
Save the Andes!

Unit 4

This slide deck is intended to help guide you and your students through the sequence of this unit. While you may choose to use these slides as a helpful tool to prompt and facilitate students, all detailed information for each unit is in the student and teacher unit booklets.

Unit Essential Question

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

Humans and Their Environment

Lift-Off Task

Man



<https://www.youtube.com/watch?v=WfGMYdaICIU&t=157s>

Generate Questions!

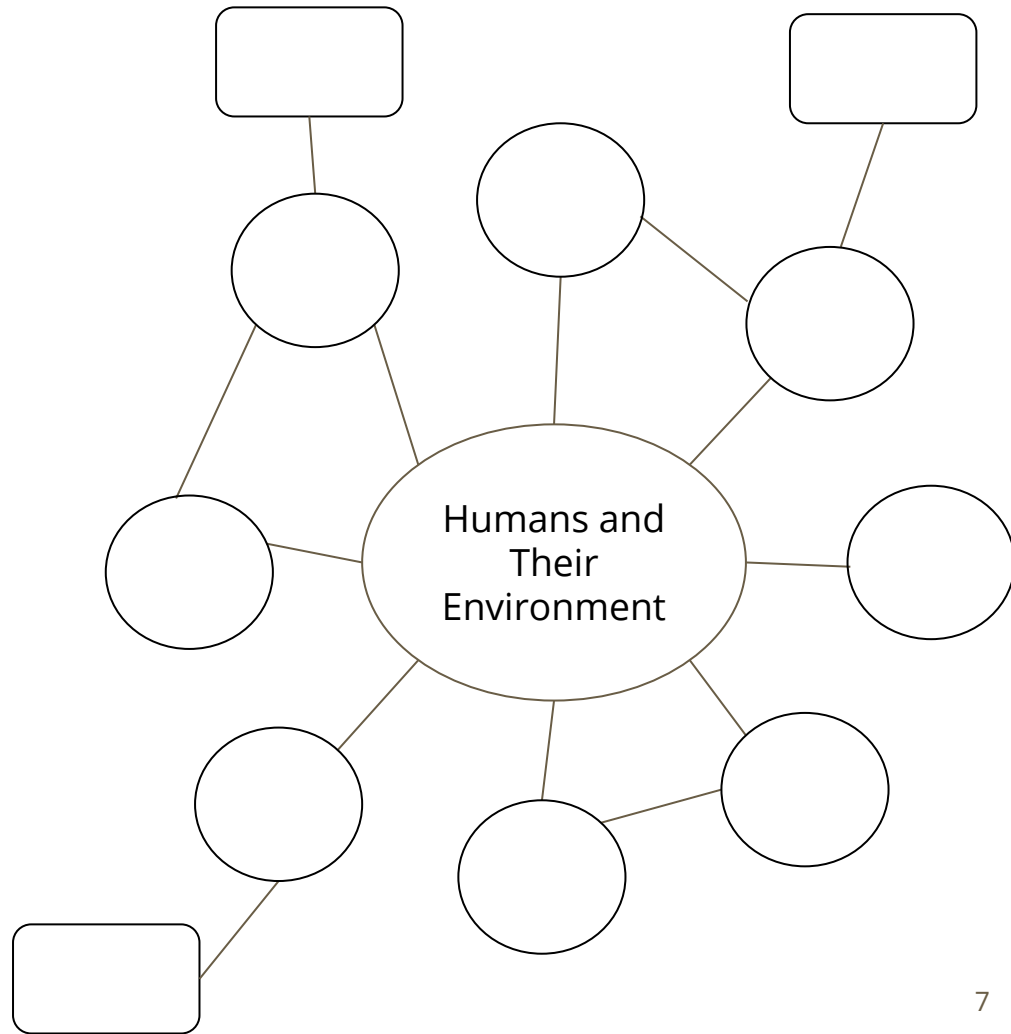
Based on the video and your prior knowledge, what questions would you ask about how humans interact with their environment?



Group Concept Map

As a group, create a concept map that shows:

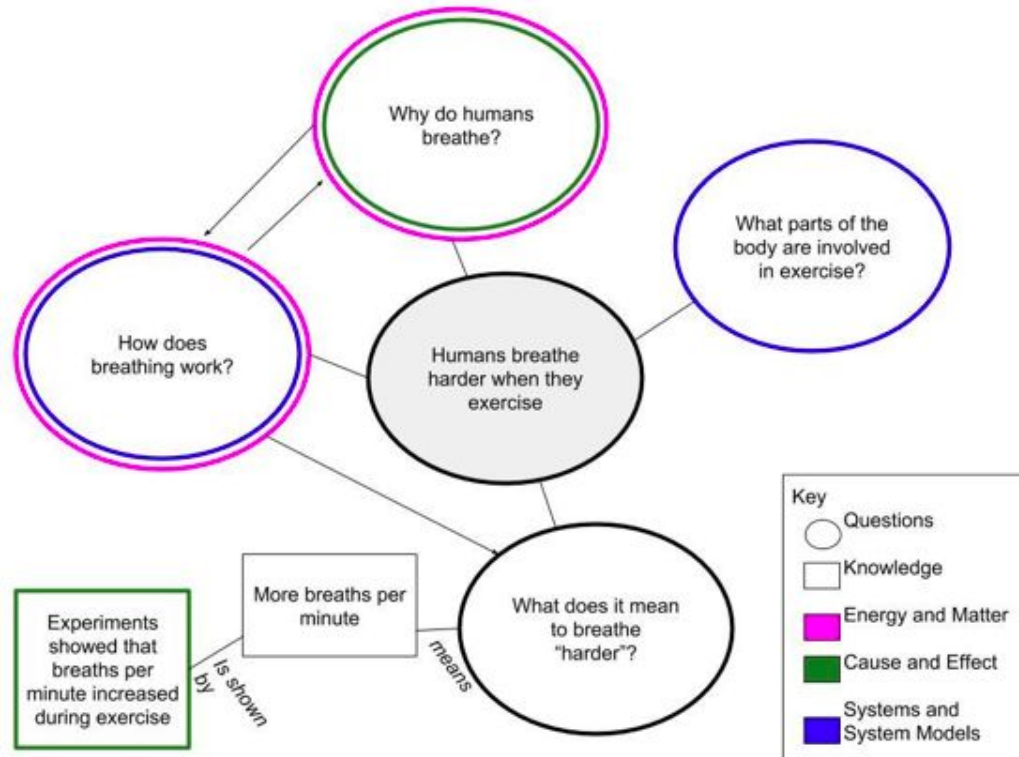
- Questions your group members had in common (circles)
- Possible answers to some questions (squares)
- Connections between related questions (lines)



Class Concept Map

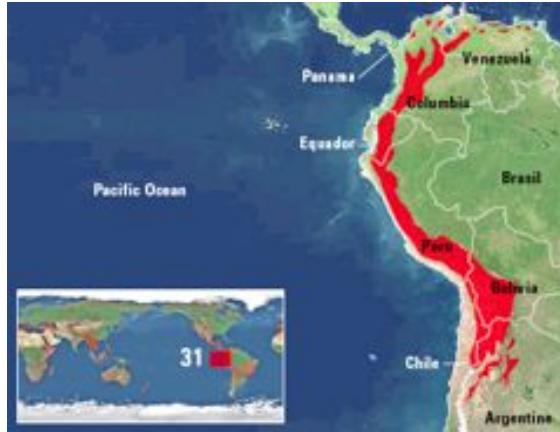
As a class, create a concept map that shows:

- Key questions (circles)
- Possible answers to some questions (squares)
- Connections between related questions (lines)
- Crosscutting concepts used (trace in color)



Introduction to the Culminating Project

Create a Proposal to Preserve the Andes!



Group Project - A scientific poster presentation of a proposal to save the Andes region

Individual Project - A journal article that details a proposal to save the Andes Region

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?

Complete this **individually** in your Project Organizer.

Reflection

Complete the questions at the end of your student guide to reflect on what you have learned in the Lift-Off Task.

Sculpting Landscapes

Task 1

What questions do you still have?



Engage

How do environments function naturally?



With a partner, brainstorm some examples of natural changes that can happen to environments on Earth.

Explore

What natural changes created the Andes region?

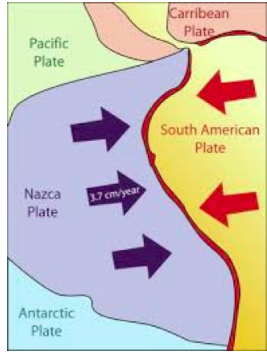


As a group,

1. Visit the stations to collect evidence on the geoscience processes that have made the Andes Mountains what they are today.
2. Take notes in the data chart.

Explain

Constructing Explanations



How have natural geoscience processes changed the Andes Mountains over time?

Individually, construct an explanation using evidence from the *Explore* to support your claim.

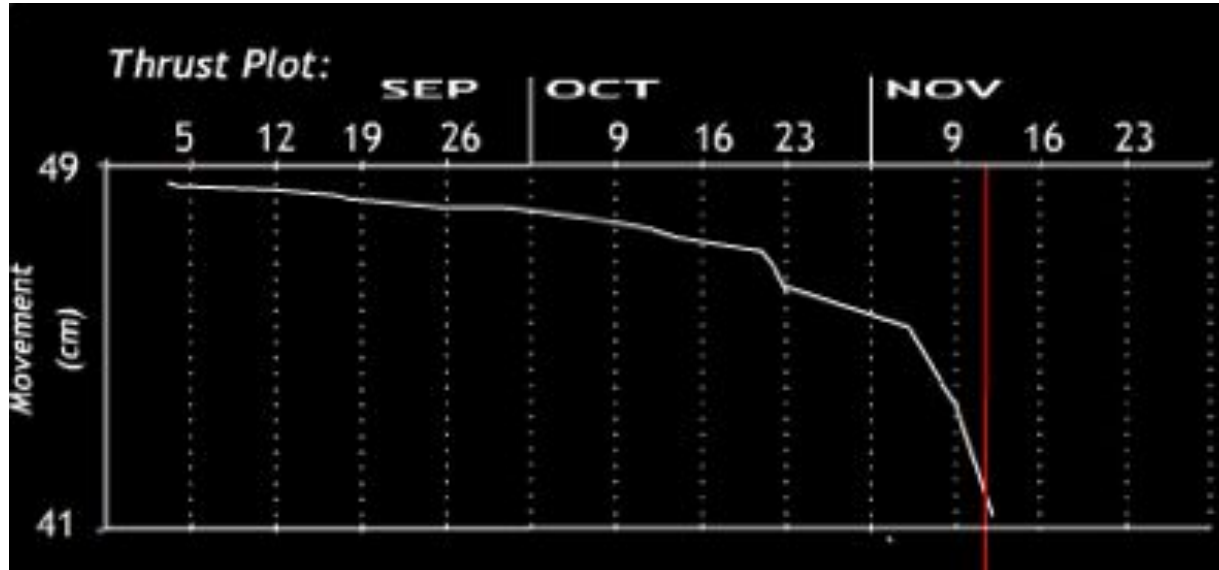
Elaborate

Sabancaya Volcano, Andes Mountains

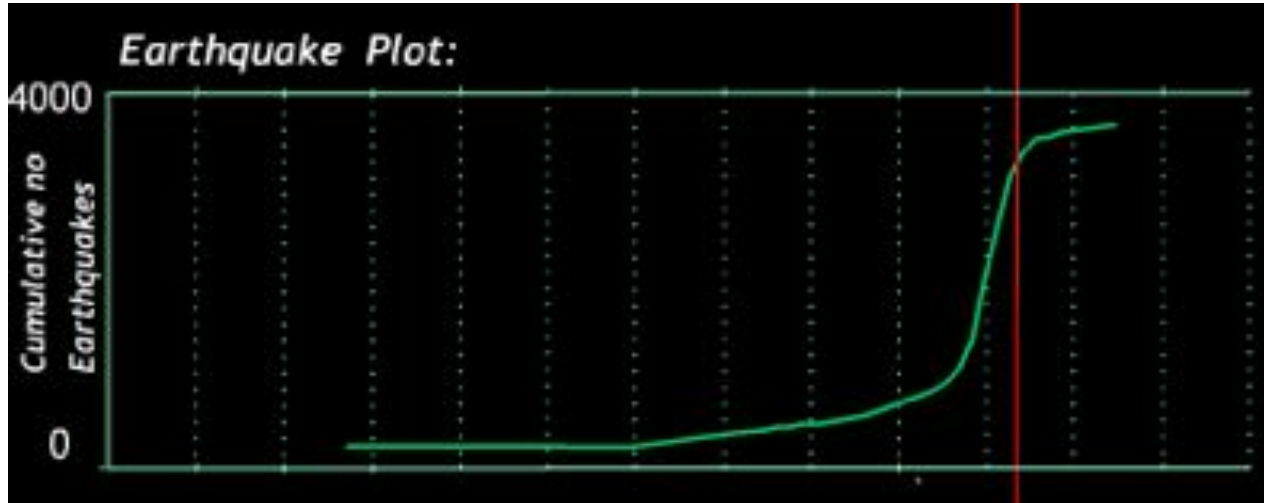


How can we predict volcanic eruptions to help mitigate the negative effects?

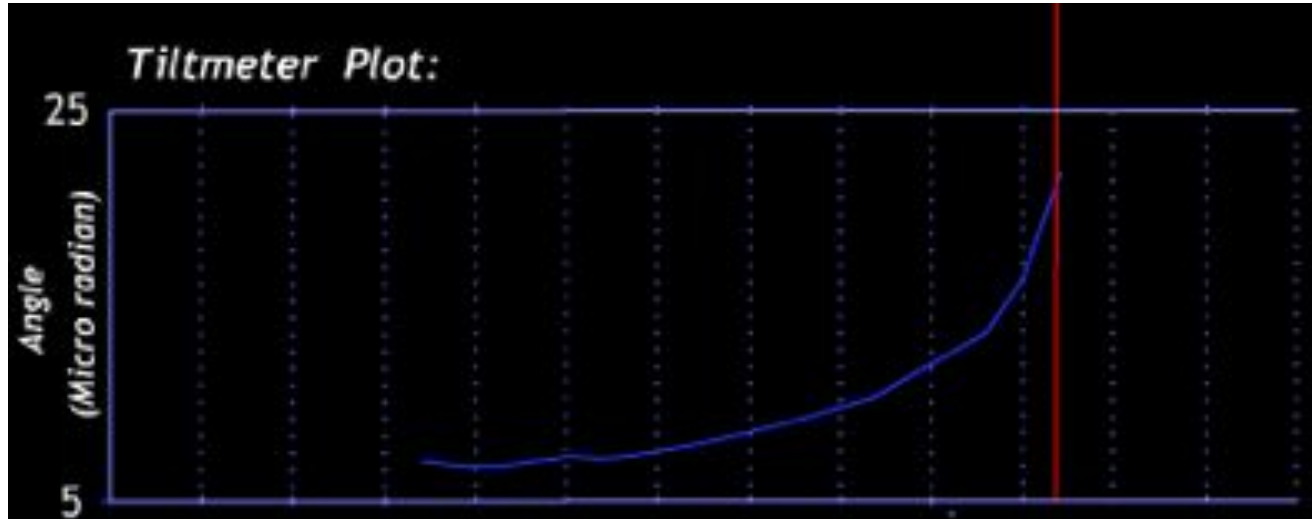
Data Type 1 - Thrusts



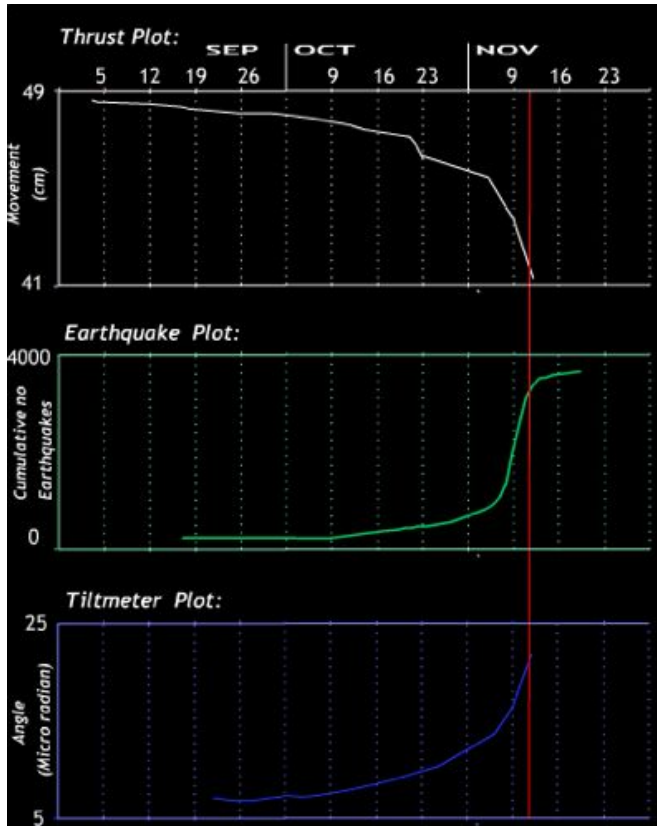
Data Type 2 - Earthquakes



Data Type 3 - Tiltmeter



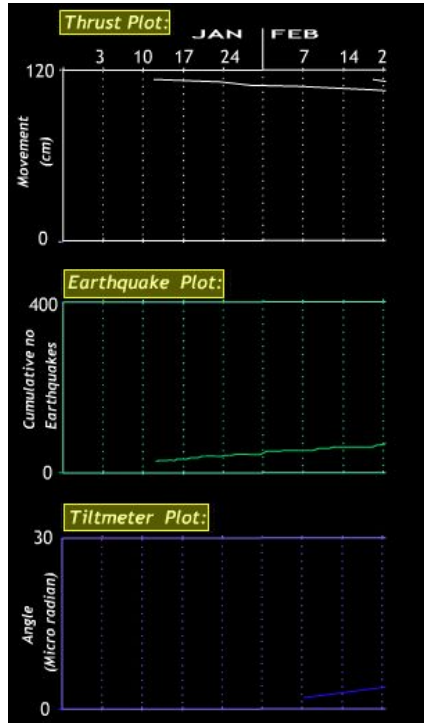
Predict a Volcanic Eruption!



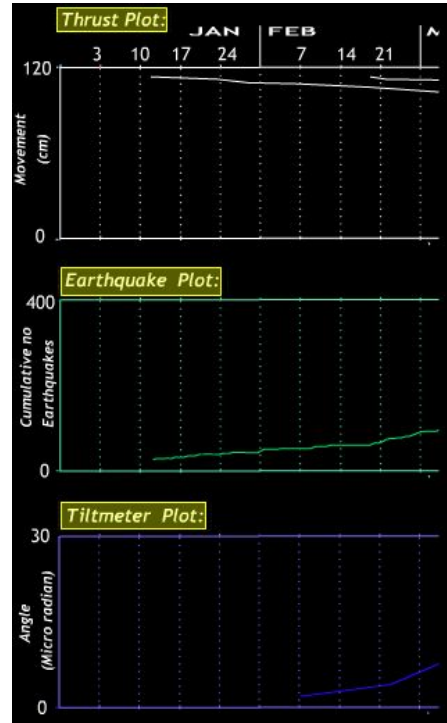
As a group,

1. Read Table #1 to review the evidence necessary to predict an eruption.
2. Follow the directions in your Student Guide to predict a volcanic eruption on the USGS website.
3. Record patterns in the graphs and use the patterns to inform predictions at different dates.

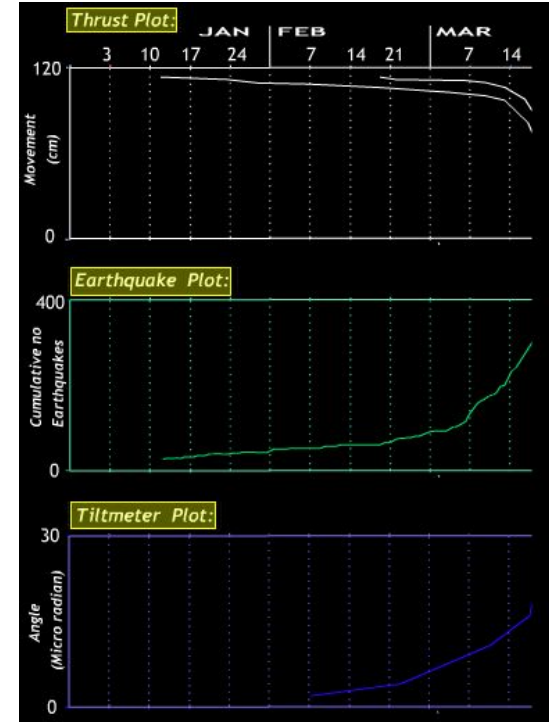
Class Debrief



February 21



March 3



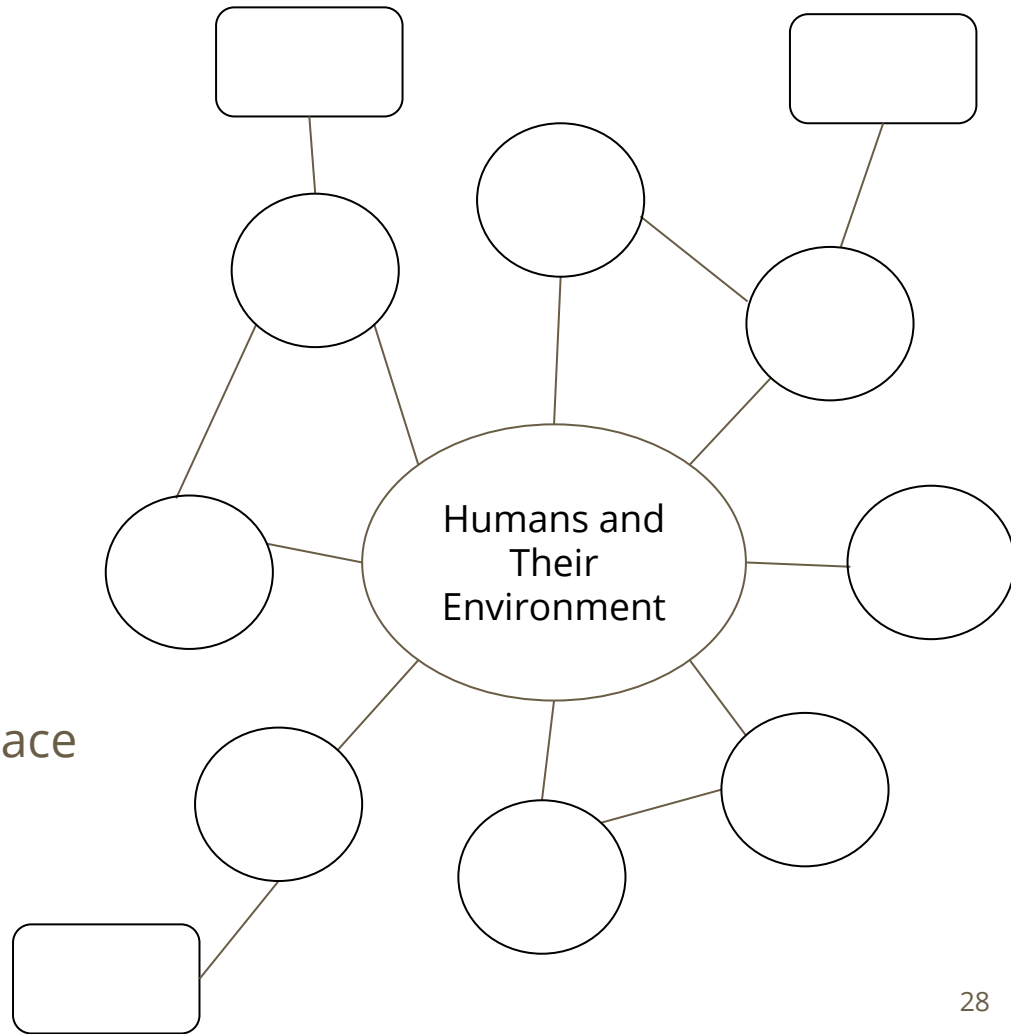
March 17

What should you do at each date? Why?

Class Concept Map

Add to your class concept map:

- New questions (circles)
- New ideas learned (squares)
- New connections (lines and connector words)
- Crosscutting concepts used (trace in color)
 - Patterns
 - Scale, Proportion, and Quantity



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.

Complete this **individually** in your Project Organizer.

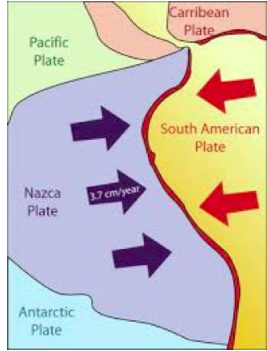
Reflection

Complete the questions at the end of your student guide to reflect on what you have learned in Task 1.

Disrupting Earth's Natural Systems

Task 2

What questions do you still have?



Engage

Think-Pair-Share



What ecosystem services and resources does nature provide humans?

Why do you think they are important for our survival and comfort?

Explore

When our reliance on the environment begins to disrupt natural systems, problems arise



Explore how humans are changing the Andes



As a group,

1. Visit the stations to learn how humans are affecting the Andes
2. Discuss and record information in your student guide



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 evidence from the *Explore* as evidence to justify your argument.

Critique, Correct, and Clarify

1. Critique: Analyze the response below:

*The resource card indicates that mining **does** destroy habitats for many plants and animals, putting animals like the Yellow Tailed Woolly Monkey and the Andean Mountain Cat in danger of extinction. Mining also contaminates water sources with toxic chemicals, like lead and cyanide, causing drinking water shortages and contamination of some agriculture fields.*

2. Correct: Individually, write an improved argument in your student guide.
3. Clarify: Describe how and why you corrected the response.

Elaborate

Are you part of the problem?



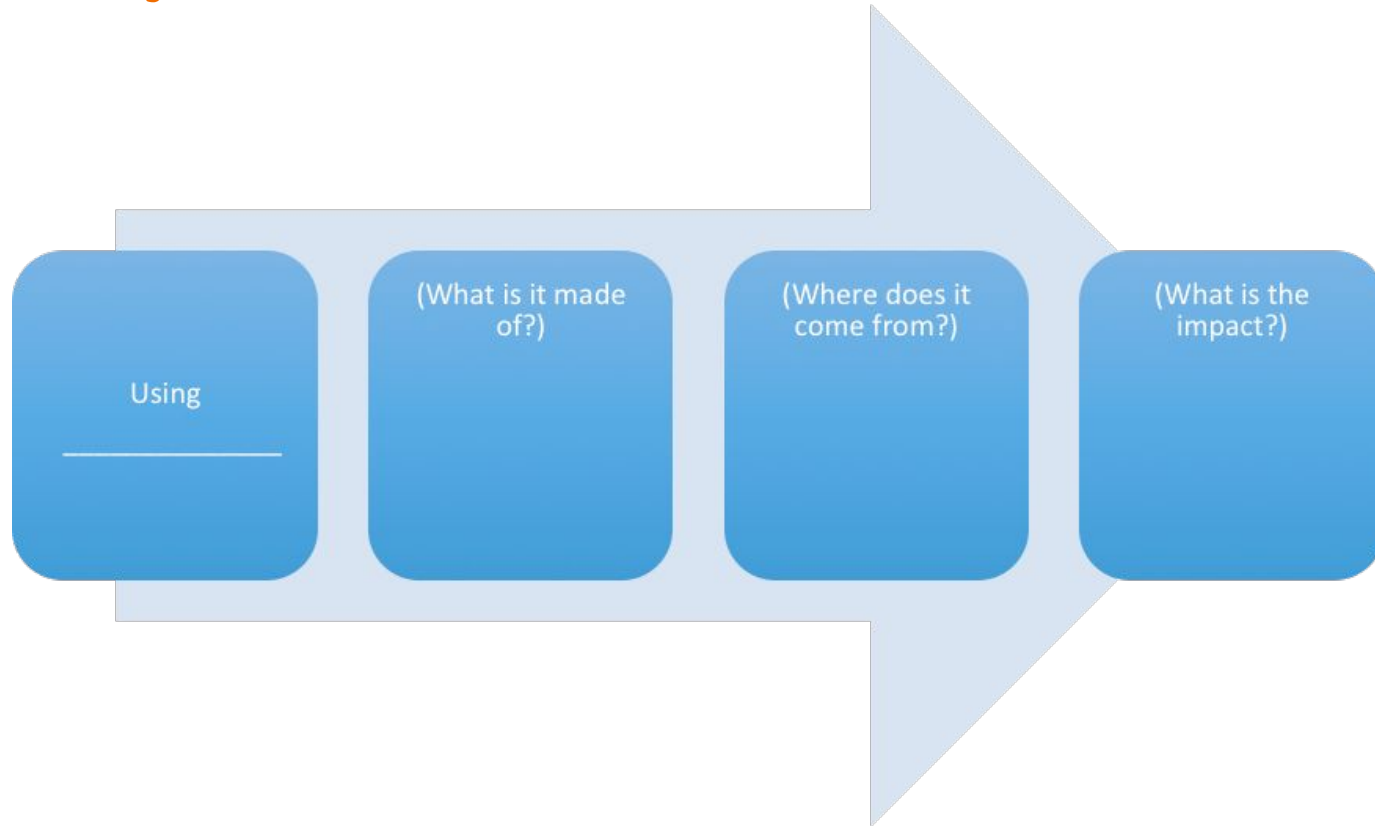
Case Study: Petroleum



Where does it come from? What products is it used for?

In groups, follow the instructions in your Student Guide to research one human activity in the Andes--the extraction of petroleum.

Case Study Debrief: Petroleum



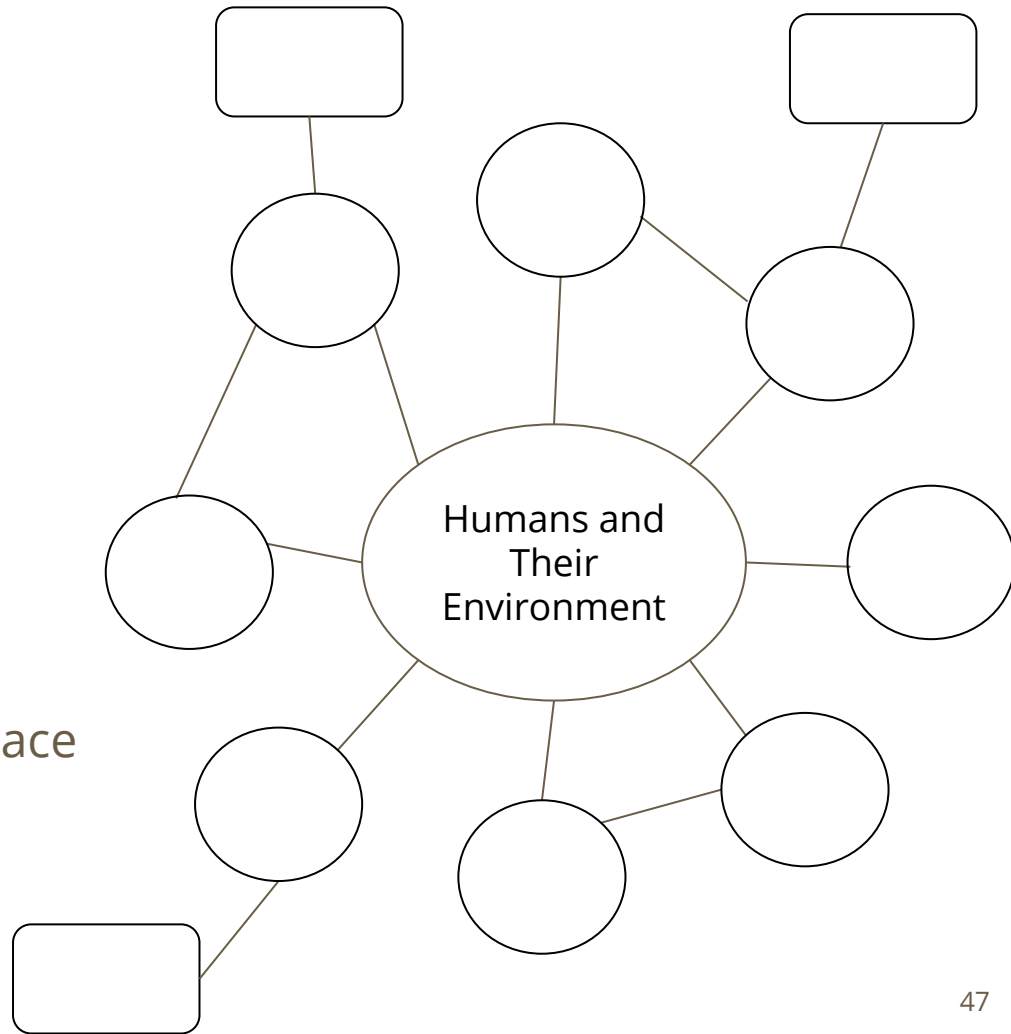
Think-Pair-Share

- Do you think that you personally are part of the problem?
- Can you think of ways to make these items without relying on petroleum?
- Can you think of possible alternatives to using these items?

Class Concept Map

Add to your class concept map:

- New questions (circles)
- New ideas learned (squares)
- New connections (lines and connector words)
- Crosscutting concepts used (trace in color)
 - Stability and Change
 - Structure and Function



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?

Complete this **individually** in your Project Organizer.

Reflection

Complete the questions at the end of your student guide to reflect on what you have learned in Task 2.

Living in Harmony - Weighing the Consequences

Task 3

What questions do you still have?



Engage

Why Should We Care?



https://www.youtube.com/watch?v=GK_vRtHJZu4

Watch the video and answer the questions in your Student Guide

Explore

We know human activities are negatively impacting the Andes



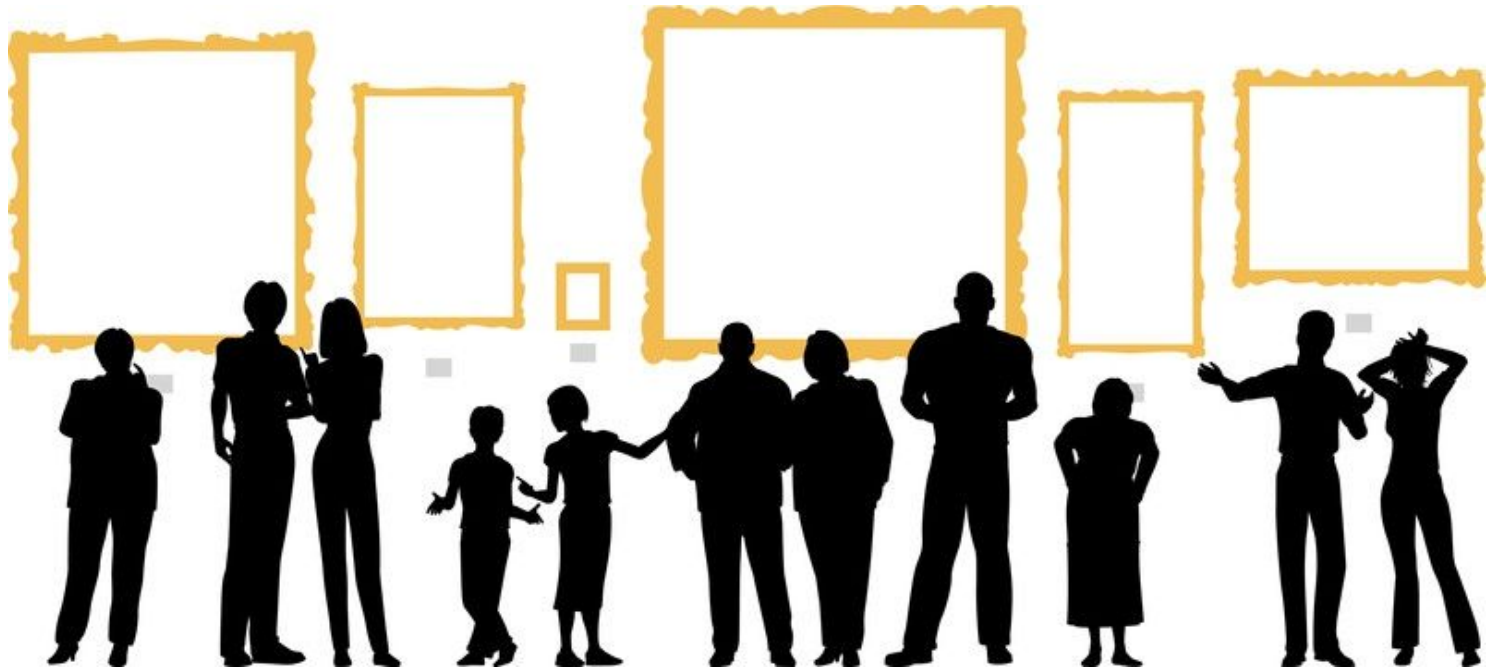
Now it is time to explore solutions!



As a group, follow the directions in your student guide to research one human activity that is negatively impacting the Andes and the solutions people are currently using to combat this type of problem around the world.

Explain

Share your research



Create a poster to share the two solutions you researched, including benefits and drawbacks.

Elaborate

Every Solution Will Impact Humans

Consider how each of your solutions will impact both local and global communities.

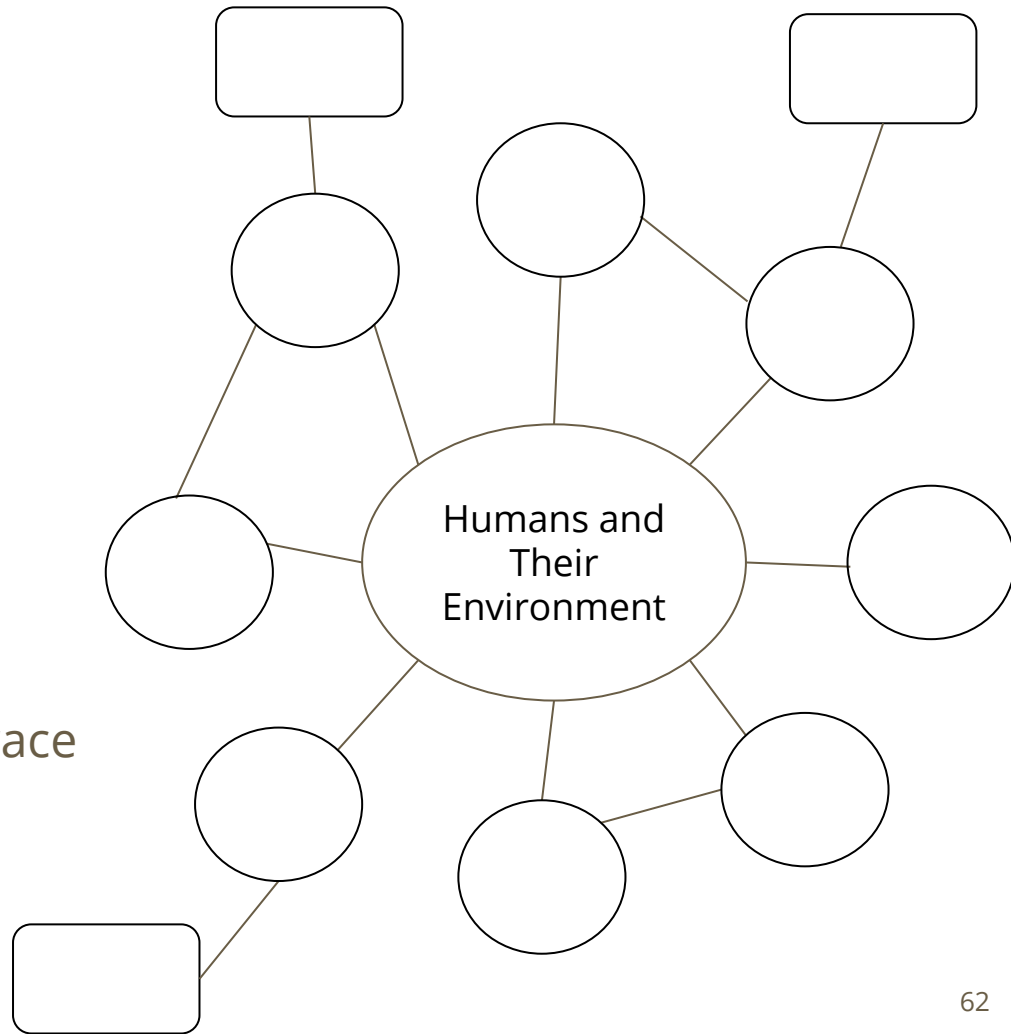
Based on the effects, which solution do you think is more likely to be publicly supported?



Class Concept Map

Add to your class concept map:

- New questions (circles)
- New ideas learned (squares)
- New connections (lines and connector words)
- Crosscutting concepts used (trace in color)
 - Stability and Change



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?

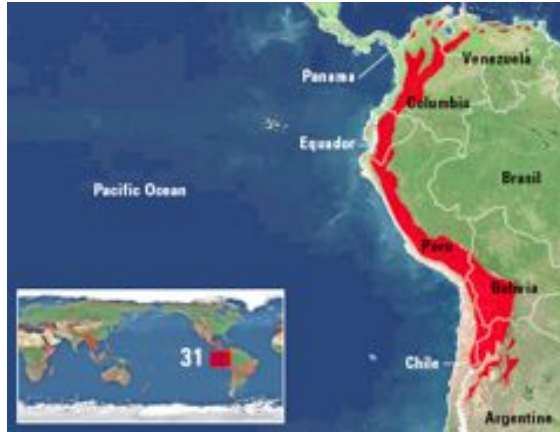
Complete this **individually** in your Project Organizer.

Reflection

Complete the questions at the end of your student guide to reflect on what you have learned in Task 3.

Culminating Project

Create a Proposal to Preserve the Andes!



Group Project - A scientific poster presentation of a proposal to save the Andes region

Individual Project - A journal article that details a proposal to save the Andes Region

Don't forget to use your checklist of criteria!

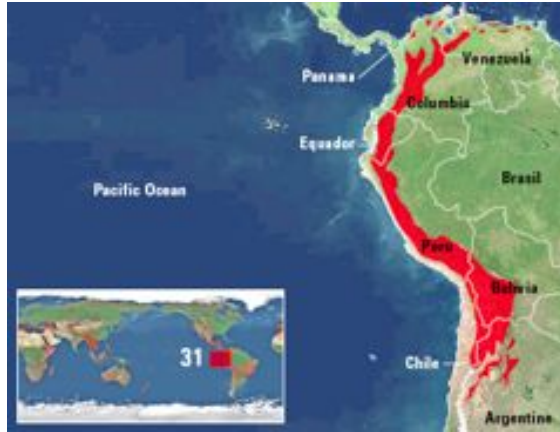
Group Project Criteria for Success

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

Create a Proposal to Preserve the Andes!



Group Project - A scientific poster presentation of a proposal to save the Andes region

Individual Project - A journal article that details a proposal to save the Andes Region

Optional Template

Your Article Title

Environmental Science Journal 2020

Write 2-3 catchy sentences to introduce your article, so readers will know what it is about.

Background on the Andes



Biodiversity in the Andes

One Problem Facing the Andes

Existing Solutions Around the World

Our Proposal

Don't forget to use your checklist of criteria!

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 shaped the Andes landscape, 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?
 - Using your stability and change table from Task 3, 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

Peer Review

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 shaped the Andes mountains, 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.

- Identify the constraints: What barriers might make it difficult to stop this problem?
 - Using a cause-and-effect flowchart, depict the 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: