

RESOURCE LIBRARY
ACTIVITY : 50 MINS

Considering the Consequences of Building an Oil Pipeline through British Columbia

Students use reference materials to construct knowledge and learn about the stakeholders involved in the British Columbia oil pipeline decision. They develop a Consequence Web to analyze the consequences of the decision and its impact on different stakeholders.

GRADES

9 - 12+

SUBJECTS

Biology, Geography, Human Geography

CONTENTS

1 PDF

OVERVIEW

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For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/considering-consequences-building-oil-pipeline-through-british-columbia/>

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
- 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)
 - 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.9-10.3

- 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

- 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

- 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 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

What You'll Need

MATERIALS YOU PROVIDE

- Blank paper for students to draw Consequence Webs
- Pencils (1 per student)

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, 1 computer per small group, Interactive whiteboard, Presentation software

PHYSICAL SPACE

- Classroom
- Computer lab
- Media Center/Library

SETUP

Students will need to be in participant structures that allow for whole class discussion as well as small-group work. A space that allows students to move freely between these structures is needed. Students will also need access to computers where they can talk with a small group.

GROUPING

- Heterogeneous grouping
- Large-group instruction

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

["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.

Term	Part of Speech	Definition
rainforest	<i>noun</i>	area of tall, mostly evergreen trees and a high amount of rainfall.
refinery	<i>noun</i>	industrial installation that purifies a substance, in order to make it more useful.
stakeholder	<i>noun</i>	person or organization that has an interest or investment in a place, situation, or company.

For Further Exploration

Maps

- [Map of the Proposed Pipeline Route](#)
- [Interactive Map of First Nation Profiles](#)

Websites

- [Pipeline Popularity Dropping in B.C.: Insights West](#)
- [Marine Plan Partnerships for the North Pacific Coast \(MaPP\)](#)
- [Biodiversity of the Central Coast](#)
- [Oil Spills and Vancouver's Stanley Park](#)

