NATIONAL GEOGRAPHIC

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LESSON

Making a Decision about the Construction of an Oil Pipeline through British Columbia

Students will analyze a real-world environmental case of building an oil pipeline through British Columbia. They will explore the geographical, cultural, and environmental context of building the pipeline, identify the stakeholders and their role and impact, and map out the intended and unintended consequences of the decision they make.

GRADES

9 - 12+

SUBJECTS

Biology, Geography, Human Geography

CONTENTS

3 Activities

ACTIVITY 1: A PROPOSAL TO BUILD AN OIL PIPLINE THROUGH BRITISH COLUMBIA | 1 HR 15 MINS

DIRECTIONS

1. Connect to students' prior knowledge about how we use oil and where it comes from.

Set the stage by activating students' prior understanding about how they use oil in their daily lives. It is important for students to develop an understanding of where the demand for oil comes from, why oil pipelines are necessary, and the environmental and social impacts of

extracting and transporting oil via pipelines and tankers. Ask the following questions and support students in constructing responses to these questions through small group or a whole class discussion:

- *What is oil?* It is a non-renewable energy source created as the remains of marine plants and animals decay under huge amounts of pressure and heat over millions of years.
- *Why do we need oil? What do we use oil for?* Our modern economy largely relies on oil for energy, heat, and electricity, and also fuel for cars and airplanes.
- *Where does oil come from?* Crude oil is pumped from the ground.
- *How does it get to us?* Once it is extracted, it needs to be transported to refineries to be prepared for us to use. Pipelines can transport oil over land or oil can be shipped via oil tankers over sea. At the refineries, the crude oil is converted to more usable forms (diesel fuel, gasoline, kerosene, for example).

Have students then think about and discuss the process of removing the oil from the ground and getting it to the consumer. Have students think about and discuss the construction of pipelines and refineries, and the transportation of oil over land and sea to get to the consumer. Ask: *What are the benefits of building pipelines and refineries?* (Think about employment opportunities in addition to the economic benefits to the areas that have the oil sands as well as the consumers who want the oil for their daily lives). *What might be some consequences of moving oil through pipelines and oil tankers?* (Think about habitat damaged by the pipeline infrastructure itself, oil spills and leaks). Then have students think about and discuss the effects these projects have on the environment, even if everything goes well. Ask: *What living things might be affected by decisions to build pipelines or refineries? How are they affected?* Have students think about and discuss with partners or in small groups the tensions involved in making difficult decisions. Ask a couple of students to share their thinking with the class. The focus of this discussion is to talk about a few examples and to get students thinking about human impacts on the environment within the context of oil extraction and transportation.

2. Introduce the Oil Pipeline Letter to Students.

Once students understand the importance of oil to the modern economy along with the environmental and social impacts of extracting oil from the ground and getting it to the consumer, give students the Pipeline Letter to Students handout and ask them to read for understanding. Ask students to write any questions they might have. After reading the letter, have a brief discussion with the class to check for understanding. Ask:

- *What is the reason for building the pipeline?* (The purpose is to remove oil from the oil sands in Alberta and distribute it to consumers in Asia who will use it for fuel and energy.)
- *Who does the pipeline benefit?* (It will benefit the Asian consumers who want oil for fuel and energy. It will benefit the oil and gas company, the marine transportation industry, the British Columbian economy, and people who need jobs.)
- *What would happen to the environment in the area if the pipeline were built?* (The primary concern is the potential risks of threatening the biodiversity in both the marine and the terrestrial ecosystems in the coastal areas of British Columbia. With any extraction and transportation of oil, there is the risk of an oil spill or leak. This would be devastating to any ecosystem, and to those that rely on the ecosystem for their livelihoods or food sources. Assuming all goes well and spills and leaks don't happen, there will still be increased tanker traffic and pollution—noise, air, and in the water channels along the coast).
- *What would happen to the people and other living things in the area if the pipeline were built?* (The noise, the pollution, the increased tanker traffic will disturb, relocate, or possibly eliminate marine life. The impacts on the marine organisms will then have a cascading effect on the consumers and other interdependent organisms in the terrestrial ecosystem. For example, if salmon migration patterns are cut off, they won't flow into the inland rivers where the grey wolf and Kermode bear are looking for them. The indigenous communities, like the Gitga'at or Haisla, may find that their main food sources (shellfish, other fish, salmon, seaweed) are greatly reduced. In addition to food, there are cultural traditions within these communities that will be affected by not having readily available resources, such as salmon and shellfish. On the flipside, some of these communities may benefit from financial incentives to support social programming or employment opportunities that would otherwise not be available.)

3. Have students portray one of the stakeholders introduced in the Pipeline Letter.

Use the letter to identify individuals that will be involved in the decision about the construction of the Enbridge Northern Gateway Pipeline. 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 Enbridge Northern Gateway Pipeline 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 (First Nations communities [Gitga'at and Haisla], terrestrial and marine ecosystems, wildlife, oil and gas company, marine transportation industry, commercial fishermen, Asian 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 review the Pipeline Letter to Students to see what they can determine about their stakeholder's influence in the pipeline decision. Have each group complete the row for their assigned 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 stakeholder has in the British Columbian oil pipeline 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 pipeline and the stakeholders that are not in favor of the pipeline. Compare and contrast the reasoning of each of the stakeholder's groups. Ask the class to share aloud which stakeholder(s) they think has the most influence in the decision-making process. Ask: *Which of the stakeholders has the least influence and why? Which stakeholders will be the most affected by the decision to build a pipeline? 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 letter.) 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 British Columbian oil pipeline 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 natural resource management decision requires an examination of economic, cultural, social, and environmental factors. Have students consider which factors they need to explore further so they can make a more informed decision. Use the following questions to guide their reflections:

- *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 from the perspective of one stakeholder?*
- *Did you consider economic, cultural, social and environmental factors of other stakeholders as well? 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 to multiple stakeholders?*

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.

Informal Assessment

In this activity, students will complete the Stakeholders Table in small groups and participate in discussion. Students will draft a decision statement from one stakeholder's perspective. Student talk and student work 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 oil pipeline from the point of view of one stakeholder.
- Have students conduct further research on marine and terrestrial wildlife and construct food webs among the organisms in the coastal British Columbia ecosystems. Have students pay close attention to where marine and terrestrial food webs start overlapping.
- Have students use different maps to explore the geography of coastal British Columbia, as well as the location of various First Nations communities and the location of the Great Bear Rainforest.
- Have students research one particular coastal First Nations communities to understand the history of the community and current issues they are facing.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Learning Objectives

Students will:

- identify the role that stakeholders play in determining the outcome of building an oil pipeline through British Columbia
- identify various geographic, political, social, and environmental factors that may influence the decision to build an oil pipeline in British Columbia
- assess and summarize the impact that a decision about an oil pipeline would have on the stakeholders in British Columbia

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
    - 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 GEOGRAPHY STANDARDS

- **Standard 11:**

The patterns and networks of economic interdependence on Earth's surface

- **Standard 14:**

How human actions modify the physical environment

- **Standard 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.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.9-10.1

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

Key Ideas and Details, RI.11-12.3

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

Key Ideas and Details, RI.9-10.3

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

Comprehension and Collaboration, SL.11-12.1

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

Comprehension and Collaboration, SL.9-10.1

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

Comprehension and Collaboration, SL.11-12.2

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

Comprehension and Collaboration, SL.9-10.2

NEXT GENERATION SCIENCE STANDARDS

- **HS. Earth and Human Activity: 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

Coastal British Columbia is the most biodiverse area of British Columbia, Canada. The rugged coastline and many islands separate populations resulting in species divergence. The isolation of species allows them to adapt to their local environments in both appearance and behavior. Many unique species of mammals, fish, birds, and plants are located exclusively on the coast of British Columbia. The Great Bear Rainforest stretches almost 403 kilometers (250 miles) along the coast and is one of the world's largest coastal temperate rainforest.

The unique land-sea connection functions as one ecosystem. To protect the rainforest, the sea needs to be healthy. To protect the sea, the rainforest needs to be healthy. When salmon come into the rivers from the sea, they bring vital nutrients with them. The grey wolves and Kermode bears (also called spirit bears) that feed on the salmon bring their carcasses deep into the forest where the nutrients feed the terrestrial ecosystem. Salmon are also important to the culture and economy of the local First Nations communities.

There are several Coastal First Nations communities throughout British Columbia that have a long history with the land and sea. The Gitga'at and Haisla are two such communities. These indigenous cultures have vast traditional ecological knowledge (TEK) of the local area. While their TEK has been informed by generations of experience in the environment, and they understand how human activity can affect local ecosystems, some of these communities are so remote and are experiencing such devastating economic and social hardships (e.g. unemployment and alcoholism) that people are willing to accept jobs or financial incentives to support families or social programming for their communities, even though they know the projects could negatively impact their cultural traditions and historic livelihoods.

A Marine Plan Partnership for the North Pacific Coast (MaPP) was collaboratively developed by the Province of British Columbia and 17 First Nations. This ecosystem-based management plan is intended to support sustainable economic development and a healthy marine environment by using both local and traditional knowledge, with the support of scientific knowledge and expertise. For example, the Haida Gwaii plan includes an economic development goal to focus on managing the growth of tourism and shellfish aquaculture, developing new fisheries, and supporting new sustainable technology initiatives. These plans also include high environmental standards for all new developments and activities, which will have implications for projects such as the construction of an oil pipeline.

The proposed Enbridge Northern Gateway Pipeline includes twin pipelines. One would export diluted bitumen from the Athabasca oil sands in Alberta to Kitimat, where the marine terminal will be located. Then super tankers would take it to Asian markets. The other pipeline would import natural gas condensate and move it in the other direction.

The Canadian government accepted Enbridge's project proposal in 2014—with 209 issues that need to be addressed. These include consultations with First Nations communities; an environmental review assessment; improving oil spill response, prevention, and recovery systems for the coastline and ocean; and addressing the legal requirements regarding treaty and aboriginal rights.

Prior Knowledge

["Students should have prior knowledge of the importance of oil to the modern economy for energy, heat, electricity, and fuel for cars and airplanes.","For this lesson, it would also be helpful for students to know a little about the process of how oil is extracted from the ground, transported to refineries, and prepared for use. The details are not essential, but students need to understand where the demand for oil comes from, why oil pipelines are necessary, and the social and environmental impacts of extracting and transporting oil via pipelines and tankers."]

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
biodiversity	*noun*	all the different kinds of living organisms within a given area.
consequence	*noun*	result or outcome of an action or situation.
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.
energy	*noun*	capacity to do work.
extract	*verb*	to pull out.
First Nations	*noun*	indigenous (Native American) peoples of Canada south of the Arctic.
fuel	*noun*	material that provides power or energy.
indigenous	*adjective*	characteristic to or of a specific place.
intertidal zone	*noun*	region between the high and low tide of an area.
oil	*noun*	fossil fuel formed from the remains of marine plants and animals. Also known as petroleum or crude oil.
oil tanker	*noun*	large ship used for transporting petroleum.
pipeline	*noun*	series of pipes used to transport liquids or gases over long distances.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
refinery	*noun*	industrial installation that purifies a substance, in order to make it more useful.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation, or company.

Before Moving on to the Next Activity

In Activity 1, students explored a real-world social issue of building an oil pipeline in British Columbia and identified the stakeholders involved in making the decision to build the pipeline. In the next activity, students will explore the consequences of building the oil pipeline in British Columbia.

ACTIVITY 2: CONSIDERING THE CONSEQUENCES OF BUILDING AN OIL PIPELINE THROUGH BRITISH COLUMBIA | 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 an oil pipeline in British Columbia. Ask: *Which stakeholders did you think had the most influence and why? What cultural, environmental, social, 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 natural resource management decisions. So far, students have experienced that when analyzing a natural resource management 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, social, 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 construct an oil pipeline that will cross through important biodiverse temperate rainforest and coastal ecosystems in British Columbia.

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, minerals mining), we are altering this environmental system. Alterations within the system have consequences. Because this particular ecosystem is on the coast, we have to consider both the marine and the terrestrial ecosystems and the interactions between the two. For example, building a pipeline will remove trees and require some wildlife to move out of that region. Building marine terminals that will allow access for daily oil tanker traffic will disturb migration patterns of some animals, like salmon, which provide a major food source for mainland mammals, as well as First Nations communities, and livelihood for commercial fishermen. Sometimes the consequences are unintended and not always known until after the

decision and/or time has passed. Ask students to revisit the Pipeline Letter to Students they read in Activity 1. As they are rereading, have them highlight any potential consequences linked to the decision of placing the Enbridge Northern Gateway Pipeline in British Columbia.

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 pipeline and the associated marine terminals are that it will meet the demand for oil by Asian consumers, it will provide more jobs for an area with high unemployment; however, it may also affect the wildlife and water quality in the area, and possibly cause First Nations communities to change their long-standing cultures to adapt to a changing environment. Remind students to consider the cultural, social, environmental, and economic aspects of each decision.

4. Have students extend their understanding of the pipeline decision 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. Have students use the Internet resources listed in the Potential Research Sites handout to do their research. They can explore interactive maps that display the placement of the proposed pipeline route along the edge of the Great Bear Rainforest as well as the proposed tanker routes through the channels off the coast of British Columbia. They can watch videos and view pictures that illustrate the relationship between First Nations groups and their surrounding ecosystems. There are also resources available that extend the discussion around the potential effects of oil spills, a risk that has to be considered when building a pipeline and transporting oil. Students should select resources that extend their understanding of both sides of the pipeline 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. Ask students to record notes of their research.

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, social, environmental, and economic factors. Ask: *Which of these consequences are intended and which are unintended? What other unintended consequences did you run into when doing your research?* 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.

Tip

To highlight the cultural, social, environmental, and economic consequences of building a pipeline in British Columbia, different student groups could complete a consequence web focusing on one of these types of consequences and include more stakeholders related to that type of consequence.

Informal Assessment

In this activity, students will construct a consequence web in small groups and participate in 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 oil pipeline from the point of view of one stakeholder.
- Have students conduct further research on marine and terrestrial wildlife and construct food webs among the organisms in the coastal British Columbia ecosystems. Have students pay close attention to where marine and terrestrial food webs start overlapping and consider the consequences if organisms from the food webs are reduced or move out of the ecosystem.
- Have students use different maps to explore the geography of coastal British Columbia, as well as the location of various First Nations communities and the location of the Great Bear Rainforest.
- Have students research one particular coastal First Nations community to understand the history of the community and current issues they are facing.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Learning Objectives

Students will:

- analyze various consequences from a decision about the British Columbia oil pipeline 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 natural resource management issues and recognize the solutions to these issues are usually multi-layered and complex
- assess and summarize the impact that a decision will have on the stakeholders within British Columbia

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
    - Media Literacy
  - Learning and Innovation Skills
    - Critical Thinking and Problem Solving
- 21st Century Themes
  - Environmental Literacy
- Critical Thinking Skills
  - Analyzing
  - Understanding
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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)
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Key Ideas and Details, RI.11-12.3

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Comprehension and Collaboration, SL.11-12.1

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

Comprehension and Collaboration, SL.9-10.1

• **Writing Standards 6-12:**

Text Types and Purposes, W.11-12.2

• **Writing Standards 6-12:**

Text Types and Purposes, W.9-10.2

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BACKGROUND & VOCABULARY

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There are several Coastal First Nations communities throughout British Columbia that have a long history with the land and sea. The Gitga'at and Haisla are two such communities. These indigenous cultures have vast traditional ecological knowledge (TEK) of the local area. While their TEK has been informed by generations of experience in the environment, and they understand how human activity can affect local ecosystems, some of these communities are so remote and are experiencing such devastating economic and social hardships (e.g. unemployment and alcoholism) that people are willing to accept jobs or financial incentives to support families or social programming for their communities, even though they know the projects could negatively impact their cultural traditions and historic livelihoods.

A Marine Plan Partnership for the North Pacific Coast (MaPP) was collaboratively developed by the Province of British Columbia and 17 First Nations. This ecosystem-based management plan is intended to support sustainable economic development and a healthy marine environment by using both local and traditional knowledge, with the support of scientific knowledge and expertise. For example, the Haida Gwaii plan includes an economic development goal to focus on managing the growth of tourism and shellfish aquaculture, developing new fisheries, and supporting new sustainable technology initiatives. These plans also include high environmental standards for all new developments and activities, which will have implications for projects such as the construction of an oil pipeline.

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The Canadian government accepted Enbridge's project proposal in 2014—with 209 issues that need to be addressed. These include consultations with First Nations communities; an environmental review assessment; improving oil spill response, prevention, and recovery systems for the coastline and ocean; and addressing the legal requirements regarding treaty and aboriginal rights.

Prior Knowledge

["Knowledge of the controversy around the decision to build an oil pipeline in British Columbia","Identification of stakeholders that could be influenced by the decision to build a pipeline in British Columbia","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.
consequence	*noun*	result or outcome of an action or situation.
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.
energy	*noun*	capacity to do work.
extract	*verb*	to pull out.
First Nations	*noun*	indigenous (Native American) peoples of Canada south of the Arctic.
fuel	*noun*	material that provides power or energy.
indigenous	*adjective*	characteristic to or of a specific place.
oil	*noun*	fossil fuel formed from the remains of marine plants and animals. Also known as petroleum or crude oil.
oil tanker	*noun*	large ship used for transporting petroleum.
pipeline	*noun*	series of pipes used to transport liquids or gases over long distances.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
refinery	*noun*	industrial installation that purifies a substance, in order to make it more useful.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation, or company.

Before Moving on to the Next Activity

In Activity 2, students identified the consequences associated with building an oil pipeline in British Columbia. In the next activity, students synthesize all the information they gathered from their research and make a decision statement about the construction of the oil pipeline.

ACTIVITY 3: PRESENTING A DECISION ABOUT BUILDING AN OIL PIPELINE THROUGH BRITISH COLUMBIA | 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 while analyzing each stakeholder's influence and connection to the decision. Finally, they identified cultural, economic, social, and environmental consequences of the decision to build an oil pipeline and associated marine terminals in British Columbia. In this activity, they will pull together what they have learned in the previous activities to complete the analysis of the decision about building the Enbridge Northern Gateway Oil Pipeline in British Columbia. Place students in small 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.

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 stakeholder's 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 Enbridge Northern Gateway Oil Pipeline.

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 Webs from Activity 2. Have them complete Part 2: Consequences in the

Pipeline 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 contains three things: (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 an oil pipeline on each of the stakeholders. The Decision Statement worksheet will be collected and assessed using a rubric.

Extending the Learning

- Have students write a persuasive paper to argue for or against building the oil pipeline from the point of view of one stakeholder.
- Have students create an informative campaign (brochure, multimedia presentation, etc.) for or against the construction of the oil pipeline and share it with a relevant stakeholder (by email or mail).
- Have each group take on the role of one stakeholder for this lesson and complete all activities from the stakeholder's perspective. In the final activity, each group could present a persuasive argument to the class about whether they feel the pipeline should be built from their stakeholder's perspective. The audience could complete the rest of the tables in Parts 1 and 2 of the Decision Worksheet as the groups are presenting. The final decision statement would then be the culmination of the activities based on the arguments of each of the stakeholder groups. Have the students write a final draft of the decision statement in the form of a letter responding to the initial student letter asking for their help.

OBJECTIVES

Subjects & Disciplines

Biology

Geography

- Human Geography

Learning Objectives

Students will:

- assess and summarize the impact that a decision about constructing an oil pipeline will have on the stakeholders within British Columbia

- construct a decision statement weighing the tradeoffs of the decision on each stakeholder
- consider human impacts on the marine and terrestrial ecosystems when making their decision statement

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
    - Critical Thinking and Problem Solving
- 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 GEOGRAPHY STANDARDS

- **Standard 11:**

The patterns and networks of economic interdependence on Earth's surface

- **Standard 14:**

How human actions modify the physical environment

- **Standard 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.9-10.3

- **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.9-10.1

- **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.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

Coastal British Columbia is the most biodiverse area of British Columbia, Canada. The rugged coastline and many islands separate populations resulting in species divergence. The isolation of species allows them to adapt to their local environments in both appearance and behavior. Many unique species of mammals, fish, birds, and plants are located exclusively on the coast of British Columbia. The Great Bear Rainforest stretches almost 403 kilometers (250 miles) along the coast and is one of the world's largest coastal temperate rainforests.

The unique land-sea connection functions as one ecosystem. To protect the rainforest, the sea needs to be healthy. To protect the sea, the rainforest needs to be healthy. When salmon come into the rivers from the sea, they bring vital nutrients with them. The grey wolves and Kermode bears (also called spirit bears) that feed on the salmon bring their carcasses deep into the forest where the nutrients feed the terrestrial ecosystem. Salmon are also important to the culture and economy of the local First Nations communities.

There are several Coastal First Nations communities throughout British Columbia that have a long history with the land and sea. The Gitga'at and Haisla are two such communities. These indigenous cultures have vast traditional ecological knowledge (TEK) of the local area. While their TEK has been informed by generations of experience in the environment, and they understand how human activity can affect local ecosystems, some of these communities are so remote and are experiencing such devastating economic and social hardships (e.g.

unemployment and alcoholism) that people are willing to accept jobs or financial incentives to support families or social programming for their communities, even though they know the projects could negatively impact their cultural traditions and historic livelihoods.

A Marine Plan Partnership for the North Pacific Coast (MaPP) was collaboratively developed by the Province of British Columbia and 17 First Nations. This ecosystem-based management plan is intended to support sustainable economic development and a healthy marine environment by using both local and traditional knowledge, with the support of scientific knowledge and expertise. For example, the Haida Gwaii plan includes an economic development goal to focus on managing the growth of tourism and shellfish aquaculture, developing new fisheries, and supporting new sustainable technology initiatives. These plans also include high environmental standards for all new developments and activities, which will have implications for projects such as the construction of an oil pipeline.

The proposed Enbridge Northern Gateway Pipeline includes twin pipelines. One would export diluted bitumen from the Athabasca oil sands in Alberta to Kitimat, where the marine terminal will be located. Then super tankers would take it to Asian markets. The other pipeline would import natural gas condensate and move it in the other direction.

The Canadian government accepted Enbridge's project proposal in 2014—with 209 issues that need to be addressed. These include consultations with First Nations communities; an environmental review assessment; improving oil spill response, prevention, and recovery systems for the coastline and ocean; and addressing the legal requirements regarding treaty and aboriginal rights.

Prior Knowledge

["Students should know about the controversy around the decision to build an oil pipeline in British Columbia","Students should be able to identify stakeholders that could be influenced by the decision to build a pipeline in British Columbia","Students should be able to identify potential cultural, environmental, and economic aspects of this decision","Students should be

able to select evidence from text and media to support their decisions.","Students should be able to obtain, evaluate, and communicate information about their decision."]

Recommended Prior Activities

- A Proposal to Build an Oil Pipline through British Columbia
- Considering the Consequences of Building an Oil Pipeline through British Columbia

Vocabulary

Term	Part of Speech	Definition
biodiversity	*noun*	all the different kinds of living organisms within a given area.
consequence	*noun*	result or outcome of an action or situation.
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.
energy	*noun*	capacity to do work.
extract	*verb*	to pull out.
First Nations	*noun*	indigenous (Native American) peoples of Canada south of the Arctic.
fuel	*noun*	material that provides power or energy.
indigenous	*adjective*	characteristic to or of a specific place.
oil	*noun*	fossil fuel formed from the remains of marine plants and animals. Also known as petroleum or crude oil.
oil tanker	*noun*	large ship used for transporting petroleum.
pipeline	*noun*	series of pipes used to transport liquids or gases over long distances.
rainforest	*noun*	area of tall, mostly evergreen trees and a high amount of rainfall.
refinery	*noun*	industrial installation that purifies a substance, in order to make it more useful.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation, or company.

Alternative Assessment

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