

# UNIT 4

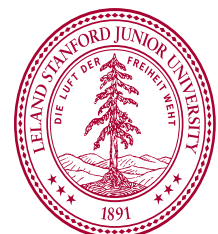
## Save the Andes!



How can we sustain biodiversity in a modern, changing world?

**SCALE**

Stanford Center for Assessment,  
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## 7th Grade Science Unit 4: Save the Andes! Culminating Project

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

### Challenge

As human beings, we depend on natural resources, such as food, water, and other materials from ecosystems. As we learned in Unit 3, each ecosystem contains natural cycles and interactions that keeps it stable and functioning. One such ecosystem is located in the Andes mountains, in South America. This region has a wide range of natural habitats and organisms, and thus contains many valuable resources which humans need. As you saw in the Lift-Off video, as humans take what they need, they negatively impact natural ecosystems, like the Andes.



For this project, you will create a proposal to help preserve the Andes. You will first investigate the ways in which humans impact ecosystems, and then evaluate various strategies used to reduce this impact. As a group, you will propose a reasonable plan to preserve ecosystems in the Andes and communicate this plan by presenting a poster at an Environmental Science Conference. Individually, you will submit a more detailed version of this proposal in the form of a written article to be published in the Environmental Science Journal.

<http://www.thinktheearth.net/earthrium/18bdhotspots/text04.html>

### Group Project Criteria for Success

Your scientific poster presentation should include:

- Your Proposal
  - Justification: What problem in the Andes does your proposal address?
  - What is your proposal for addressing the problem?
  - What are the limitations of your proposal?
  
- Your final proposal should be:
  - A scientific poster
  - Specific and well-researched
  - Organized logically
  - Interesting to the audience
  - Illustrated and aesthetically pleasing

## 7th Grade Science Unit 4: Save the Andes!

### Culminating Project

#### Individual Project Criteria for Success

Your journal article should include:

- Background on the Andes Region
  - A geographic map of the Andes, showing and explaining:
    - How large and small geoscience processes have resulted in specific geographic features, using evidence from Task 1 to support your explanation.
  - A description of biodiversity in the Andes, including:
    - What is biodiversity, and why is it important for ecosystem health?
    - How does the biodiversity in the Andes provide ecosystem services and natural resources for humans?
    - How do human changes to biodiversity affect these ecosystem services and natural resources?
  
- The Problem
  - Define the problem:
    - Describe one human activity that is affecting the Andes and explain why humans do this activity.
    - Construct an argument for how this human activity causes large changes across populations of organisms, using evidence from Task 2 to support your argument.
  - Identify the constraints: What barriers might make it difficult to stop this problem?
    - Use what you learned in Task 3 to depict the small- and large-scale consequences that any solution may have on humans.
  
- Existing Solutions Worldwide
  - Describe the best solutions to address this problem.
  - Identify the benefits and drawbacks for each solution.
  
- Your Proposal
  - Describe your proposal for addressing this problem.
  - Explain why your proposal is the best option.

**7th Grade Science Unit 4: Save the Andes!**  
**Culminating Project**



**Journal Article Peer Review Feedback**

Complete after you have a full first draft of your journal article.

Journal Article Author's Name	
Journal Article Reviewer's Name	

**Review the following sections of the Journal Article:**

- Background on the Andes Region
  - A geographic map of the Andes, showing and explaining:
    - How large and small geoscience processes have resulted in specific geographic features, using evidence from Task 1 to support your explanation.
  - A description of biodiversity in the Andes, including:
    - What is biodiversity, and why is it important for ecosystem health?
    - How does the biodiversity in the Andes provide ecosystem services and natural resources for humans?
    - How do human changes to biodiversity affect these ecosystem services and natural resources?
  - Positive Comment:
  
  - Constructive Comment:
  
- The Problem
  - Define the problem:
    - Describe one human activity that is affecting the Andes and explain why humans do this activity.
    - Construct an argument for how this human activity causes large changes across populations of organisms, using evidence from Task 2 to support your argument.

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- Identify the constraints: What barriers might make it difficult to stop this problem?
  - Use what you learned in Task 3 to depict the small- and large-scale consequences that any solution may have on humans.
  
- Positive Comment:
  
  
- Constructive Comment:
  
  
- Existing Solutions Worldwide
  - Describe the best solutions to address this problem.
  - Identify the benefits and drawbacks for each solution.
  
- Positive Comment:
  
  
- Constructive Comment:
  
  
- Your Proposal
  - Describe your proposal for addressing this problem.
  - Explain why your proposal is the best option.
  
- Positive Comment:
  
  
- Constructive Comment:

**7th Grade Science Unit 4: Save the Andes!**

**3-Dimensional Individual Project Rubric**

**Overview:** The following rubrics can be used to assess the individual project: a journal article detailing your proposal to save the Andes. Each rubric is aligned to one section of the *Individual Project Criteria for Success*, located on your Culminating Project Student Instructions. Use these rubrics to see if you are doing your best work on your individual project.

**Rubric 1:** Student identifies the geographic features of the Andes Mountains, and cites evidence to explain how large and small geoscience processes caused these features.

Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Student identifies <b>inaccurate</b> geographic features of the Andes mountains. OR Student identifies the <b>accurate</b> geographic features of the Andes mountains, and <b>inaccurately</b> explains how large and small geoscience processes caused these features.	Student identifies the <b>accurate</b> geographic features of the Andes mountains, and cites <b>some</b> evidence to <b>generally</b> explain how large and small geoscience processes caused these features.	Student identifies the <b>accurate</b> geographic features of the Andes mountains, and cites <b>some</b> evidence to <b>partially</b> explain how large and small geoscience processes caused these features.	Student identifies the <b>accurate</b> geographic features of the Andes mountains, and cites <b>all</b> evidence to <b>completely</b> explain how large and small geoscience processes caused these features.

**Rubric 2:** Student describes how biodiversity is important to ecosystem health, and explains how small changes in biodiversity in the Andes lead to large effects on ecosystem services and natural resources.

Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Student <b>inaccurately</b> describes how biodiversity is important to ecosystem health, <b>AND/OR inaccurately</b> explains how small changes in biodiversity in the Andes lead to large effects on ecosystem services and natural resources.	Student <b>accurately</b> describes how biodiversity is important to ecosystem health, and <b>generally</b> explains how small changes in biodiversity in the Andes lead to large effects on ecosystem services and natural resources.	Student <b>accurately</b> describes how biodiversity is important to ecosystem health, and <b>partially</b> explains how small changes in biodiversity in the Andes lead to large effects on ecosystem services and natural resources.	Student <b>accurately</b> describes how biodiversity is important to ecosystem health, and <b>completely</b> explains how small changes in biodiversity in the Andes lead to large effects on ecosystem services and natural resources.

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**3-Dimensional Individual Project Rubric**

**Rubric 3:** Student writes an argument for how one human activity leads to large effects on populations of organisms in the Andes ecosystem, supporting with evidence and reasoning.

<b>Emerging (1)</b>	<b>Developing (2)</b>	<b>Proficient (3)</b>	<b>Advanced (4)</b>
Student writes an <b>inaccurate</b> argument for how one human activity leads to large effects on populations of organisms in the Andes ecosystem.	Student writes an <b>accurate</b> argument for how one human activity leads to large effects on populations of organisms in the Andes ecosystem, supporting with <b>no</b> evidence and reasoning.	Student writes an <b>accurate</b> argument for how one human activity leads to large effects on populations of organisms in the Andes ecosystem, supporting with <b>partial</b> evidence and reasoning.	Student writes an <b>accurate</b> argument for how one human activity leads to large effects on populations of organisms in the Andes ecosystem, supporting with <b>complete</b> evidence and reasoning.

**Rubric 4:** Student describes a human-related limitation to solving an environmental problem in the Andes, and explains the small- and large-scale consequences any solution may pose.

<b>Emerging (1)</b>	<b>Developing (2)</b>	<b>Proficient (3)</b>	<b>Advanced (4)</b>
Student <b>inaccurately</b> describes a human-related limitation to solving an environmental problem in the Andes, and <b>does not</b> explain the small- and large-scale consequences any solution may pose.	Student <b>accurately</b> describes a human-related limitation to solving an environmental problem in the Andes, and <b>does not</b> explain the small- and large-scale consequences any solution may pose.	Student <b>accurately</b> describes a human-related limitation to solving an environmental problem in the Andes, and <b>partially</b> explains the small- and large-scale consequences any solution may pose.	Student <b>accurately</b> describes a human-related limitation to solving an environmental problem in the Andes, and <b>completely</b> explains the small- and large-scale consequences any solution may pose.

**Rubric 5:** Student explains why their solution to an environmental problem facing the Andes region best meets the criteria and constraints of the problem by comparing to other solutions.

<b>Emerging (1)</b>	<b>Developing (2)</b>	<b>Proficient (3)</b>	<b>Advanced (4)</b>
Student provides an <b>irrelevant</b> explanation of why their solution best meets the criteria and constraints of the problem.	Student provides a <b>general</b> explanation of why their solution best meets the criteria and constraints of the problem by <b>not</b> comparing to other solutions.	Student provides a <b>detailed</b> explanation of why their solution best meets the criteria and constraints of the problem by <b>implicitly</b> comparing to other solutions.	Student provides a <b>detailed</b> explanation of why their solution best meets the criteria and constraints of the problem by <b>explicitly</b> comparing to other solutions.

**7th Grade Science Unit 4: Save the Andes!**  
**Project Organizer**



**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

You have been tasked with creating a proposal to save the Andes. After each task, you will return to the table below to organize what you learn as you go through the unit. By the end of the four tasks, you will have all this information to use for your culminating project. For each activity, be sure to include answers to **ALL** the questions provided.

<p><b>Lift-Off Task:</b> Humans and Their Environment</p>	<p>Based on what you watched in the video, how do you think humans might be impacting the Andes?</p>
<p><b>Task 1:</b> Sculpting Landscapes</p>	<p>First, you need to give your audience some background on the Andes region itself.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> What natural changes have led to the Andes region you see today?</li> <li><input type="checkbox"/> Draw diagrams with labels to explain your evidence.</li> </ul>



**7th Grade Science Unit 4: Save the Andes!**  
**Project Organizer**

<p><b>Task 2:</b>          Disrupting Earth's Natural Systems</p>	<p>As part of this proposal you will need to define a problem in the Andes region, and identify the criteria and constraints for solving the problem. To help you plan this, follow the steps below:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Define the problem:             <ul style="list-style-type: none"> <li>○ What is one ecosystem service or resource from the Andes region that humans rely on?</li> <li>○ How are humans negatively impacting the Andes region in order to benefit from this ecosystem service or resource?</li> </ul> </li> <li><input type="checkbox"/> Identify the criteria for a successful solution to one problem in the Andes region:             <ul style="list-style-type: none"> <li>○ What problem will your solution solve?</li> <li>○ How will you determine if a solution is successful?</li> </ul> </li> <li><input type="checkbox"/> Identify the constraints (limitations) of solving this problem:             <ul style="list-style-type: none"> <li>○ What consequences will your solution have on humans in the Andes and around the world? To better explain this, make a flowchart (see <i>Elaborate</i>) to trace your plan backwards and see the potential effects it will have on people's daily lives.</li> <li>○ What scientific knowledge, or lack of knowledge, may limit possible solutions?</li> </ul> </li> </ul>
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**7th Grade Science Unit 4: Save the Andes!**

**Project Organizer**



<p><b>Task 3:</b> Living in Harmony – Weighing the Consequences</p>	<p>In this task, you have researched and evaluated solutions currently used to address some of the environmental problems caused by human activity in the Andes region. By now, you also realize that developing a conservation plan is often a balancing act that involves helping the environment on one hand, but also getting public support in order to accomplish this plan. To help you with this, use your new knowledge from this task to answer the following questions:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> What are the best solutions you heard about or researched in this task?</li> <li><input type="checkbox"/> How can you combine the parts of these solutions to create a stronger proposal for your final project?</li> <li><input type="checkbox"/> How might your combined proposal affect human communities at smaller (local) and larger (global) scales?</li> </ul>
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**7th Grade Science Unit 4: Save the Andes!**  
**Lift-Off Task: Humans and Their Environment**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

Watch the following video entitled “Man”: <https://www.youtube.com/watch?v=WfGMYdalCIU&t=157s>.



**Part A:** Based on the video and your prior knowledge, what questions would you ask about how humans interact with their environment? Individually record any questions you would ask to better understand the concepts introduced in the video.

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**Lift-Off Task: Humans and Their Environment**

Part B: As a group,

- Discuss what each member wrote on his or her list above.
- On a large piece of poster paper:
  - Write the phrase “Humans and Their Environment” in the middle of your poster and draw a circle around it.
  - Around the circle, record the questions that were similar across your group members.
  - Draw lines to link together questions that relate to each other.
  - Draft possible answers to the questions, using your prior knowledge. Connect these to the questions on your poster.
- Post your group poster on the wall.
- Walk around and look at each groups’ ideas.

Part C: As a whole class,

- Construct a class concept map with the phenomenon in the middle: “Humans and Their Environment”.
  - Decide which key questions you want to have on the concept map.
  - Draw lines with arrows between two key questions to show that there is a relationship.
  - Make as many connections as you can between the questions on the concept map.
- It’s important for everyone to share their ideas and it’s okay if you don’t agree.
- You will be revisiting this concept map to revise and add new information as you learn more about humans and the environment.

**7th Grade Science Unit 4: Save the Andes!**  
**Lift-Off Task: Humans and Their Environment**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Connecting to the Culminating Project**

You will be creating a plan to save the Andes. Based on what you watched in the video, how do you think humans might be impacting the Andes?

This should be completed individually in your Project Organizer.

**Reflection**

Individually reflect on the Lift-Off Task, using the questions provided:

1. At the beginning of this task, you made a list of all the questions you have about how humans interact with their environment. Look back at your list: think about the questions your peers asked that you did not initially write down. How are their questions different from the ones you originally asked?
2. In this unit, we will be focusing on four crosscutting concepts:
  - **Patterns:** Graphs, charts, and images can be used to identify patterns.
  - **Scale, Proportion, and Quantity:** Phenomena can be observed at various scales using models.
  - **Structure and Function:** The properties of materials affect the function of a design.
  - **Stability and Change:** Small changes in one part of a system can cause large changes in another part.

Looking at your class concept map, give one example of how one of the crosscutting concepts came up in today's task.

3. Now that you understand what project you'll be working on over the course of this unit, what else do you need to know? What additional questions do you have?



**7th Grade Science Unit 4: Save the Andes!****Task 1: Sculpting Landscapes**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Engage**

In the Lift-Off task, we saw how humans can interact with the environment, and we asked questions to begin making sense of this phenomenon. Many of you noticed that human actions often disrupt the natural environment in ways that can be harmful to the environment. In this task, you will think about how environments function naturally, and how humans can influence their natural function. Keep in mind that environments are not static. In other words they do not stay the same all the time—sometimes natural changes occur, which may also impact the environment.



<https://dripley91.wordpress.com/2013/12/14/case-study-sustainable-design-natural-capitalism-and-the-2nd-industrial-revolution/>

**Brainstorm with a partner:**

- What are some examples of natural changes that can happen to environments on Earth?
- For each example, explain whether it is a long-term change (millions of years) or a short-term change.

**7th Grade Science Unit 4: Save the Andes!**

**Task 1: Sculpting Landscapes**



**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Explore**

Before we think about how humans impact the Andes Mountains, we have to think about out how the Andes Mountains once functioned prior to human history. What past *natural* changes do you think may have impacted how the Andes Mountains look today? Remember, these changes can be big or small!

In groups, visit each of the stations to collect evidence on the geoscience processes that have made the Andes Mountains what they are today. Take notes in the data chart below:

	Explanation of Cause	Effect on the Andes	<b>Scale, Proportion, and Quantity:</b> Does this event seem to cause a large-scale or small-scale change? Sudden or gradual change?
Plate Motions			
Earthquakes			
Volcanoes			
Weathering and Erosion			

**7th Grade Science Unit 4: Save the Andes!****Task 1: Sculpting Landscapes**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Explain**

**Constructing Explanations:** Individually construct an explanation answering the following question: *How have natural geoscience processes changed the Andes Mountains over time?* Remember to use evidence from your *Explore* activity chart to help support your claim.

**7th Grade Science Unit 4: Save the Andes!**

**Task 1: Sculpting Landscapes**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Elaborate**

The Sabancaya Volcano in the Andes Mountains experienced many eruptions between 1990 and 1998. While we see that volcanic eruptions can lead to beautiful natural processes in the long-term, they can also cause catastrophic loss of human life and property in the short-term. Luckily, we can use **Patterns** in data to try to predict when these eruptions will occur in order to help mitigate their negative effects. Visit the USGS website to learn about how to predict a volcanic eruption before doing it yourself!

**Instructions:**

1. Scientists look at three different types of data when trying to predict when a volcano may erupt. Read Table #1 to better understand the evidence necessary to predict an eruption.

Table #1

	<p><b>Thrusts:</b> As magma starts to rise into the volcano, the crater floor begins to break apart, making what are called thrust faults. One part of the fault is pushed over the other, causing movement that can be detected by scientists. The more movement, the more likely a volcano is to erupt soon.</p> <p><b>Earthquakes:</b> The rising magma also causes rocks to break, resulting in small Earthquakes, which can be detected by scientists. The more earthquakes, the more likely a volcano is to erupt soon.</p> <p><b>Tiltmeter:</b> As magma rises into the volcano, the crater floor is pushed up and out of the dome. This causes the ground to tilt at an angle. The greater the angle, the more likely a volcano is to erupt soon.</p>
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**7th Grade Science Unit 4: Save the Andes!**

**Task 1: Sculpting Landscapes**

2. As a group, visit the website: [https://volcanoes.usgs.gov/vsc/predict/EP\\_look\\_800.html](https://volcanoes.usgs.gov/vsc/predict/EP_look_800.html) and click on “Exercise” in the yellow bar on the left-hand side. Use the arrows at the bottom of the page to navigate to page 4 (“Your Turn”) and follow the directions to make your own prediction for a volcano like Sabancaya. As you go through each page, record your data in the table below:

Date	What <b>patterns</b> do you notice when examining the graphs?	<b>Analyzing and Interpreting Data:</b> Based on this data and the information from Table #1, what should you do at this date, and why?
February 21 <sup>st</sup>		
March 3 <sup>rd</sup>		
March 17 <sup>th</sup>		

3. Conclude: Why do you think it’s important to be able to predict natural hazards, like volcanic eruptions?



**7th Grade Science Unit 4: Save the Andes!****Task 1: Sculpting Landscapes**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Evaluate: Connecting to the Culminating Project**

You have been tasked with creating a proposal to save the Andes. First, you need to give your audience some background on the Andes region itself.

- What natural changes have led to the Andes region you see today?
- Draw diagrams with labels to explain your evidence.

This should be completed individually in your Project Organizer.

**7th Grade Science Unit 4: Save the Andes!****Task 1: Sculpting Landscapes**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Reflection**

Individually reflect on Task 1, using the questions provided:

1. At the beginning of this task, you were asked to brainstorm some natural changes you think occur in environments on Earth. Look back at your brainstorm: after re-examining all the evidence, what would you add to your brainstorm? Use evidence from the task to justify your additions and record them below.
2. In this task, we focused on the crosscutting concepts of:
  - **Patterns:** Graphs, charts, and images can be used to identify patterns.
  - **Scale, Proportion, and Quantity:** Phenomena can be observed at various scales using models.

Where did you see examples of **Patterns** and **Scale, Proportion, and Quantity** in this task?

3. Now that you have learned more about how environments can change through natural processes, what questions do you still have?

**7th Grade Science Unit 4: Save the Andes!**  
**Task 2: Disrupting Earth’s Natural Systems**



**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Engage**

In Task 1, you explored how past and current geoscience processes have shaped the beautiful natural landscape of the Andes region. The natural processes, cycles, and resources present in the Andes region help provide numerous benefits for humans. Scientists call these natural processes and cycles “ecosystem services” because the natural ecosystem is providing services that humans need.



<https://freshwaterwatch.thewaterhub.org/content/ecosystem-services>

**Brainstorm in pairs:** What ecosystem services and resources does nature provide humans? Why do you think they are important for our survival and comfort?

**7th Grade Science Unit 4: Save the Andes!**

**Task 2: Disrupting Earth’s Natural Systems**



**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Explore**

While it is wonderful that humans can benefit from Earth’s ecosystem services and resources, problems arise when our reliance on the environment begins to disrupt these natural systems.

**Stability and Change:** As a group, visit the stations to explore how humans are changing the natural ecosystem of the Andes region, and how these changes affect organisms in the region. As you visit each station, record information in the data collection table below. This information will serve as your evidence as you think more about how human actions cause large changes to the Andes ecosystem.

Station	Human Action	Changes to the Andes Ecosystem
1		
2		
3		

**7th Grade Science Unit 4: Save the Andes!**

**Task 2: Disrupting Earth's Natural Systems**



4		
5		
6		
7		
8		



**7th Grade Science Unit 4: Save the Andes!****Task 2: Disrupting Earth's Natural Systems**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Explain**

**Engaging in Argument From Evidence:** Individually, construct an argument that supports or refutes the following claim: Human disruptions to the Andes ecosystem result in large changes to natural populations of organisms. Use information from the *Explore* as evidence to justify your argument.

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Elaborate**

**Obtaining, Evaluating, and Communicating Information:** We now know more about how human activities are negatively impacting the Andes ecosystem. So, you might ask at this point, “Am I part of the problem?” In this activity, you will investigate one specific human activity in the Andes region—the extraction of petroleum—by examining petroleum from where it comes from in the Andes to the products it is used to make.

As a group, conduct Internet research about petroleum. Record information that you find and answer all questions in the table on the next page:

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**Task 2: Disrupting Earth’s Natural Systems**



<p>1. What is petroleum?</p> <ul style="list-style-type: none"> <li>List its physical properties.</li> <li>List its chemical properties.</li> </ul>	
<p>2. Make a list of the synthetic products made from petroleum.</p> <ul style="list-style-type: none"> <li>Draw a star next to products that you use.</li> <li>Circle the products that you use on a daily basis.</li> </ul>	
<p>3. What is one chemical reaction that begins with petroleum as a starting material (reactant)?</p> <ul style="list-style-type: none"> <li>Describe the reaction.</li> <li>What are the reactants?</li> <li>What products are formed?</li> </ul>	

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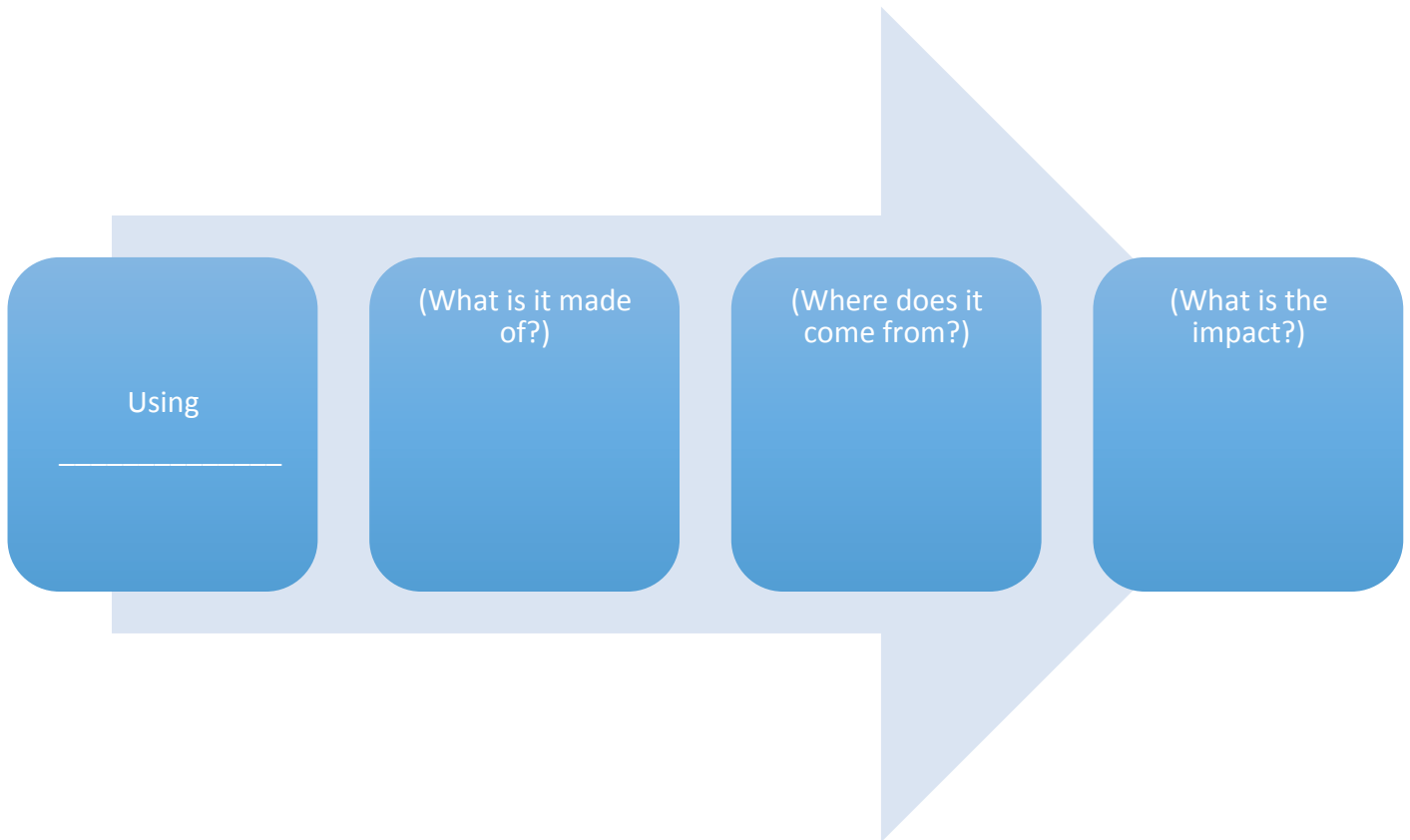
**Task 2: Disrupting Earth’s Natural Systems**



<p><b>4. Structure and Function:</b></p> <ul style="list-style-type: none"> <li>• How do the properties of the synthetic materials compare to the properties of the petroleum?</li> <li>• How do the properties of the synthetic material contribute to its function?</li> </ul>	
<p><b>5. List the Internet sources you used for this research.</b></p> <p>For each source, be sure to:</p> <ul style="list-style-type: none"> <li>• Write the Internet source (include the title of the web page and the url).</li> <li>• Describe who created the webpage (for example the company, organization, or agency that created or sponsored the site).</li> <li>• Explain why you think the source is accurate.</li> <li>• Explain why you think the source is reliable.</li> </ul>	

**7th Grade Science Unit 4: Save the Andes!****Task 2: Disrupting Earth's Natural Systems**

1. Fill in the flowchart below that traces one of the products you use back to where it came from, including the effect it may have had on the environment.



2. Using what you've learned about petroleum, return to the original question – “Am I part of the problem?”
  - a. Knowing that using petroleum to make many items harms the environment, can you think of ways to make these items without relying on petroleum?
  - b. Can you think of possible alternatives to using these items?

**7th Grade Science Unit 4: Save the Andes!****Task 2: Disrupting Earth's Natural Systems**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Evaluate: Connecting to the Culminating Project**

You have been asked to create a proposal to help save the Andes. As part of this proposal you will need to define a problem in the Andes region, and identify the criteria and constraints for solving the problem. To help you plan this, follow the steps below:

- Define the problem:
  - What is one ecosystem service or resource from the Andes region that humans rely on?
  - How are humans negatively impacting the Andes region in order to benefit from this ecosystem service or resource?
- Identify the criteria for a successful solution to one problem in the Andes region:
  - What problem will your solution solve?
  - How will you determine if a solution is successful?
- Identify the constraints (limitations) of solving this problem:
  - What consequences will your solution have on humans in the Andes and around the world? To better explain this, make a flowchart (see *Elaborate*) to trace your plan backwards and see the potential effects it will have on people's daily lives.
  - What scientific knowledge, or lack of knowledge, may limit possible solutions?

This should be completed individually in your Project Organizer.

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Reflection**

Individually reflect on Task 2, using the questions provided:

1. At the beginning of this task, you thought about different ecosystem services and resources humans get from nature. Looking back at your earlier response (*Engage*), and using all your knowledge from this unit, which ecosystem service or resource do humans seem to be using most? Do you think humans are abusing this ecosystem service or resource, or using it irresponsibly? Explain your response.



**7th Grade Science Unit 4: Save the Andes!****Task 2: Disrupting Earth's Natural Systems**

2. In this task, we focused on the crosscutting concepts of:
- **Stability and Change**, or how small changes in one part of a system might cause larger changes in another part.
  - **Structure and Function**, or how structures can be designed to serve particular functions by taking into account properties of different materials.

Where did you examples of **Stability and Change** and **Structure and Function** in this task?

3. Now that you have learned more about how humans use ecosystem services and resources from the Andes region, and the resulting environmental impacts, what questions do you still have?

**7th Grade Science Unit 4: Save the Andes!**  
**Task 3: Living in Harmony – Weighing the Consequences**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Engage**

In Task 2, you explored how human actions often alter the natural ecosystem of the Andes region in harmful ways. For example, we saw that human activities such as mining and deforestation eliminate or endanger many plant and animal species, destroy natural habitats, and pollute once-clean freshwater sources.

1. Why should we care? Watch the video as a class and then answer the following question individually: why might the survival of ALL the plant and animal species in the Andes region matter?  
([https://www.youtube.com/watch?v=GK\\_vRtHJZu4](https://www.youtube.com/watch?v=GK_vRtHJZu4))

2. Think about the human impacts on the Andes region that you explored in Task 1. Individually, pick one human impact and brainstorm ways to resolve the problem.

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**Explore**

In Task 1, we explored eight human activities that negatively impact the Andes region: hunting, mining, deforestation, agriculture, increased carbon emissions, reliance on hydroelectric power, building roads, and developing synthetic materials. We can categorize these human activities based on the following environmental problems they contribute to: endangering species, destruction of habitats, and water pollution. Knowing that these human activities cause environmental problems is a good start; however, we also need to think about what can be done to help resolve these problems.

**Engaging in Argument From Evidence:** We know that humans can impact ecosystems negatively and cause large changes. However, people can also help ecosystems by doing things that restore **Stability** to an ecosystem.

As a group, you will:

1. Select one human activity that is negatively affecting the Andes region.
2. Conduct research on one type of environmental problem this human activity leads to.
3. Conduct research on how people currently combat this environmental problem.
4. Describe at least two solutions you found in your research that meet the criteria of the problem.
5. Compare/contrast the solutions you've described by explaining the benefits and drawbacks of each solution.

As you conduct your research, use the questions below to guide you. (See also the "Tips for Internet Research Resource Card" to help you conduct your research.) Record your research on a separate piece of paper.

1. How does this human activity negatively affect the Andes region?
2. What environmental problems does this human activity cause?
3. How do these environmental problems threaten biodiversity?
4. What are at least two solutions to combat these environmental problems?
  - a. How does each solution work?
  - b. Where have they tried each solution?
  - c. How successful was each solution?
  - d. If a solution was not successful, why didn't it work?
5. What are the potential benefits, or advantages, of each solution?
6. What are the potential drawbacks, or disadvantages, of each solution?

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**Explain**

**Engaging in Argument From Evidence:** In your group, create a poster or digital presentation that you will share with the class, which describes the two solutions you researched. As a class, you will then evaluate the benefits and drawbacks of each solution. You may use the space below to plan your poster or digital presentation.

**7th Grade Science Unit 4: Save the Andes!**  
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**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Elaborate**

When thinking of ways to stop harming the environment, it is easy to offer solutions like “stop cutting down trees” or “stop polluting the water”. However, seemingly small (local) changes like stopping deforestation may have significant consequences at larger (global) scales. For example, if some parts of the world depend on wood from forests in the Andes region, then what happens when trees from the Andes are no longer cut down?

As a group,

1. **Stability and Change:** For each of your solutions, write down how it would impact human communities at smaller and larger scales. (Hint: think about the products or services these resources provide).

Solution	Small Scale Effects (Local community)	Large Scale Effects (Global community)

2. Based on potential small and large scale effects, which solution do you think is more likely to be publicly supported? Explain your choice.



**7th Grade Science Unit 4: Save the Andes!**  
**Task 3: Living in Harmony – Weighing the Consequences**

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Evaluate: Connecting to the Culminating Project**

You have been asked to create a proposal to save the Andes. In this task, you have researched and evaluated solutions currently used to address some of the environmental problems caused by human activity in the Andes region. By now, you also realize that developing a conservation plan is often a balancing act that involves helping the environment on one hand, but also getting public support in order to accomplish this plan. To help you with this, use your new knowledge from this task to answer the following questions:

- What are the best solutions you heard about or researched in this task?
- How can you combine the parts of these solutions to create a stronger proposal for your final project?
- How might your combined proposal affect human communities at smaller (local) and larger (global) scales?

This should be completed individually in your Project Organizer.

**Unit Essential Question:** *How can we sustain biodiversity in a modern, changing world?*

**Reflection**

Individually reflect on Task 3, using the questions provided:

1. At the beginning of this task, you brainstormed a possible solution to an environmental issue in the Andes. Look back at your initial response: after learning everything you have in this task, does this solution still seem realistic? Would you be able to get support from local and global communities? If not, how would you change your proposal to gain more support?

**7th Grade Science Unit 4: Save the Andes!****Task 3: Living in Harmony – Weighing the Consequences**

2. In this task, we focused on the crosscutting concept of:
- **Stability and Change**, or how small changes in one part of a system might cause larger changes in another part.

Where did you see us looking at **Stability and Change** in this task?

3. Now that you have learned more about different solutions to preserve the Andes region, what questions do you still have?