NATIONAL GEOGRAPHIC

**RESOURCE LIBRARY I** ACTIVITY : 2 HRS 30 MINS

# Exploring the Tradeoffs between Accessing Resources and Protecting the Amazon Rain Forest

Students explore the effects of human development on the Amazon rain forest in order to access valuable resources by analyzing the map Amazonia: The Human Impact. After analyzing effects due to mining and the construction of hydroelectric dams and oil and gas blocks, students write a proposal to protect an area that is at risk of being developed in the future.

**GRADES**

6, 7, 8

**SUBJECTS**

*Earth Science, Geography, Human Geography, Physical Geography*

**CONTENTS**

5 PDFs

## OVERVIEW

Students explore the effects of human development on the Amazon rain forest in order to access valuable resources by analyzing the map Amazonia: The Human Impact. After analyzing effects due to mining and the construction of hydroelectric dams and oil and gas blocks, students write a proposal to protect an area that is at risk of being developed in the future.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/exploring-tradeoffs-between-accessing-resources-and-protecting-amazon-rain-forest/

## DIRECTIONS

**1. Activate prior knowledge about students' use of resources that come from the Amazon.**

Introduce the mineral resources gold, copper, tin, and iron ore. Ask students how they, or people in general, use these resources in their daily lives. Then introduce oil and natural gas and ask students how they use these resources in their daily lives. Have students brainstorm as many possibilities as they can. Then ask: *Where do these resources come from? How do we get them?* Introduce students to mining, oil and gas blocks, and hydroelectric plants. Explain that these methods are needed to extract the resources we need. Then introduce the Amazon rain forest as a place that provides many of these resources. To get to these resources, people need to clear forests to build roads, mines, and plants. (If there is a local or regional development project or deforestation issue, use that scenario to draw out student ideas about how development impacts the ecosystem and then connect those ideas to development in the Amazon). Tell students they are going to explore maps of the Amazon rain forest with many proposed mines, oil and gas blocks, and hydroelectric plants. Based on information from the map, they will identify which proposed mines, blocks, and plants will have the most damaging effects on the Amazonian ecosystem and the indigenous communities nearby. They will then propose the location of a new protected area in the rain forest.

**2. Explore the map to construct knowledge about where resources are located.**

Divide students into small groups of three to explore the map Amazonia: The Human Impact and get a sense of where different resources are primarily located. In their groups, have students complete Part 1 of the worksheet Resources in the Amazon to explore the location of mines (gold, copper, tin, and iron ore), oil and natural gas blocks, and hydroelectric plants.

**3. Explore the location of indigenous populations and protected areas.**

Ask students to complete Part 2 of the worksheet Resources in the Amazon to explore the location of indigenous territories and protected areas and their proximity to the mines, oil and gas blocks, and hydroelectric plants.

**4. Explore the locations of proposed projects.**

Ask students to complete Part 3 of the worksheet Resources in the Amazon to explore the mines, blocks, and hydroelectric plants that are under exploration or planned.

**5. Propose a new site for a protected area.**

Ask students to discuss in their groups the information they found and recorded in their worksheets. Then ask them to identify areas in which the indigenous populations in Amazonia will be most affected. As a group, have them discuss a proposal for where they believe a new protected area should be placed. Distribute the Proposal Rubric and discuss the rubric criteria as a class. Next ask students to complete the worksheet A Proposal for a New Protected Area in Amazonia as a group to write their proposal.

**6. Students present their proposals.**

Have each small group present their proposals to the class. Ask audience members to take notes on the advantages and disadvantages of each new protected area proposal. Discuss the proposals as a whole class. Ask: *Were proposals similar across groups? What did groups pay attention to when selecting new protected areas in Amazonia? Were there common or different stakeholders across groups? Could different actions be taken to minimize the impact on the surrounding area?*

# Modification

For younger students or struggling readers, have them complete the Resources in the Amazon worksheet during a whole-class discussion.

# Modification

This activity works best in small groups. Cooperative learning benefits advanced learners and struggling readers. Assign groups so that advanced students are grouped with struggling readers.

# Modification

To complete the worksheet, Role of Trees in the Amazon, place struggling readers or English language learners with peers who are stronger readers that can help them interpret the questions and find evidence on the map to answer the questions.

# Modification

To ensure that everyone participates in group work, assign or allow students to choose jobs according to their strengths (e.g., recorder, facilitator, speaker, and map reader).

# Modification

To ensure that everyone participates in group work, assign or allow students to choose jobs according to their strengths (e.g., recorder, facilitator, speaker, computer driver).

# Alternative Assessment

Collect the written proposals from each group and use the provided rubric to assess groups' written work.

# Extending the Learning

- Research local or regional development and deforestation issues to help students make a connection to similar issues in the Amazon. Have students consider the tensions between the need for resources and the impact on the local ecosystem and the forced relocation of people.
- Have students conduct further research on how the extraction of different resources (mineral resources, oil and gas, hydroelectric energy) impacts local ecosystems and forces the displacement of people.
- For a cross-curricular extension, have students explore indigenous peoples and how the Amazon rain forest is integrated with their culture and traditions.
- Consider adding trade books, video, or websites with photographs or narratives to provide background information for students and introduce some of the concepts presented in the activity such as mining, drilling for oil and gas, or building hydroelectric dams.

## OBJECTIVES

# Subjects & Disciplines

**Earth Science**

**Geography**

- Human Geography
- Physical Geography

# Learning Objectives

Students will:

- use a map to identify areas where resources are commonly found and extracted in Amazonia along with potential sites for future extraction
- draw patterns across layers of information provided in a map, including the relationship between resources, hydroelectric power, protected areas, and the distribution of indigenous populations in Amazonia
- write a proposal for the location of a protected area that includes evidence from the map to support why they believe that area needs to be protected

# Teaching Approach

- Learning-for-use

# Teaching Methods

- Cooperative learning
- Discussions
- Reading
- Writing

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information Literacy

    - Learning and Innovation Skills
        - Communication and Collaboration
        - Critical Thinking and Problem Solving
- 21st Century Themes
    - Environmental Literacy
    - Global Awareness
- Critical Thinking Skills
    - Analyzing
    - Understanding
- Geographic Skills
    - Acquiring Geographic Information
    - Analyzing Geographic Information
- Science and Engineering Practices
    - Analyzing and interpreting data
    - Constructing explanations (for science) and designing solutions (for engineering)
    - Obtaining, evaluating, and communicating information

# National Standards, Principles, and Practices

### IRA/NCTE STANDARDS FOR THE ENGLISH LANGUAGE ARTS

- **Standard 7:**

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

### NATIONAL GEOGRAPHY STANDARDS

- **Standard 1:**

How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

- **Standard 14:**

How human actions modify the physical environment

- **Standard 15:**

How physical systems affect human systems

- **Standard 4:**

The physical and human characteristics of places

## COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **Reading Standards for Informational Text 6-12:**

Integration of Knowledge and Ideas, RI.6.7

- **Reading Standards for Literacy in History/Social Studies 6-12:**

Integration of Knowledge and Ideas, RH.6-8.7

- **Science and Technical Subjects 6–8:**

Craft and Structure, RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context

- **Speaking and Listening Standards 6-12:**

Comprehension and Collaboration, SL.8.2

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.6.4

- **Speaking and Listening Standards 6-12:**

Comprehension and Collaboration, SL.7.1

- **Speaking and Listening Standards 6-12:**

Comprehension and Collaboration, SL.7.2

- **Speaking and Listening Standards 6-12:**

Presentation of Knowledge and Ideas, SL.7.4

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- **Speaking and Listening Standards 6-12:**

Comprehension and Collaboration, SL.6.2

- **Writing Standards 6-8:**

Text Types and Purposes, WHST.6-8.1C

- **Writing Standards 6-8:**

Text Types and Purposes, WHST.6-8.1B

## ISTE STANDARDS FOR STUDENTS (ISTE STANDARDS*S)

- **Standard 4:**

Critical Thinking, Problem Solving, and Decision Making

## THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

• **Geographic Representations: Spatial Views of the World: D2.Geo.2.6-8:**
Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.
• **Geographic representations: spatial views of the world: D2.Geo.6-8:**
Use paper based and electronic mapping and graphing techniques to represent and analyze spatial patterns of different environmental and cultural characteristics.
• **Human Population: Spatial Patterns and Movements: D2.Geo.7.3-5:**
Explain how cultural and environmental characteristics affect the distribution and movement of people, goods, and ideas.

**Preparation**

**What You'll Need**

### MATERIALS YOU PROVIDE

- Pencils

### PHYSICAL SPACE

- Classroom

### SETUP

A space that allows for whole class discussion as well as small group work, and that allows students to move freely between these structures is needed.

### GROUPING

- Heterogeneous grouping

### OTHER NOTES

This activity is intended to be conducted in two, 50-minute class periods: Day 1-- students explore the map and construct knowledge about the location of various resources and proposed extraction; Day 2 -- students write and present proposals.

**RESOURCES PROVIDED: HANDOUTS & WORKSHEETS**

- Amazonia: The Human Impact
- Resources in the Amazon
- Resources in the Amazon Answer Key
- A Proposal for a New Managed Area in Amazonia
- Proposal Rubric

## BACKGROUND & VOCABULARY

# Background Information

Rain forests are disappearing at an alarmingly fast pace, largely due to human development over the past few centuries. Once covering 14% of land on Earth, rain forests now make up only 6%. Since 1947, the total area of tropical rain forests has likely been reduced by more than half, to about 6.2 to 7.8 million square kilometers (3 million square miles). Many biologists expect rain forests will lose 5-10% of their species each decade. Rampant deforestation could cause many important rain forest habitats to disappear completely within the next hundred years. Throughout the Amazon, mining and logging operations clear cut to build roads and dig mines. The Amazon is also threatened by massive hydroelectric power projects, where dams flood acres of land. Development is encroaching on rain forest habitats from all sides. Economic inequalities fuel this rapid deforestation. Much of the Amazon rain forest is located in developing countries with economies based on natural resources. Wealthy nations, like the United States, drive demand for products, and economic development increases energy use. These demands encourage local governments to develop rain forest acreage at a fraction of its value. Impoverished people who live on or near these lands are also motivated to improve their lives by converting forests into subsistence farmland.

The mining industry is very important to South America's economy. Mining is the process of extracting ore from the Earth. Mineral resources including iron ore, copper, gold, and tin are extracted through mining. South America contains about 20% of the world's iron ore reserves.

Iron ore and steel, which is made from iron, are used in construction and machinery throughout the world. South America contains more than 25% of the world's copper reserves. Copper is used in electrical wiring and equipment because it is a good conductor of heat and is resistant to corrosion. Gold is also extracted through mining. Because of its value and high demand for luxury goods, illegal miners burn parts of the forest to quickly access areas with gold. They also use mercury to separate gold, which contaminates rivers and is a toxin that enters the food chain when it is taken up by fish. Tin is another mineral extracted through mining. It is used to solder metallic surfaces.

Oil and natural gas are also very important to South America's economy. They are extracted via drilling and then used for energy and fuel. Oil extraction can release toxins into rivers, and when pipelines break this can result in leaks that spill oil into the environment.

Moving water is used to make hydroelectric energy. To harness energy from flowing water, the water must be controlled. Usually a dam is constructed on a river to create a reservoir. The water is then channeled through tunnels in the dam that cause turbines to turn, which ultimately leads to the generation of electricity. While hydroelectricity relies on water, a clean renewable energy source, the construction of the dams needed to harness that energy can affect the local plant and animal life, as well as cause humans to relocate.

Indigenous communities are scattered throughout the Amazon rain forest. These populations have a long relationship with the forest that allows them to hunt, fish, and grow crops for sustenance. Indigenous territories have been diminishing as loggers, drug traffickers, oil companies, and miners have encroached on their land. As a result, they have retreated deeper into the jungle, where they choose to live in isolation to preserve their cultural traditions and spiritual connections to the rain forest.

# Prior Knowledge

["map reading skills","ability to select evidence from maps and text that supports a claim","ability to obtain, evaluate, and communicate information from media and text resources"]

# Recommended Prior Activities

- None

# Vocabulary

| Term | Part of Speech | Definition |
|---|---|---|
| **basin** | *noun* | a dip or depression in the surface of the land or ocean floor. |
| **biodiversity** | *noun* | all the different kinds of living organisms within a given area. |
| **copper** | *noun* | chemical element with the symbol Cu. |
| **dam** | *noun* | structure built across a river or other waterway to control the flow of water. |
| **deforestation** | *noun* | destruction or removal of forests and their undergrowth. |
| **economy** | *noun* | system of production, distribution, and consumption of goods and services. |
| **ecosystem** | *noun* | community and interactions of living and nonliving things in an area. |
| **electricity** | *noun* | set of physical phenomena associated with the presence and flow of electric charge. |
| **extract** | *verb* | to pull out. |
| **gold** | *noun* | valuable chemical element with the symbol Au. |
| **hydroelectric energy** | *noun* | energy generated by moving water converted to electricity. Also known as hydroelectricity. |
| **hydroelectricity** | *noun* | power generated by moving water converted to electricity. Also called hydroelectric energy or hydroelectric power. |
| **indigenous** | *adjective* | characteristic to or of a specific place. |
| **indigenous reserve** | *noun* | area of land set aside by the government for exclusive use by an indigenous community. |
| **iron** | *noun* | chemical element with the symbol Fe. |
| **logging** | *noun* | industry engaged in cutting down trees and moving the wood to sawmills. |
| **mining** | *noun* | process of extracting ore from the Earth. |
| **natural gas** | *noun* | type of fossil fuel made up mostly of the gas methane. |
| **ore** | *noun* | deposit in the Earth of minerals containing valuable metal. |
| **rainforest** | *noun* | area of tall, mostly evergreen trees and a high amount of rainfall. |
| **renewable energy** | *noun* | energy obtained from sources that are virtually inexhaustible and replenish naturally over small time scales relative to the human life span. |
| **reservoir** | *noun* | natural or man-made lake. |

| Term | Part of Speech | Definition |
|---|---|---|
| **resource** | *noun* | available supply of materials, goods, or services. Resources can be natural or human. |
| **stakeholder** | *noun* | person or organization that has an interest or investment in a place, situation or company. |
| **steel** | *noun* | metal made of the elements iron and carbon. |
| **tin** | *noun* | chemical element (metal) with the symbol Sn. |
| **tropical rain forest** | *noun* | grouping of tall evergreen trees, usually close to the Equator, which receives more than 203 centimeters (80 inches) of rain a year. |

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