Food and Agriculture Center for Science Education

California Wildfires Task

High School, Earth Science

Task Overview

In this task, students will explore what is causing the wildfire crisis in the West and identify the best ways to manage forests to mitigate the negative impact to biodiversity and human communities in two different areas of California.

Students will evaluate and compare sources of information presented in different formats to explore what is causing wildfires, the negative impacts of wildfires on biodiversity and human communities, and several potential forest management strategies to mitigate these impacts. Students begin the task by looking at figures and watching a short video clip to see how humans are causing potential wildfires and begin to brainstorm strategies to reduce these impacts. Next, students will evaluate figures and read a series of excerpts related to three common fire management practices - using prescribed burning, letting wildfires burn undisturbed, and suppressing wildfires entirely. By integrating information from all of these sources and comparing relevant characteristics of two different areas of California (i.e., population, wildfire risk, and amount of forest land), students make recommendations for which fire management tools should be implemented in each area to successfully combat the ongoing wildfire crisis.

Background Information

California is facing an unprecedented and growing forest and wildfire crisis. Five of CA's largest fires in modern history burned at the same time, destroying thousands of buildings, forcing hundreds of thousands of people to flee their homes, and exposing millions of residents to dangerously unhealthy air. More than 4 million acres burned across the state, destroying forests, watersheds, and biodiversity. With such a large and ongoing crisis facing California, it is imperative for regions that are plagued by instances of fire to implement land management practices with goals to sustain biodiversity and human communities within the region. As students will discover in their research, most often, a single solution cannot be established as best practice. Instead, it is the incorporation of a combination of management tools that are specific to the ecosystem of the region, accompanied by the development of responsible education about available resources, that make for the most effective solution.

Next Generation Science Standards

Three-Dimensional Claim

Compare, integrate, and evaluate sources of information presented in different media and formats in order to develop solutions at different scales to a resource management problem where human activities have threatened the sustainability of a natural resource and the surrounding human communities.

This task is intended to elicit student learning of the following **NGSS elements** for each of the three dimensions:

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems (HS)

- The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information (HS)

- Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.

Crosscutting Concepts

Scale, Proportion, and Quantity (HS)

- Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.

Suggestions for Use

This task is intended to be used for formative assessment purposes - to identify students' strengths and needs with the above dimensions in order to provide feedback to students and guide shifts in instruction.

Assumptions

Students should have engaged with instructional experiences that ask them to integrate and compare various types of data (visual, written, oral) to evaluate potential pros and cons of possible solutions to environmental concerns. Students should also have an understanding of the role that humans play in maintaining biodiversity of ecosystems and that responsible management of natural resources is a necessity for sustainability.

Materials Needed

- California Wildfires Student Task
- Computer access (for videos)
- Optional: Highlighters (for annotation)
- Optional: Post-it notes (for annotation)

Assessment Guidance

Introduction

Forest fires across the world are getting larger and more dangerous. The images below are evidence of the devastating impacts of increased wildfires.

Prompt 1

Prompt 1: NOT ASSESSED. This is to generate initial thoughts about relevancy and authenticity. We encourage you to use this first prompt as a way to engage students in small group and whole class discussion before they engage with the rest of the task.

Prompt 2

Prompt 2: NOT ASSESSED. This is a scaffolding prompt.

Prompt 3A, 3B, 3C

Prompt 3A, 3B, 3C: NOT ASSESSED. These are scaffolding prompts.

Prompt 3D

Explain what may be causing the increase of wildfires in California and how that is impacting California forests and the surrounding human communities. Use evidence from the sources (1, 2, and 3) above to support your answer.

Prompt 3D Performance Outcome:
Compare, integrate, and evaluate sources of information presented in different media and formats to determine how human activities have threatened the sustainability of natural resources and communities.

SEP	Compare, integrate, and evaluate sources of information presented in different media

	and formats
DCI	Determine how human activities have threatened the sustainability of a natural resources and the surrounding human communities

Prompt 3D Rubric			
	Emerging	Developing	Proficient
Sample Student Response	Cars and campfires cause more fires. Controlled fires mean we are controlling them better.	According to Chart 1, people are causing wildfires by being stupid and not controlling their campfires or other fires when they burn things. In Figure 1, electric cars are a solution to the increase in carbon pollution that is making fires more intense. The video explained that we should put the fire down to kill the dead plants.	According to Chart 1, burning debris and vehicles are the leading causes of forest fires for that year. When there is more fire, there is more loss of habitat and biodiversity. Human communities are also impacted because more fire means loss of property and danger to human life. We saw both of these impacts in the video too. Humans are also increasing carbon emissions, so forests are drying out, temperatures are rising, and the fires get worse (Figure 1).
Look-Fors	Explanation **uses limited** information from sources to provide a **general or inaccurate** description of	Explanation uses **relevant** information from **multiple** sources to **partially** describe	• Explanation uses **relevant** information from **multiple** sources to **sufficiently** describe the causes

	• the causes for the increase in wildfires **and/or** • how wildfires have impacted natural environments **and/or** human communities. **OR** Student response is **inaccurate or irrelevant.**	• the causes for the increase in wildfires **and/or** • how wildfires have impacted natural environments (forests) **and/or** human communities.	for the increase in wildfires **and** • how wildfires have impacted **both** natural environments (forests) **and** human communities.

Prompt 4A, 4B, 4C, 4D

Prompt 4A, 4B, 4C, 4D: NOT ASSESSED. These are scaffolding prompts.

Prompt 4E

Using the information you have gathered so far in previous prompts, describe how each fire management tool affects biodiversity and the sustainability of forests and human communities in the area.

Using Prescribed Fire (Ecologically-Managed)	Suppressing Wildfires Entirely	Letting Wildfires Burn
Using prescribed fire affects biodiversity by...	Suppressing wildfires entirely affects biodiversity by...	Letting wildfires burn affects biodiversity by...
Using prescribed fire affects human communities by...	Suppressing wildfires entirely affects human communities by...	Letting wildfires burn affects human communities by...
Why do humans use fire management tools?		

Prompt 4E Performance Outcome:
Compare, integrate, and evaluate sources of information presented in different media and formats to determine how responsible resource management can improve biodiversity and the sustainability of human communities.

SEP	Compare, integrate, and evaluate sources of information presented in different media and formats
DCI	Responsible resource management can improve biodiversity and the sustainability of human communities

Prompt 4E Rubric			
	Emerging	Developing	Proficient
Sample Student Response	Using Prescribed Fire Effects on Biodiversity Planned, compare conditions Effects on Human Communities —--- Suppressing Wildfires Entirely Effects on Biodiversity Allow burning fires	Using Prescribed Fire Effects on Biodiversity Forest can be thinned so there's not that much trees Effects on Human Communities Stopping wildfires/burning makes other areas safer Suppressing Wildfires Entirely Effects on Biodiversity Keeps dead trees	Using Prescribed Fire Effects on Biodiversity This leads to less intense fires so more animals and plants can survive when there is a smaller fire. Effects on Human Communities They do it safely so it doesn't spread to humans Suppressing Wildfires Entirely Effects on Biodiversity Probably increases biodiversity at first but

	Effects on Human Communities —--- Letting Wildfires Burn Effects on Biodiversity Not putting it out Effects on Human Communities —--- Why do humans use fire management tools? They control them in different ways	Effects on Human Communities Unlikely to spread to community Letting Wildfires Burn Effects on Biodiversity If you don't try and stop it then it will ruin habitats and forest and will spread Effects on Human Communities Can spread to nearby folk Why do humans use fire management tools? Depending on where humans live and the amount of forest, fires might be managed differently.	since it can lead to bigger fires, biodiversity could decrease Effects on Human Communities It costs a lot of money and resources Letting Wildfires Burn Effects on Biodiversity Depending on the forest, it could be helpful or it could kill all the trees. Wildlife and biodiversity is lost. Effects on Human Communities If it is close to humans, it could burn their homes or other things Why do humans use fire management tools? They are used to manage fires in different ways to maintain biodiversity and protect human property, depending on where humans live and the amount of forest.
Look-Fors	Student response uses **little to no** information **from sources** to provide	Student response uses information from **multiple** sources to **partially and/or**	Student response uses information from **multiple** sources to

	a limited or inaccurate description for how resource management strategy(ies) affect biodiversity **or** human communities. **OR** **Student response is inaccurate or irrelevant.**	**generally** describe how resource management strategy(ies) affect biodiversity **and/or** human communities.	**sufficiently and accurately** describe how **each** resource management strategy affects biodiversity **and** human communities.

Prompt 5A

Prompt 5A: NOT ASSESSED. This is a scaffolding prompt.

Prompt 5B

Describe which fire management tool(s) you would recommend for Area A and Area B.
In your answer, explain how the fire management tool(s) you've selected:

- ☐ Manage a natural resource
- ☐ Sustain biodiversity
- ☐ Sustain human communities

Recommendation for Area A	Recommendation for Area B

Prompt 5B Performance Outcome:
Integrate different sources of information to compare solutions to a resource management problem at different scales in order to best sustain biodiversity and human communities in particular areas.

SEP	Compare, integrate, and evaluate sources of information presented in different media and formats
DCI	Responsible resource management is necessary to sustain biodiversity and human communities

CCC	Compare solutions at different scales

Prompt 5B Rubric			
	Emerging	Developing	Proficient
Sample Student Response	Area A - I would use prescribed fire because there are more areas that could start a fire. Area B - I would use prescribed fire because it seems like this is the best one all around.	Area A - I would use prescribed fire because there are more areas that could start a fire because there is a lower population. Area B - I would use suppressing wildfires because there is a higher population in that area.	Area A - Use prescribed burns. The biodiversity might decrease slightly at first but it would benefit biodiversity in the long run because there is lots of forestland here and fires would be less intense when they do happen. Human communities would also be impacted less since Area A is less populated. Area B - Use fire suppression.It would be safer for the people to use this tool since the population is much higher here. Biodiversity could decrease because a lot of plants would be burned if there is a big fire but there is also a smaller amount of forest land in Area B for biodiversity to be as threatened.
Look-Fors	Student responses identify a fire	Student responses identify a fire	Student responses identify a fire

	management strategy **relevant to at least one** of the areas **AND** Provide **little to no** evidence **from sources with limited or inaccurate** reasoning about the connections between the characteristics of the region (ie. population **and/or** amount of forest) and a fire management strategy used to sustain biodiversity and/or human communities in those regions. **OR** Student responses **are inaccurate or irrelevant.**	management strategy **relevant to each area** (at different scales) **AND** Provide **partial evidence from multiple sources** and reasoning with **limited connections between** the characteristics of the region (ie. population **and/or** amount of forest) and the fire management strategy used to sustain biodiversity and/or human communities in those regions.	management strategy **relevant to each area** (at different scales) **AND** Provide **sufficient** evidence **from multiple sources** and reasoning that **explicitly connects** the characteristics of the region (ie. population and amount of forest) with a fire management strategy used to sustain biodiversity and/or human communities in those regions.

Sources

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