

# Impact of mining on the environment

As part of our lesson, we discuss the impact of obtaining natural resources and their effects on the environment. Students learn about the extraction processes and how the minerals are used in our daily life.

This lesson focuses on pros/ cons of mining on environment and the role of minerals in our society.

Photo: [https://commons.wikimedia.org/wiki/File:%22Mine\\_railroad\\_at\\_Dolomi,\\_Alaska.%22\\_-\\_NARA\\_-\\_297776.jpg](https://commons.wikimedia.org/wiki/File:%22Mine_railroad_at_Dolomi,_Alaska.%22_-_NARA_-_297776.jpg)



**Essential question:**

**Can we mine while not destroying the Earth?**

**Purpose/Objectives/Outcomes:**

Students recognize that there are always environmental and human impacts caused by the resource extraction process.

This lesson asks students to focus on what minerals we can find in Southeast Alaska.

We are going to speak briefly about when was gold first found in Southeast Alaska.

By learning about the extraction process, students will be encouraged to think about the individuals behind the production process and the environmental and human impacts associated with producing their belongings.

**This lesson addresses the following content standards:**

Standard A 1. Science and Inquiry of Process- students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments;

Standard D 2. concepts of Earth Science- students develop an understanding of the origins, ongoing processes, and forces that shape the structure, composition, and physical history of the Earth

Standard E 2. Science and Technology- students develop an understanding that solving problems involves different ways of thinking, perspectives, and curiosity that lead to the exploration of multiple paths that are analyzed using scientific, technological, and social merits.

**Curriculum Standards addressed:**

Standard C: views all community members as potential teachers and all events in the community as potential learning opportunities  
makes appropriate use of modern tools and technology to help document and transmit traditional cultural knowledge  
Standard D:draws parallels between knowledge derived from oral tradition and that derived from books  
Standard E:prepares students to “think globally, act locally.”

**Engagement**

**Students will participate in a Kahoot! Pre-assessment, match names of minerals with photos, watch a video about an abandoned Gold Mine in Juneau, Alaska, do a lab activity simulating mining, listen to a story about the resources of the Tongass, hear a presentation by a U.S. Forest Service employee and a USGS employee, and hold a mock debate on the pros/cons of mining.**

**Materials/Resources:**

1. blueberry muffin, paper towel, toothpick, knife, other mining materials?
2. Video about an abandoned Gold Mine in Juneau, Alaska
3. **The Last American Rain Forest Tongass, by Shelley Gill.**
4. Guest from Forest Service and USGS expert

**Technology:**

1. Computers or ipads for their kahoot! game

**Renewable/nonrenewable resources**

Renewable resources can be totally replenished in the course of time. Oxygen, fresh water, solar energy, timber, and biomass are all renewable resources.

Gasoline, coal, natural gas, diesel, plastics and other things that come from fossil fuels are not renewable.

## When was gold first found in SE Alaska ?

Prospectors found gold on Telegraph Creek in Southeast Alaska in 1861. The first Alaska mining district had the headquarters at Sitka in 1879. The following year, Chief Kowee revealed to prospectors Joe Juneau and Richard Harris revealed the presence of gold in Silver Bow Basin. The strike sparked the Juneau gold rush which resulted



in the development of many placer & lode mines including the largest gold mines in the world: the Treadwell complex of lode mines on Douglas Island. Before the mines flooded in 1917, the company extracted \$67 million worth of gold.

Photo: [https://commons.wikimedia.org/wiki/File:Miners\\_During\\_the\\_Gold\\_Rush\\_in\\_Alaska\\_ca\\_1900.gif](https://commons.wikimedia.org/wiki/File:Miners_During_the_Gold_Rush_in_Alaska_ca_1900.gif)

Nearly all of the products we need to make our life comfortable are made from mineral resources. Our society as we know it today could not function without a large and varied supply of minerals. Food, shelter, water supply, clothing, health aides, transportation, and communication all depend on mineral resources. Nickel, copper, stainless steel, aluminum, and silver are necessary in cooking and eating.

Photo: <https://upload.wikimedia.org/wikipedia/commons/e/e8/Difference-Between-a-Rock-and-Mineral-Mineral.jpg>






**Instructional Strategies, Accommodations, and Student activities:**

Students will participate in a Kahoot! pre-assessment.

[To view and play the pre-assessment Click here:](#)

**Activity to recognize minerals from Southeast Alaska**

Mineral	Image
Pyrite	 <p>Photo:<a href="https://commons.wikimedia.org/wiki/File:Pyrite-278315.jpg">https://commons.wikimedia.org/wiki/File:Pyrite-278315.jpg</a></p>
Pyrrhotite	 <p>Photo:<a href="https://commons.wikimedia.org/wiki/File:Galena-Pyrrhotite-lw41a.jpg">https://commons.wikimedia.org/wiki/File:Galena-Pyrrhotite-lw41a.jpg</a></p>
Biotite( black)	 <p>Photo:<a href="https://en.wikipedia.org/wiki/Mineral#/media/File:Biotite-Orthoclase-229808.jpg">https://en.wikipedia.org/wiki/Mineral#/media/File:Biotite-Orthoclase-229808.jpg</a></p>



<p>Gypsum</p>	 <p>Photo:<a href="http://geology.com/minerals/gypsum.shtml">http://geology.com/minerals/gypsum.shtml</a></p>
<p>Chalcopyrite</p>	 <p>Photo:<a href="https://commons.wikimedia.org/wiki/File:Chalkopyrit-Chalcopyrite-Buntkupfer-Kupferkies1.jpg">https://commons.wikimedia.org/wiki/File:Chalkopyrit-Chalcopyrite-Buntkupfer-Kupferkies1.jpg</a></p>
<p>Coal</p>	 <p>Photo:<a href="https://en.wikipedia.org/wiki/Coal">https://en.wikipedia.org/wiki/Coal</a></p>
<p>Garnets</p>	 <p>Photo:<a href="https://en.wikipedia.org/wiki/Garnet">https://en.wikipedia.org/wiki/Garnet</a></p>
<p>Gold</p>	

	Photo: <a href="https://upload.wikimedia.org/wikipedia/commons/6/6d/Gold_nugget_(placer_gold)_%28Pennsylvania_Mountain,_Alma_Mining_District,_Park_County,_Colorado,_USA%29_1_(17064000675).jpg">https://upload.wikimedia.org/wikipedia/commons/6/6d/Gold_nugget_(placer_gold)_ (Pennsylvania Mountain, Alma Mining District, Park County, Colorado, USA) 1 (17064000675).jpg</a>
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## Video of Abandoned Gold Mine Railroad- Juneau, Alaska, 2011

Minerals are everywhere around us. For example, it is estimated that more than 70 million tons of gold is in the ocean waters. It would be too expensive to recover because it is so scattered. Minerals need to be concentrated into deposits by Earth's natural processes to be useful to us.

Besides gold we can find other minerals in Southeast Alaska. Native people were using copper because of its great malleability( property of a metal describing the ease with which it can be hammered, forged, pressed, or rolled into thin sheets).

## Mining for Blueberries

( lab activity simulating mining)



For this activity students will work in groups of 3.

### Mining Challenge

**Question:** Can you successfully mine for blueberries while not destroying the earth?

**Research:** Can you mine for minerals without destroying the earth?

**Hypothesis:** What are some techniques you are planning to use?

**Materials Needed:** blueberry muffin, paper towel, toothpick, knife, other mining materials?

**Experiment:** You will be given a muffin. The muffin represents a land area and the blueberries are valuable deposits. Your goal is to remove as many mineral deposits (blueberries) with the least amount of damage to the land.

Inspect the land area for surface deposits and made predictions about underground deposits

- Record findings and predictions.
- Record the number of mineral deposits successfully removed.
- As a group, compare and average your data.

Photo: <http://procyon4x.blogspot.com/2005/02/blueberry-muffins.html>

**Record Data:**

	You	average
number of surface deposits		
predicted number of underground deposits		
number of mineral deposits successfully removed		
number of failed or abandoned attempts		

**Analyze Data:**

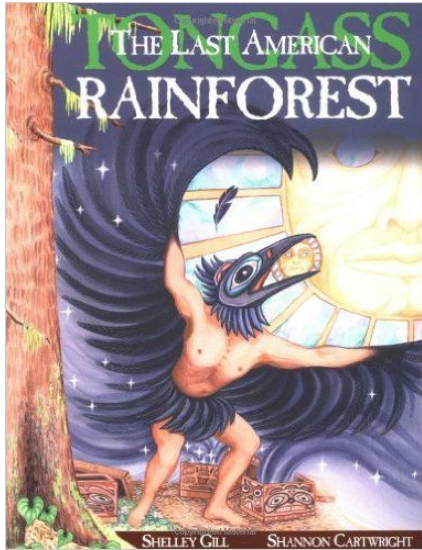
Was your mining effort successful? How did you determine your level of success?

How did the land areas change as a result of your mining?

**Conclusion:**

Can you successfully mine for blueberries while not destroying the earth? Explain.

Students will take 5 minutes to think about the experiment and write a paragraph on the results.



**Students will listen to a story called The Last American Rain Forest Tongass, by Shelley Gill.**

The purpose of the book is for students to reflect at all the wildlife that will be endangered by mining.

Mining is generally very destructive to the environment. It is one of the main causes of deforestation. In order to mine, trees and vegetation are cleared and burned. With the ground completely bare, large scale mining operations use huge bulldozers and excavators to extract the metals and minerals from the soil. In order to amalgamate (cluster) the extractions, they use chemicals such as cyanide, mercury, or methylmercury. These chemicals go through tailings (pipes) and are often discharged into rivers, streams, bays, and oceans. This pollution contaminates all living organisms within the body of water and ultimately the people who depend on the fish for their main source of protein and their economic livelihood.

Students will hear 2 presentations by a U.S. Forest Service employee and by a USGS expert.

The guest from U.S.Forest Service will speak about resource choices in the forest and about the local garnet mine ( Petersburg), and how decisions are being made about resource extraction and public land.

The guest from USGS will present all the reasons minerals are so useful for our society. Read more:

[http://kids.mongabay.com/lesson\\_plans/lisa\\_algee/mining.html#uvHJuXOgk5MDvLgw.99](http://kids.mongabay.com/lesson_plans/lisa_algee/mining.html#uvHJuXOgk5MDvLgw.99)

[Salgado pit mining photos](#)



To assess the outcomes students will be split in 2 groups and will have a mock debate in front of our guests and classroom. One group will be given the task to brainstorm 5 things pro mining and the other group will have to come up with 5 things against mining. Both groups will have 2 minutes to support their cause.

As a future project for this lesson, and to create an authentic audience students could have the debate in front of other peers, parents, and teachers.

Photo:[https://en.wikipedia.org/wiki/Jesus\\_in\\_the\\_Talmud](https://en.wikipedia.org/wiki/Jesus_in_the_Talmud)



Sources:

[https://en.wikipedia.org/wiki/Gold\\_mining\\_in\\_Alaska](https://en.wikipedia.org/wiki/Gold_mining_in_Alaska)

<https://www.mineralseducationcoalition.org>

<http://www.akhistorycourse.org/americas-territory/gold>