NATIONAL GEOGRAPHIC

RESOURCE LIBRARY | LESSON

Making a Decision about Building a Road in the Amazon

Students will analyze a real-world environmental case of building a road through the Amazon rain forest. They will explore the geographical, cultural, and environmental context of building the road, identify the stakeholders and their role and impact, and map out the intended and unintended consequences from the decision that they make.

GRADES

9 - 12+

SUBJECTS

Biology, Geography, Human Geography

CONTENTS

3 Activities

ACTIVITY 1: A PROPOSAL TO BUILD A ROAD IN THE AMAZON | 50 MINS

DIRECTIONS

1. Connect to students' prior knowledge about human impacts on the environment.

Activate students' prior understanding about human impacts on the environment. Have students think about various construction projects—buildings, bridges, highways, etc. (If there is something local, use that more relevant scenario to draw out student ideas.) Have students think about why these construction projects are important for the local communities and people who live there. Ask: *Why do we need more bridges? Another building? Wider highways? What are the benefits of making these changes?* Then have students think about the effects these projects have on the environment. Ask: *What other living things are often*

affected by decisions to build bridges, roads, or buildings? How are they affected? Have students think about the tensions involved in making difficult decisions. Ask a couple of students to share their thoughts with the class. The focus of this discussion is to get a few examples and to get students thinking about human impacts on the environment.

2. Introduce the Amazon Road Building case study.

Give students The Amazonian Road Decision handout and ask them to read for understanding. Ask students to write any questions they might have. After reading the case study, have a brief discussion with the class to check for understanding. Ask:

- *What is the reason for building the road?* (The purpose is to connect rural communities that have had relatively stagnant economic growth over the past few decades.)
- *Who does the road benefit?* (It will benefit the rural communities near the road, particularly citizens of Cruzeiro do Sul, Brazil, by giving them access to transport and trade their goods to a larger city, and ultimately enhance their participation in the global economy.)
- *What would happen to the environment in the area if the road were built?* (The primary concern is the correlation between deforestation and roads throughout the Amazon. This road will provide easier access to large canopy trees, such as mahogany, that are highly valued in the global economy. Removing these trees will release large amounts of carbon into the atmosphere, affecting global warming. Additionally, road construction and ultimately road use could lead to pollution in the area and damage water quality.)
- *What would happen to the people and other living things in the area if the road were built?* (The indigenous people, like the Ashéninka population, will have to relocate and could face threats from disease as they lack immunity to diseases from outside cultures. Canopy dwellers—like birds and monkeys—and other living things will have to relocate as their resources and water quality will be diminished.)

3. Have students portray one of the stakeholders from the Amazon Road case study.

Brainstorm individuals that might be involved in the decision about the construction of the Pucallpa-Cruzeiro do Sul road. Explain that the individuals they identify are called *stakeholders*. A stakeholder is a person, organization, living organism, or physical environment that is affected by the decision that is made. Some stakeholders, such as people and organizations, have a strong voice in the decision and generally are a part of the decision-making process. Other stakeholders, such as plants, animals, and the physical environment, are silent and do not have a voice in the decision or the process for making a decision.

Remind students that the Pucallpa-Cruzeiro do Sul road has a real-world environmental impact and, therefore, many stakeholders will be influenced when decisions are made. Write the list of stakeholders identified on the board (Ashéninka people (indigenous communities), Amazonian ecosystem, wildlife, loggers and logging companies, residents of rural communities, international consumers).

Distribute the Stakeholder Table worksheet, and model how to complete the first row. Explain to students that they will take on the role of one of these stakeholders and will write an early decision statement based on their knowledge and viewpoint of that stakeholder. Divide students into groups of three, and assign each group one of the stakeholders; grouping in odd numbers supports a more productive discussion. Ask students to read about their stakeholder in The Amazonian Road Decision handout and complete the row for that stakeholder in Part 1 of the Stakeholder Table worksheet. After they have discussed this stakeholder thoroughly, have students work as a group to write a decision statement from their stakeholder's perspective in Part 2 of the Stakeholder Table worksheet. There are no right or wrong answers to the table or the decision statement.

4. Have stakeholder groups share their decision statement.

Ask each group to share its decision statement with the rest of the class. Record the decision statements on the board for all students to see. As groups are sharing, the audience groups can fill out the rest of their Stakeholder Table worksheet.

5. Have students reflect on the level of influence each of the stakeholder's has in the Amazon road decision.

After all groups have presented, have a class discussion about the similarities and differences among the various stakeholder statements. To promote discussion, categorize the stakeholders that are in favor of building the road and the stakeholders that are not in favor of the road. Compare and contrast the reasoning of each of the stakeholder's groups. Ask the class to share aloud which stakeholder(s) they think have the most influence in the decision-making process. Ask: *Which of the stakeholders have the least influence and why? Which stakeholders will be the most affected by the decision to build a road? Is there a relationship*

between the stakeholders that have the least influence and the ones that are the most affected? (There is no right answer to these questions. Use these questions to support a lively discussion. When appropriate, reference the case study.) Ask students to take notes on the back of the Stakeholder Table worksheet. Ask students to hold onto their notes and Stakeholder Table worksheet. They will use this table and their notes in Activity 3 of this lesson.

6. Have students reflect on the Amazon road decision.

Explain to students that in this activity, they were asked to make a decision from one perspective. Ask: *What do you think it would be like if you had to negotiate the multiple perspectives and needs of all stakeholders? Do you think you could come to a decision in which all involved would be happy? If yes, why? What would the process be?* Remind students a decision like this is much more complicated than taking one stakeholder's perspective. An informed environmental decision requires an examination of economic, cultural, *and* environmental factors. Have students individually reflect upon the process they went through by writing their thoughts on a piece of paper. Have them consider which factors they need to explore more so they can make a more informed decision. Use the following questions to guide their reflections:

- *What were some of the roadblocks you experienced in making your decision?*
- *Was there anything you considered but was not necessary in your discussions during your decision-making process? Explain.*
- *Did you feel that all stakeholders got a fair voice in the process? Why or why not?*
- *How did your group weigh the different consequences when making your decision statement?*
- *Did you consider economic, cultural, and environmental factors equally? If so, what played into your decision? If not, what factors do you need to explore more so you can make a decision that more fully considers cultural, environmental, and economic consequences?*

Modification

For struggling readers, have them annotate the reading by circling new vocabulary and underlining important phrases or sentences. They can also be paired with more confident readers to help process the text.

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.

Alternative Assessment

In this activity, students will complete the Stakeholders Table in small groups and participate in discussion. They will also draft a Decision Statement based on one stakeholder's perspective. Student talk and student work will be used to determine if students are meeting both objectives for this activity.

Extending the Learning

- Have students write a persuasive paper to argue for or against building the road from the point of view of one stakeholder.
- Have students conduct further research on local building practices and create an informative campaign (brochure, multimedia presentation, etc.) for or against a local building project.
- Have students use MapMaker Interactive to explore the geography of the Amazon rain forest.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Learning Objectives

Students will:

- identify the role that stakeholders play in determining the outcome of building a road within the Amazon rain forest

- identify various geographic and political factors that may influence the decision to build a road in the Amazon rain forest

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Reading
- Role playing
- 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
- Critical Thinking Skills
  - Analyzing
  - Understanding
- Geographic Skills
  - Acquiring Geographic Information
  - Analyzing Geographic Information
- Science and Engineering Practices
  - Analyzing and interpreting data

- Asking questions (for science) and defining problems (for engineering)
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

• **Theme 11: The Patterns and Networks of Economic Interdependence on Earth's Surface:**
• **Theme 14: How human actions modify the physical environment:**
• **Theme 16: The changes that occur in the meaning, use, distribution, and importance of resources:**

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.1
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.3
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.1
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.3
• **Speaking and Listening Standards 6-12:**
Comprehension and Collaboration, SL.9-10.1
• **Speaking and Listening Standards 6-12:**
Comprehension and Collaboration, SL.11-12.1
• **Writing Standards 6-12:**
Text Types and Purposes, W.11-12.2
• **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.2

NEXT GENERATION SCIENCE STANDARDS

• **HS. Earth's Systems:**
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
• **HS. Ecosystems: Interactions, Energy, and Dynamics:**
HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Preparation

BACKGROUND & VOCABULARY

Background Information

- The Amazon rain forest is a carbon sink. The Amazon rain forest plays a crucial role in keeping carbon out of our atmosphere, as it naturally sequesters about 20% of the atmospheric carbon emitted by the burning of fossil fuels elsewhere. But, it can only remain a carbon sink as long as it absorbs more carbon dioxide than it releases. The diminishing rain forest would greatly affect global warming.

- The Amazon is one of the most biodiverse ecosystems in the world. Yet, there are species that live there that are endangered or threatened, including primates such as the spider monkey and red howler monkey. When large trees, like mahogany, are removed, the large canopy that provided shelter, food, or nesting for some of these species disappears, resulting in relocation and possible fragmentation of some populations. Changes made to the ecosystem affect all life that lives there, but for the endangered or threatened populations, these changes could challenge their survival.

- Indigenous communities are scattered throughout the Amazon rain forest. The Ashéninka are one indigenous group whose territory lies at the Peru-Brazil border. They are the second largest indigenous group in the Amazon rain forest (behind the Quechua). Most of the Ashéninka population lives on the Peruvian side of the border, where they hunt, fish, and grow crops for sustenance. Ashéninka 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.

- Mahogany, a strong, reddish-brown wood, is found throughout the tropical Amazon rain forest, with dense populations near the Peru-Brazil border. It is valued for its color (hence the nickname, “red gold”) and durability and often used in paneling, furniture-making, and for musical instruments. The United States and Britain are the two largest importers of mahogany. In 2001, Brazil put a moratorium on mahogany exports making Peru the leading exporter. A 2012 World Bank report estimated that 80% of Peruvian timber export stemmed from illegal logging. A conservative estimate in 2000 stated nearly 57,000 mahogany trees were provided to the United States alone.

- Tensions are high between environmental activists who want to protect the rain forest and illegal loggers, miners, and other developers who want to make money to provide a better standard of living for their families and communities. In the past 10 years, over 900 environmental activists have been killed around the world. Peru has had around 60 deaths since 2002, making it one of the top five most dangerous places in the world for people who defend the environment. (Brazil alone has accounted for nearly 450 deaths in this same timespan.)

- South America includes thousands of rural communities. Due to poor infrastructure throughout many South American countries, these communities remain weakly connected, if connected at all, to the larger global economy. As a result, these countries have fallen behind other countries that have made decisions to invest in upgrading their highway infrastructure in the global trade market. More roads, or other means of connecting these communities, are needed throughout the continent.

Prior Knowledge

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Recommended Prior Activities

- Building a Decision Statement
- Consequences in Environmental Decisions
- Environmental Decision-Making
- Influences of an Environmental Decision

Vocabulary

Term	Part of Speech	Definition
biodiversity	*noun*	all the different kinds of living organisms within a given area.
carbon sink	*noun*	area or ecosystem that absorbs more carbon dioxide than it releases.
climate	*noun*	all weather conditions for a given location over a period of time.
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.
greenhouse gas	*noun*	gas in the atmosphere, such as carbon dioxide, methane, water vapor, and ozone, that absorbs solar heat reflected by the surface of the Earth, warming the atmosphere.
indigenous	*adjective*	characteristic to or of a specific place.
infrastructure	*noun*	structures and facilities necessary for the functioning of a society, such as roads.
logging	*noun*	industry engaged in cutting down trees and moving the wood to sawmills.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
rural	*adjective*	having to do with country life, or areas with few residents.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation or company.
watershed	*noun*	entire river system or an area drained by a river and its tributaries.

FUNDER

IDB Inter-American Development Bank

GORDON AND BETTY MOORE FOUNDATION

Educational resources for this project funded by the Gordon and Betty Moore Foundation and the BIO Program at the Inter-American Development Bank.

Before Moving on to the Next Activity

In Activity 1, students explored a real-world social issue of building a road in the Amazon River basin and learned about the stakeholders involved in making the decision to build the road. In the next activity, students will explore the consequences (both good and bad) of building the road in the Amazon rain forest.

ACTIVITY 2: CONSIDERING THE INFLUENCES OF BUILDING A ROAD IN THE AMAZON RAIN FOREST | 50 MINS

DIRECTIONS

1. Have students discuss the influence of the stakeholders in an environmental decision.

Set the stage by connecting back to Activity 1. Remind students that in the previous activity they explored the various levels of influence of the stakeholders on the decision to build a road in the Amazon. Ask: *Which stakeholders did you think had the most influence and why? What cultural, environmental, and economic aspects of this decision did you consider?* (Answers will vary based on the class discussion at the end of Activity 1.) Explain to students that throughout this lesson, they have been uncovering the complexity of environmental decisions. So far, students have identified that when analyzing an environmental decision all stakeholders have to be identified, as well as their level of influence. It is also important to explore the geographic and political climate of the region, as well as the cultural, environmental, and economic aspects connected to the decision. In this activity, students will explore what happens once a decision has been made. They are going to identify and analyze the consequences of the decision to place a road in the Amazon rain forest.

2. Have students identify the consequences of a decision.

Explain to students that a consequence is a relationship between a cause and an effect. The environment is a complex system in which both biotic (living) and abiotic (nonliving) factors are interconnected. Organisms (biotic) rely on land formations and water resources (abiotic) for water, shelter, and nutrients. In some instances, organisms (biotic) help erode rocks, change the flow of rivers and streams, and create new land formations (abiotic). When actionable decisions are made about environmental resources (e.g., water and land rights, natural resource mining), we are altering this environmental system. Alterations within the

system have consequences. For example, building a road will remove trees and relocate some wildlife in that region. Sometimes these consequences are intended or known during the decision-making process. Other times, the consequences are unintended and not always known until after the decision and/or time has passed. Ask students to revisit The Amazonian Road Decision they read in Activity 1. As they are rereading, have them highlight any consequences linked to the decision of placing the Pucallpa-Cruzeiro du Sol road in the Amazon rain forest.

3. Have students construct a Consequence Web.

Once students are finished reading, have them visually illustrate the consequences in a Consequence Web. Ask them to draw a square in the middle of a sheet of paper and write in the square the decision made. Then have them write all the consequences around it in circles in a web-like configuration. Have students think about what additional effects the consequences will have on the environment, people, or the economy. If there are additional consequences, have students add them to the web next to the original ones. Students' Consequence Webs should have at least four levels of circles. As the circles move farther away from the square, they should get smaller and smaller. Students should draw arrows as they make connections between the levels of consequences. Ask students to write the connections above the arrows. Some consequences of building the road are that it will provide loggers access to highly-valued trees, provide a more accessible trade route for merchants and farmers, affect the wildlife and water quality in the area, and possibly cause indigenous populations to relocate. Remind students to consider the cultural, environmental, and economic aspects of each decision.

4. Have students extend their understanding of the case through research.

Once students have finished their Consequence Webs, ask each student to identify at least two stakeholders (one on either side of the decision) that they want to learn more about. In small groups or with partners, students will conduct further research on these stakeholders (resources are included here). They will explore interactive maps that display the effects deforestation has already had to the environment and biodiversity. They will watch videos that discuss indigenous groups, their relationship with the Amazon rain forest, and the impacts on these groups when they are exposed. There are also resources available that extend the discussion around the need to connect rural communities to the larger global

economy. Students should select resources that extend their understanding of both sides of the road-building decision. As they are conducting research, students should continue to develop their Consequence Webs and keep in mind the cultural, environmental, and economic aspects involved in this decision.

5. Have students reflect on the consequences of the decision.

In pairs or groups, have students decide what their final web will look like and ask them to modify their webs based on their research. Display one web on the overhead document projector. Ask students if they agree with the example. Reflect on considerations to cultural, environmental, and economic factors. Ask: *Is there anything that has been missed? Which of these consequences are intended and which are unintended? Can you think of any unintended consequences that the author of the case study might not have included?* Ask students to take notes on the back of their Consequence Web during the discussion. Ask students to hold onto their Consequence Web and notes. They will use these in Activity 3 of this lesson.

Modification

For struggling readers, have them annotate the reading by circling new vocabulary and underlining important phrases or sentences. They can also be paired with more confident readers to help process the text.

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.

Alternative Assessment

In this activity, students will construct a Consequence Web in small groups and participate in a discussion. Student talk and student work through the Consequence Webs will be used to determine if students are meeting the objectives for this activity.

Extending the Learning

- Have students write a persuasive paper to argue for or against building the road from the point of view of one stakeholder.
- Have students conduct further research on local building practices and create an informative campaign (brochure, multimedia presentation, etc.) for or against a local building project.
- Have students use MapMaker Interactive to explore the geography of the Amazon rain forest.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Learning Objectives

Students will:

- analyze various consequences from a decision and determine their impact on stakeholders
- analyze the role that stakeholders play in determining the outcome of a complex decision
- explain the complex nature of environmental issues and recognize the solutions to these issues are usually multi-layered and complex

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Reading
- Writing

Skills Summary

This activity targets the following skills:

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  - Information, Media, and Technology Skills
    - Information Literacy
    - Media Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Critical Thinking and Problem Solving
- 21st Century Themes
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  - Acquiring Geographic Information
  - Analyzing Geographic Information
- Science and Engineering Practices
  - Analyzing and interpreting data
  - Asking questions (for science) and defining problems (for engineering)
  - Engaging in argument from evidence
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NEXT GENERATION SCIENCE STANDARDS

• **HS. Earth's Systems:**
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HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Preparation

BACKGROUND & VOCABULARY

Background Information

- The Amazon rain forest is a carbon sink. The Amazon rain forest plays a crucial role in keeping carbon out of our atmosphere, as it naturally sequesters about 20% of the atmospheric carbon emitted by the burning of fossil fuels elsewhere. But, it can only remain a carbon sink as long as it absorbs more carbon dioxide than it releases. The diminishing rain forest would greatly affect global warming.

- The Amazon is one of the most biodiverse ecosystems in the world. Yet, there are species that live there that are endangered or threatened, including primates such as the spider monkey and red howler monkey. When large trees, like mahogany, are removed, the large canopy that provided shelter, food, or nesting for some of these species disappears, resulting in relocation and possible fragmentation of some populations. Changes made to the ecosystem affect all life that lives there, but for the endangered or threatened populations, these changes could challenge their survival.

- Indigenous communities are scattered throughout the Amazon rain forest. The Ashéninka are one indigenous group whose territory lies at the Peru-Brazil border. They are the second largest indigenous group in the Amazon rain forest (behind the Quechua). Most of the Ashéninka population lives on the Peruvian side of the border, where they hunt, fish, and grow crops for sustenance. Ashéninka 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.

- Mahogany, a strong, reddish-brown wood, is found throughout the tropical Amazon rain forest, with dense populations near the Peru-Brazil border. It is valued for its color (hence the nickname, “red gold”) and durability and often used in paneling, furniture-making, and for musical instruments. The United States and Britain are the two largest importers of mahogany. In 2001, Brazil put a moratorium on mahogany exports making Peru the leading exporter. A 2012 World Bank report estimated that 80% of Peruvian timber export stemmed from illegal logging. A conservative estimate in 2000 stated nearly 57,000 mahogany trees were provided to the United States alone.

- Tensions are high between environmental activists who want to protect the rain forest and illegal loggers, miners, and other developers who want to make money to provide a better standard of living for their families and communities. In the past 10 years, over 900 environmental activists have been killed around the world. Peru has had around 60 deaths since 2002, making it one of the top five most dangerous places in the world for people

who defend the environment. (Brazil alone has accounted for nearly 450 deaths in this same timespan).

- South America includes thousands of rural communities. Due to poor infrastructure throughout many South American countries, these communities remain weakly connected, if connected at all, to the larger global economy. As a result, these countries have fallen behind other countries that have made decisions to invest in upgrading their highway infrastructure in the global trade market. More roads, or other means of connecting these communities, are needed throughout the continent.

Prior Knowledge

["Knowledge of the conflict around the decision to build a road in the Amazon rain forest","Identification of stakeholders that could be influenced by the decision to build a road in the Amazon rain forest","Identification of potential cultural, environmental, and economic aspects of this decision"]

Recommended Prior Activities

- A Proposal to Build a Road in the Amazon

Vocabulary

Term	Part of Speech	Definition
biodiversity	*noun*	all the different kinds of living organisms within a given area.
carbon sink	*noun*	area or ecosystem that absorbs more carbon dioxide than it releases.
climate	*noun*	all weather conditions for a given location over a period of time.
consequence	*noun*	result or outcome of an action or situation.
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.
greenhouse gas	*noun*	gas in the atmosphere, such as carbon dioxide, methane, water vapor, and ozone, that absorbs solar heat reflected by the surface of the Earth, warming the atmosphere.
indigenous	*adjective*	characteristic to or of a specific place.

Term	Part of Speech	Definition
infrastructure	*noun*	structures and facilities necessary for the functioning of a society, such as roads.
logging	*noun*	industry engaged in cutting down trees and moving the wood to sawmills.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
rural	*adjective*	having to do with country life, or areas with few residents.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation or company.
watershed	*noun*	entire river system or an area drained by a river and its tributaries.

FUNDER

Educational resources for this project funded by the Gordon and Betty Moore Foundation and the BIO Program at the Inter-American Development Bank.

Before Moving on to the Next Activity

In Activity 2, students identified the consequences associated with building a road in the Amazon rain forest. In the next activity, students synthesize all the information they gathered in the previous activities and make a decision statement.

ACTIVITY 3: PRESENTING A DECISION ABOUT BUILDING A ROAD IN THE AMAZON | 50 MINS

DIRECTIONS

1. Have students discuss what they learned in Activities 1 and 2.

Set the stage by reviewing the sequence of activities within this lesson. Remind students that at the beginning of this lesson, they explored a decision through one stakeholder's viewpoint. They then learned more about the area both geographically and politically, analyzed each stakeholder's influence and connection to the decision, and then identified cultural, economic,

and environmental consequences of the decision to place a road in the Amazon. In this activity, they will pull together what they have learned in the previous activities to complete the analysis of the decision about the Pucallpa-Cruzeiro do Sul road in the Amazon. Place students in groups of three, and assist them through the following process as a group. Each group of three will hand in a decision statement at the end of this lesson. Ask students to pull out their Stakeholder Table and Consequences Webs they developed in Activities 1 and 2. They can use their individual documents as evidence to support the group-level conversations.

2. Have students revisit the information gathered on the influence of stakeholders.
Ask students to have available their Stakeholder Table from Activity 1. Distribute one copy of the Decision Statement worksheet to each group and have students complete Part 1: Stakeholders. Using the information they gathered in Activities 1 and 2, ask students to rate each of the stakeholders' level of influence within the decision. Remind them that not every stakeholder has a voice or equal influence in the decision. Ask students to reflect on the role these particular stakeholders have played in the decision-making process of building the Pucallpa-Cruzeiro do Sul road.

3. Have students revisit the information gathered from the identification of consequences.
Remind students that all decisions and actions have consequences. Ask students to refer to their Consequences Web from Activity 2. Have them complete Part 2: Consequences in the Decision Statement worksheet by identifying the impact of the consequences upon each of the known stakeholders considering environmental, cultural, and economic factors.

4. Have students create a decision statement.
Explain to students that the product of the decision-making process is a decision statement. A decision statement has three parts: (1) a statement of the decision; (2) evidence that supports the decision; and (3) a statement of who will positively and negatively benefit from the decision considering economic, cultural, and environmental factors. Ask students to complete Part 3: Decision Statement. Remind students in Activity 1, they made a decision from one stakeholder's perspective. This time, they need to consider all stakeholders' perspectives. Collect completed Decision Statement worksheets as a formal evaluation of the lesson.

5. Have students reflect upon the decision-making process.
Ask students to refer to the decision statement they created in Activity 1. Ask them to reflect upon everything they have learned in the lesson. Have them compare what they wrote in Activity 1 with their final decision statement in Activity 3. Ask: *Did your decision statement stay the same or change? If it changed, what influenced your decision? What additional information affected your thinking? If it did not change, are you surprised? Why or why not?*

Modification

For struggling readers, have them annotate the reading by circling new vocabulary and underlining important phrases or sentences. They can also be paired with more confident readers to help process the text.

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.

Alternative Assessment

In this activity, students will complete the final Decision Statement in small groups based on all the information they collected from the previous two activities about the influence of different stakeholders and the consequences of building a road on each of the stakeholders. Final Decision Statements will be collected and assessed using a rubric.

Extending the Learning

- Have students write a persuasive paper to argue for or against building the road from the point of view of one stakeholder.
- Have students conduct further research on local building practices and create an informative campaign (brochure, multimedia presentation, etc.) for or against a local building project.
- Have students use MapMaker Interactive to explore the geography of the Amazon rain forest.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Teaching Approach

- Learning-for-use

Teaching Methods

- Cooperative learning
- Discussions
- Reading
- Role playing
- Writing

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information Literacy
    - Media Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Critical Thinking and Problem Solving
- 21st Century Themes
  - Environmental Literacy
- Critical Thinking Skills
  - Analyzing
  - Understanding
- Geographic Skills

- Acquiring Geographic Information
- Analyzing Geographic Information

- Science and Engineering Practices
  - Analyzing and interpreting data
  - Asking questions (for science) and defining problems (for engineering)
  - Constructing explanations (for science) and designing solutions (for engineering)
  - Engaging in argument from evidence
  - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

• **Theme 11: The Patterns and Networks of Economic Interdependence on Earth's Surface:**
• **Theme 14: How human actions modify the physical environment:**
• **Theme 16: The changes that occur in the meaning, use, distribution, and importance of resources:**

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.1
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.9-10.3
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.1
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.11-12.3
• **Speaking and Listening Standards 6-12:**
Comprehension and Collaboration, SL.11-12.1
• **Speaking and Listening Standards 6-12:**

Comprehension and Collaboration, SL.11-12.2

• **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.2

• **Writing Standards 6-12:**

Text Types and Purposes, W.11-12.2

NEXT GENERATION SCIENCE STANDARDS

• **HS. Earth's Systems:**

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

• **HS. Ecosystems: Interactions, Energy, and Dynamics:**

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Preparation

BACKGROUND & VOCABULARY

Background Information

- The Amazon rain forest is a carbon sink. The Amazon rain forest plays a crucial role in keeping carbon out of our atmosphere, as it naturally sequesters about 20% of the atmospheric carbon emitted by the burning of fossil fuels elsewhere. But, it can only remain a carbon sink as long as it absorbs more carbon dioxide than it releases. The diminishing rain forest would greatly affect global warming.

- The Amazon is one of the most biodiverse ecosystems in the world. Yet, there are species that live there that are endangered or threatened, including primates such as the spider monkey and red howler monkey. When large trees, like mahogany, are removed, the large canopy that provided shelter, food, or nesting for some of these species disappears, resulting in relocation and possible fragmentation of some populations. Changes made to the ecosystem affect all life that lives there, but for the endangered or threatened populations, these changes could challenge their survival.

- Indigenous communities are scattered throughout the Amazon rain forest. The Ashéninka are one indigenous group whose territory lies at the Peru-Brazil border. They are the second largest indigenous group in the Amazon rain forest (behind the Quechua). Most of the

Ashéninka population lives on the Peruvian side of the border, where they hunt, fish, and grow crops for sustenance. Ashéninka 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.

- Mahogany, a strong, reddish-brown wood, is found throughout the tropical Amazon rain forest, with dense populations near the Peru-Brazil border. It is valued for its color (hence the nickname, “red gold”) and durability and often used in paneling, furniture-making, and for musical instruments. The United States and Britain are the two largest importers of mahogany. In 2001, Brazil put a moratorium on mahogany exports making Peru the leading exporter. A 2012 World Bank report estimated that 80% of Peruvian timber export stemmed from illegal logging. A conservative estimate in 2000 stated nearly 57,000 mahogany trees were provided to the United States alone.

- Tensions are high between environmental activists who want to protect the rain forest and illegal loggers, miners, and other developers who want to make money to provide a better standard of living for their families and communities. In the past 10 years, over 900 environmental activists have been killed around the world. Peru has had around 60 deaths since 2002, making it one of the top five most dangerous places in the world for people who defend the environment. (Brazil alone has accounted for nearly 450 deaths in this same timespan).

- South America includes thousands of rural communities. Due to poor infrastructure throughout many South American countries, these communities remain weakly connected, if connected at all, to the larger global economy. As a result, these countries have fallen behind other countries that have made decisions to invest in upgrading their highway infrastructure in the global trade market. More roads, or other means of connecting these communities, are needed throughout the continent.

Prior Knowledge

["Knowledge of the conflict around the decision to build a road in the Amazon rain forest","Identification of stakeholders that could be influenced by the decision to build a road in the Amazon rain forest","Identification of potential cultural, environmental, and economic consequences of this decision"]

Recommended Prior Activities

- A Proposal to Build a Road in the Amazon
- Considering the Influences of Building a Road in the Amazon Rain Forest

Vocabulary

Term	Part of Speech	Definition
biodiversity	*noun*	all the different kinds of living organisms within a given area.
carbon sink	*noun*	area or ecosystem that absorbs more carbon dioxide than it releases.
climate	*noun*	all weather conditions for a given location over a period of time.
consequence	*noun*	result or outcome of an action or situation.
decision	*noun*	judgment, conclusion, or finding.
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.
greenhouse gas	*noun*	gas in the atmosphere, such as carbon dioxide, methane, water vapor, and ozone, that absorbs solar heat reflected by the surface of the Earth, warming the atmosphere.
indigenous	*adjective*	characteristic to or of a specific place.
infrastructure	*noun*	structures and facilities necessary for the functioning of a society, such as roads.
logging	*noun*	industry engaged in cutting down trees and moving the wood to sawmills.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
rural	*adjective*	having to do with country life, or areas with few residents.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation or company.
watershed	*noun*	entire river system or an area drained by a river and its tributaries.

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Alternative Assessment

The lesson-level assessment will be the students' decision statements, which will be assessed using a rubric.

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