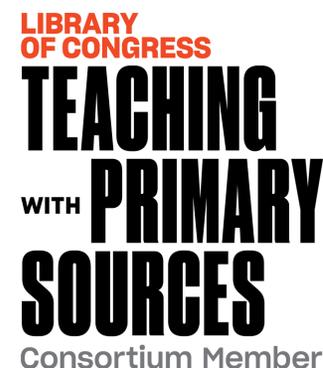


1. Title / Content Area:	Forests of Change
2. Important Sites:	Forests of Colorado including those impacted by grazing, fire, and climate change
3. Episode:	https://www.pbs.org/video/forests-of-change-ufmhof/
4. Developed by:	Jennifer Congedo, Adams 12 School District Michelle Pearson, Adams 12 School District
5. Grade Level and Standards:	<p><i>Grade Level:</i> 6th - HS <i>Standards:</i> Colorado Social Studies Standards 1-4 <i>Prepared Graduate Competencies:</i> Content in this Document Based Question (DBQ) link to Prepared Graduate Competencies in the Colorado Academic Standards HS: PGC 1-5, 7, 8</p> <p>Grade Level: Middle School Standards: NGSS</p> <p>MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</p>
6. Assessment Question:	<p>What are the implications of a changing forest ecosystem in Colorado? (Focus on water, biodiversity, animal populations, and tourism)</p> <p>Additional assessment question possibility: How do environmental challenges affect the ecosystem's biodiversity, and energy flow over time?</p>
7. Contextual Paragraph	Colorado forests have been changing and adapting over time. They have experienced disturbances from the increase in mining activity during the gold rush.



	<p>They also have experienced challenges caused by natural and human interactions such as forest fires and the overgrazing of cattle and sheep on forest land. All of these disturbances have altered the ecosystems of our forests. Today, scientists and historians are working to understand these causes and the resulting consequences of Colorado's ever changing forests. This lesson helps students explore these human-environment interactions through the use of primary and secondary sources.</p>	
<p>8. Connection to Historic Preservation</p>	<p>Historic places are often embedded in communities surrounded by forests. The issues impacting forests can have a direct impact on communities through fire, grazing, mining, and other challenges. Many of our historic farms and ranches were established across the state and have long held a part in our agricultural and environmental history.</p>	

Document Based Question (DBQ)

Document Set

The Case Study of the Hayman Fire: American Planning Association



GUIDING QUESTIONS:

1. What weather occurrence made this a particularly challenging fire to fight. Explain.
2. How is this type of weather event becoming the norm in Colorado?
3. What were the economic, environmental, and social/health impacts of this fire? Explain each with an example.

<https://www.planning.org/research/postdisaster/casestudies/haymanfire.htm>

Wildfire Lessons
US Department of Agriculture



GUIDING QUESTIONS:

1. Read through the Fire Ecology and Fire Affects section, pages 19-23. Make sure to read the captions of the pictures. Describe the effects of the Hayman Fire on the following:
 - The condition of the forest before and after the fire.
 - The alteration of the soil after the fire.
 - The greatest risk to soil and water resources after the fire.
 - Potential effects on animal and plant species after the fire.

<https://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=d56cb177-cd16-44d9-a8d2-c10f99f26123>.

In Beetle Kill Forests There Are Winners and Losers



<https://durangoherald.com/articles/277511>

GUIDING QUESTIONS:

1. Is there enough data to categorize winners and losers of our forests due to beetle kill? Explain.
2. What are the distinct and subtle changes occurring in this ecosystem?

National Park Service



Similar Views from Farview Curve

GUIDING QUESTIONS:

1. Look at the 2005 picture and the 2009 picture. What do you notice?
2. What is causing the change you notice? Explain.
3. Even though the bark beetle is a natural part of the forest, why is the damage caused by this beetle on the rise? Explain.

https://www.nps.gov/romo/learn/nature/mtn_pine_beeble_background.htm

230 Colorado Mines are Leaking Heavy Metals Into State Rivers



GUIDING QUESTIONS:

1. How can the leaching of heavy metals impact an established ecosystem?
2. Based on the video and this article, what causes the leaching of metals in the mountains of the west?

<https://www.denverpost.com/2015/08/15/230-colorado-mines-are-leaking-heavy-metals-into-state-rivers/>

Leadville, Colorado 1900



GUIDING QUESTIONS:

1. What do you see in this image? Note those items here.
2. What man made industries are evident in this picture?
3. How do these industries affect the environment surrounding Leadville?
4. What man-made impacts can you see in the landscape?

<https://digital.denverlibrary.org/digital/collection/p15330coll22/id/31008/>

Emmet Mine in Leadville, CO



GUIDING QUESTIONS:

1. Imagine how this hill looked before man arrived? Describe what you think existed.
2. How has settlement changed how this area may have looked?
3. Take an educated guess, what are the long term impacts of mining on the ecosystem which is presently surrounding Leadville, CO?
4. How did the establishment of a mine contribute to the deforestation of an area?

<https://digital.denverlibrary.org/digital/collection/p15330coll21/id/10097/>

Center for Biological Diversity: Grazing	GUIDING QUESTIONS:
	<ol style="list-style-type: none"> 1. According to this article, what are the ecological costs of grazing cattle on public lands? 2. What are the economic costs?
https://www.biologicaldiversity.org/programs/public_lands/grazing/index.html	

USDA : Livestock Grazing on the National Forest- Why Continue to Do It?	GUIDING QUESTIONS:
	<ol style="list-style-type: none"> 1. What are the objectives of the range management program for the National Forests and National Grasslands? 2. What are the ecological benefits of grazing on public lands? What are the economic benefits of grazing on public lands?
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5401590.pdf	

Range Management on the GMUG National Forest	GUIDING QUESTIONS:
	<ol style="list-style-type: none"> 1. Grazing management has increased and improved since livestock grazing was first authorized on the national forests over 100 years ago. How does this help control the damage that can be caused on the land? 2. Describe at least 3 improvements that have been implemented for grazing management to help reduce the impact on our lands.
https://www.fs.usda.gov/detail/gmug/landmanagement/resourcemanagement/?cid=stelprdb5401534	

Assessment Question

What are the implications of a changing forest ecosystem in Colorado? (Focus on water, biodiversity, animal populations, and tourism)

Response