57/100 ~~Dollars~~

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ Mary Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4656 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

KIT FOX

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

June 12 19 76 16-66/1220

Pay to the order of Computer Warehouse \$ 4100.00 <sup>00</sup>/<sub>xx</sub>

Four thousand one hundred ~~Dollars~~

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ William Whitney Sr.

⑆ ⑆ 2 200066 ⑆ ⑆ 4657 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

BALD EAGLE

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

June 18 19 77 16-66/1220

Pay to the order of Orange County Emergency \$ 634.00 <sup>00</sup>/<sub>xx</sub>

Six hundred thirty four ~~Dollars~~

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ W.A. Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4658 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

W.A. WHITNEY  
10809 MEADS  
ORANGE, CA 92669

April 13, 1963 16-66/1220

Pay to the order of Liquor Barn \$ 1200.<sup>00</sup>/<sub>xx</sub>  
Twelve hundred and <sup>00</sup>/<sub>xx</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For W.A. Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ ⑆ 465 ⑆ ⑆ ⑆ 09204 ⑆ ⑆ ⑆ 04525 ⑆ ⑆

KIT FOX

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

June 10, 1963 16-66/1220

Pay to the order of Goldsteins Jewelers \$ 900.<sup>00</sup>/<sub>xx</sub>  
Nine hundred and <sup>00</sup>/<sub>xx</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For W.A. Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ ⑆ 4652 ⑆ ⑆ ⑆ 09204 ⑆ ⑆ ⑆ 04525 ⑆ ⑆

BALD EAGLE

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

Aug. 10, 1968 16-66/1220

Pay to the order of Kids R Us \$ 875.<sup>00</sup>/<sub>xx</sub>  
Eight hundred seventy five Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For W.A. Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ ⑆ 4653 ⑆ ⑆ ⑆ 09204 ⑆ ⑆ ⑆ 04525 ⑆ ⑆

SANDHILL CRANE

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

May 14, 1975 16-66/1220

Pay to the order of Oceanview Academy \$ 3800.<sup>00</sup>/<sub>xx</sub>  
Three thousand eight hundred Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For Mary Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ ⑆ 4654 ⑆ ⑆ ⑆ 09204 ⑆ ⑆ ⑆ 04525 ⑆ ⑆

BISHORN STEEP

Mr. and Mrs. William A Whitney  
See Vec Lane P.O. Box 103  
Bishop, CA 93515

Sept. 16, 1977 16-66/1220

Pay to the order of Forest Lawn Mortuary \$ 1650.<sup>00</sup>/<sub>xx</sub>  
Sixteen hundred and fifty Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ William Whitney Sr.

⑆ 1 2 200066 ⑆ ⑆ 4660 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆

SEA OTTER

Mr. and Mrs. William A Whitney  
See Vec Lane P.O. Box 103  
Bishop, CA 93515

Oct 12, 1977 16-66/1220

Pay to the order of Mothers Against Drunk Driving \$ 200.<sup>00</sup>/<sub>xx</sub>  
Two hundred and <sup>00</sup>/<sub>xx</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ Mary Whitney

⑆ 1 2 200066 ⑆ ⑆ 466 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆

KIT FOX

Mr. and Mrs. William A Whitney  
See Vec Lane P.O. Box 103  
Bishop, CA 93515

Oct 21, 1977 16-66/1220

Pay to the order of One Day Body and Paint \$ 7,600.<sup>00</sup>/<sub>xx</sub>  
Seven thousand six hundred <sup>00</sup>/<sub>xx</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ William Whitney Sr.

⑆ 1 2 200066 ⑆ ⑆ 466 2 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆

BALD EAGLE

Mr. and Mrs. William A Whitney  
See Vec Lane P.O. Box 103  
Bishop, CA 93515

Nov. 8, 1977 16-66/1220

Pay to the order of St. Joseph's Hospital \$ 3200.<sup>00</sup>/<sub>xx</sub>  
Three thousand two hundred Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ Bill Whitney

⑆ 1 2 200066 ⑆ ⑆ 466 3 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆

SANDHILL CRANE

W.A. WHITNEY  
10809 MEADS  
ORANGE, CA 92669

Feb 4 1978 16-66/1220

Pay to the order of Sportmart \$1250<sup>00</sup>/<sub>xx</sub>  
One thousand two hundred fifty Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ William Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4664 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

BALD EAGLE

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

March 18 1978 16-66/1220

Pay to the order of C. Garcia, Attorney-at-Law \$500.<sup>00</sup>/<sub>xx</sub>  
Five hundred and <sup>00</sup>/<sub>00</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ Mary Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4668 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

SANDHILL CRANE

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

April 4 1979 16-66/1220

Pay to the order of Acme Driving Academy \$200.<sup>00</sup>/<sub>xx</sub>  
Two hundred and <sup>00</sup>/<sub>xx</sub> Dollars

**Bank of America**  
Bishop Branch 0920  
P.O. Box 817  
Bishop, CA 93514

For \_\_\_\_\_ Bill Whitney

⑆ ⑆ 2 200066 ⑆ ⑆ 4669 ⑆ ⑆ 09204 ⑆ ⑆ 04525 ⑆ ⑆

BIGHORN SHEEP

Mr. and Mrs. William A Whitney  
See Vee Lane P.O. Box 103  
Bishop, CA 93515

June 16 1979 16-66/1220

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## 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?*

#### **Introduction**

By this point in the curriculum, students have considered how humans and ecosystems interact in various ways. In the unit, students have explored how humans use science to forecast natural hazards. This pop-out focuses on the social justice ramifications of what often happens during and after a natural hazard: Who is disproportionately affected by the natural hazards and the aftermaths of the events? The pop-out uses natural hazard case studies to examine social justice. It provides students with an introductory lens through which to examine how people are unfairly affected by factors such as: socioeconomic status, age, race, English proficiency, and health concerns/physical ability.

The content in this pop-out centers around two different natural hazards: fires in Northern California and Hurricane Katrina in New Orleans, Louisiana. As these can be triggers for students, it may be beneficial to consider student backgrounds prior to engaging with the pop-out and mitigate triggers by tailoring or deleting components.

We recommend using this pop-out after completing Task 1 of Unit 4, as Task 1 addresses how to forecast natural hazards.

#### **Alignment Table**

<p><b>Content</b></p> <ul style="list-style-type: none"> <li>Certain populations are disproportionately impacted by natural hazards and their aftermaths.</li> </ul>
<p><b>Equity and Group work</b></p> <ul style="list-style-type: none"> <li>Work together to analyze, evaluate, and interpret information.</li> <li>Discuss with peers to learn about other perspectives while examining social justice concepts through exploring natural hazards.</li> <li>Use think-pair-shares and group discussions to gather information for use in written response.</li> </ul>
<p><b>Language</b></p> <ul style="list-style-type: none"> <li>Listen to a reading aloud.</li> <li>Use annotation strategies to dissect text.</li> <li>Communicate ideas verbally in class discussions.</li> <li>Communicate ideas in a written letter.</li> <li>Incorporate evidence to support an idea.</li> </ul>

#### **Learning Goals**

In this pop-out, students examine how different populations are impacted by natural hazards and their aftermaths. More specifically, the purpose is to:

- Engage students' prior knowledge by making predictions about groups impacted by fires.
- Consider an NPR article about fires in northern California.
- Explain their thoughts in a class-wide discussion.

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- Apply their learnings to the aftermath of Hurricane Katrina and write a letter to a politician explaining the impacts of natural hazards on groups of people.
- Reflect on which populations are more at-risk during and after natural hazards and consider if its fair.

#### **Content Background for Teachers**

Natural disasters are happening with increasing regularity. Scientists attribute the increased number and severity of natural hazards to climate change. Thus, it is likely that natural hazards could continue increasing and affecting the world population. With each natural hazard comes a human response: safety information is disseminated, aid groups mobilize, and relief efforts ensue. Through that process, many groups of people are disproportionately impacted. Social justice issues are at the forefront of how humanity often manages the effects of natural hazards. In this pop-out, the disproportionate effects to certain at-risk populations are addressed in the following capacities:

- Socioeconomic status: In the aftermath of Hurricane Katrina, a population's personal wealth (and ability to procure flood insurance) greatly increased the population's capacity to return to their homes. Populations in lower socioeconomic classes were less likely to return to New Orleans and rebuild their homes.
- Age: The elderly population was disproportionately impacted by the California fires and Hurricane Katrina.
- Race: While race is not explicitly addressed in the pop-out, there are strong links between race and socioeconomic status. Students may use previous knowledge to draw this connection.
- English proficiency: While this is not explicitly addressed in the pop-out, students may use prior knowledge to propose that if a population does not speak English, they are less likely to understand warnings and instructions regarding natural hazards.
- Health concerns/physical ability: Populations with decreased mobility were impacted by the California fires and not being as able to evacuate from Hurricane Katrina (e.g. most of the evacuation buses were not ADA compliant).

#### Sources:

- <https://emergency.cdc.gov/groups.asp>
- <https://www.npr.org/2017/10/19/558696780/why-older-people-didnt-fare-well-in-northern-california-wildfires>
- <https://www.accuweather.com/en/weather-blogs/climatechange/steady-increase-in-climate-rel/19974069>
- <https://www.cdc.gov/nceh/hsb/disaster/atriskguidance.pdf?forcedefault=true>

#### **Academic Vocabulary**

- Natural disaster
- At-Risk Populations
- Evacuate
- Socioeconomic status
- English proficiency

#### **Time Needed (Based on 45-Minute Periods)**

2.5 Days

- Engage: 0.25 period

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- Explore: 0.5 period
- Explain: 0.5 period
- Elaborate: 1 period
- Evaluate and Reflection: 0.25 period

**Materials**

- Unit 4, Pop-Out Student Version (1/student)

Explore

- Copy of NPR article (1/class)

Elaborate

- Computer with projector (1/class)
- Unit 4, Pop-Out Situation – Hurricane Katrina (1/student)

**Instructions**

**Engage**

1. This pop-out focuses on how social justice issues are seen in natural hazard responses. We begin that process by exploring the case of elderly people in the 2017 northern California fires.
2. In partners, have students make predictions about who wasn't able to leave their homes in the California fires. If they don't know anything about the California fires, they can make predictions based on a big fire in a city.
  - The purpose of this is to activate students' prior knowledge.

**Explore**

1. Read this article aloud to the class: <https://www.npr.org/2017/10/19/558696780/why-older-people-didnt-fare-well-in-northern-california-wildfires>. It provides students with clear reasons for why elderly people were disproportionately affected by the fires than other populations.
2. In partners, have students discuss and respond to the questions in the table. Possible student responses are included below:

<b>Who wasn't able to evacuate from the fires in time? Why?</b>	Many elderly people were not able to evacuate their houses. In many cases, the elderly populations were not mobile enough to move to safety. Others weren't able to hear or smell the fires in time to evacuate.
<b>Why does that population need special support to evacuate from natural hazards?</b>	Some elderly may need support to move, hear, or smell well enough to evacuate from a fire.
<b>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?</b>	There is no right or wrong answer, so long as students offer their personal opinion. However, this provides links to people of all ages with physical or mental disabilities.

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

#### Explain

1. Students have seen how one population group (the elderly) was affected in one natural hazard, but there are various at-risk populations and many different natural hazards.
2. Use a think-pair-share format to stimulate a class discussion. The use of equity sticks is encouraged to support an equitable discussion process. The questions for the think-pair-share are in the student guide and included here:
  - What at-risk populations do you know are unfairly affected during fires and why?
  - 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?
  - 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

1. Using a computer with a projector, play this video about the Hurricane Katrina timeline. <https://www.youtube.com/watch?v=HbJaMWw4-2Q>. Consider skipping the video portion from 3:44-3:49 as the video displays a graphic image of a dead body floating in the Hurricane aftermath.
2. Have students work individually to read through the *Unit 4, Pop-Out Hurricane Katrina Situation*. Remind them to use the annotation strategies from your class to support their learning process.
3. Divide students into groups to discuss the questions in their student guide. Encourage students to use the reading to support their answers.
4. In the wake of a natural hazard, communities learn how a natural hazard impacts different groups of people. Following these events, agencies reflect on what happened, learn from the experience, and make plans to improve natural hazard responses in the future. Because these impacts are so tightly linked to social justice, it is valuable for students to find their voices in responding to such events. Individually, have students write a letter to the New Orleans Mayor.
  - Encourage students to use what they have learned in the pop-out so far to write a letter that provides: an overall statement expressing what they know about how different population groups are impacted by natural hazards, specific examples of how those population groups were affected by Hurricane Katrina, and any relevant ideas students' have for how to address those problems in the future. It is important to note that the curriculum does not offer specific solutions or ideas to remedy the problems; any ideas that arise are acceptable.

#### Evaluate and Reflection

1. By this point, students have engaged with two different natural hazards and have considered how both of these disasters have impacted different groups of at-risk populations. The Evaluate hones in on which groups of people are affected more than others and asks students to consider whether that is fair.
2. Individually, have students answer the questions in their student guides.



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

**Assessment**

1. You may collect the student guide handout and assess using:
  - *Criteria of your choice.* We recommend focusing on the letter in the Elaborate section to elucidate students' understanding of how different groups of people are impacted by natural hazards and the aftermaths.
  - This can be a formative tool to look for trends in student demonstrations of skills and practices. You can then use this formative data to inform future instruction.

## How Did Hurricane Katrina Impact Different Groups?

*Elaborate*

### Overall Population

	Before Katrina	After Katrina
Population	484,674 people	230,172 people

In the pop-out introduction, we learned that there are six categories that contribute to how much help a person may need in a natural hazard. Let's take a look at how three of the categories of people were affected during and after Hurricane Katrina.

### Age: The Elderly

Hurricane Katrina resulted in the death of almost 1000 people. 73% of deaths were in people 60 years or older, and half of overall deaths were seen in people over 74 years old. Many of those people were not able to evacuate their homes.

### Health Concerns/Physical Ability: People with Disabilities

People with disabilities were disproportionately affected by the hurricane compared to people without disabilities. One reason is that their needs are often overlooked. For example, people with physical disabilities were not able to evacuate themselves, and many evacuation buses were not wheelchair accessible. People with visual and hearing disabilities were not able to get the messages to leave before the storm. Also, evacuation, relief, and shelter is more expensive for people with disabilities which often stops governments from making plans that include people of all abilities.

### Socioeconomic Status: Low Income Populations

The storm flooded 80% of New Orleans, most of which was neighborhoods. More than 1 million people were forced to leave their homes for the storm. Many of those people needed to repair or entirely rebuild their homes. Unfortunately, the house insurance companies took a year to pay people the money needed to fix their houses. Because of that, most of the people who returned to their homes were the ones that had the money to begin renovating the damage, and many people without wealth were forced to move somewhere else.

Adding to that challenge is that most of the money donated to Hurricane Katrina was used for emergency response. Very little money was spent on rebuilding. Five years after the storm, New Orleans has a wealthier, older, and less racially diverse population.

Sources:

- <https://www.datacenterresearch.org/data-resources/katrina/facts-for-impact/>
- <https://www.ncd.gov/publications/2006/Aug072006>