



# The Future of Forests

## Landscapes on Fire - Teacher Guide

### Setting the Stage

Scientific models are representations of ideas or processes used to explain phenomena. Scientists use models to visualize an explanation, test and revise ideas, and make predictions. Engaging students with scientific modeling allows them to make their ideas public and testable; thus, open to revision.

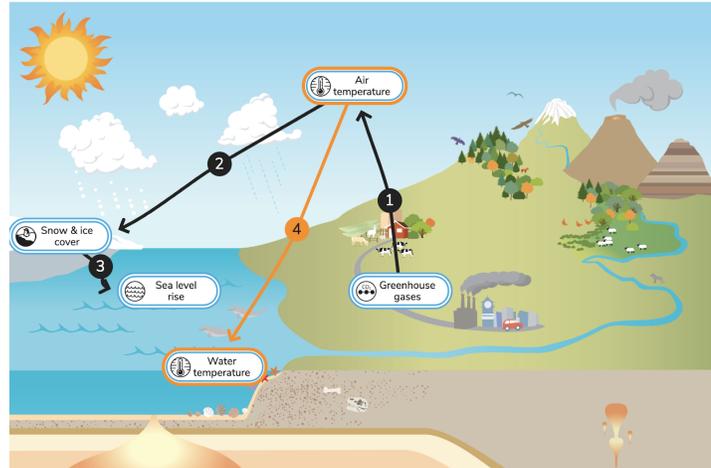


Photo Credit: [HHMI BioInteractive - Understanding Global Change](#)

### Lesson Overview

In this 2-day lesson, students work in pairs to construct initial descriptive models and explanations for the unit driving question, “How do landscapes recover after a wildfire?”

#### Day 1

- *Part 1 – (10 minutes) The Impact of Wildfires*  
Access students’ prior knowledge about wildfires.
- *Part 2 – (50 minutes) Landscapes on Fire*  
Students are introduced to the unit driving question, “How do landscapes recover after a wildfire?” after analyzing and interpreting a wildfire dataset and exploring NASA satellite imagery that documents the 2020 wildfire season.

#### Day 2

- *Part 3 – (50 minutes) Initial Model Construction*  
Students work in pairs to construct their initial models (annotated sketch) to explain the unit driving question.
- *Part 4 – (10 minutes) Next Steps*  
Students create a list of questions they have related to the unit driving question.

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Instructional Overview	
Grade Level	Middle/High School
Instructional Time	120 minutes ( <i>total time needed</i> )
Unit Driving Question	How do landscapes recover after a wildfire?
Lesson Driving Question	Why should we care if landscapes recover after a wildfire?
Building Toward	Middle School: <a href="#">MS-LS2-4</a> , <a href="#">MS-ESS3-3</a> High School: <a href="#">HS-LS2-7</a>
Three Dimensions	<p><b>Science and Engineering Practices:</b></p> <ul style="list-style-type: none"> <li>Developing and Using Models</li> <li>Asking Questions and Defining Problems</li> </ul> <p><b>Disciplinary Core Ideas:</b></p> <p><i>Middle School:</i></p> <ul style="list-style-type: none"> <li>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</li> <li>ESS3.C: Human Impacts on Earth Systems</li> </ul> <p><i>High School:</i></p> <ul style="list-style-type: none"> <li>LS2.C Ecosystems Dynamics, Functioning, and Resilience</li> </ul> <p><b>Crosscutting Concepts:</b></p> <ul style="list-style-type: none"> <li>Stability and Change</li> <li>Cause and Effect</li> </ul>
What Students Will Do	<ul style="list-style-type: none"> <li>Develop a model to explain how how landscapes recover/change after a disruption (e.g., wildfire)</li> <li>Ask questions that arise from observations of fire-affected landscapes to seek additional information about factors (causes) that might affect the landscape recovery process after a fire.</li> </ul>
Materials	<ul style="list-style-type: none"> <li><a href="#">Landscapes on Fire PPT</a></li> <li><a href="#">Landscapes on Fire Student Worksheet</a> (1 per student)</li> <li><a href="#">Initial Model Construction Worksheet</a> (1 per student-pair)</li> <li><a href="#">Summary Table Student Worksheet</a> (1 per student)</li> <li><a href="#">Answer Key</a></li> <li><a href="#">Video: Colorado Wildfires Intensify</a></li> <li><a href="#">NASA Satellite Imagery</a></li> <li>Initial Ideas Public Record (Use butcher paper to create an initial idea public record as described in Part 2 - 1 per class period)             <ul style="list-style-type: none"> <li>Alternatively, initial idea public record could be created as a Google Doc</li> </ul> </li> <li>Colored pencils, markers, crayons</li> </ul>



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<b>Material Preparation</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Cue and test web links</li><li><input type="checkbox"/> Print student worksheets</li><li><input type="checkbox"/> Review speaker notes in the <a href="#">Landscapes on Fire PPT</a></li><li><input type="checkbox"/> Be prepared to tape butcher paper in a location easily visible to students</li></ul>
<b>Vocabulary</b>	<ul style="list-style-type: none"><li>• <u>Phenomenon</u> - An observable event</li><li>• <u>Scientific Model</u> - Representation of ideas or processes used to explain a phenomenon.</li></ul>

## Part 1 - The Impacts of Wildfire (10 minutes)

Refer to Part 1 slides including in the [Landscapes on Fire PPT](#). See PPT presenter notes for additional information.

1. Students complete their warm-up, “What are the impacts of wildfires on people? Animals? Landscapes?” and share their ideas with the class.
  - a. Emphasize that people and places are impacted by wildfires in different ways.

## Part 2 - Landscapes on Fire (50 minutes)

Refer to Part 2 slides including in the [Landscapes on Fire PPT](#). See PPT presenter notes for additional information.

1. Watch the [“Colorado Wildfires Intensify” video](#) as a class and discuss the tremendous amount of forest/landscapes affected by the 2020 East Troublesome Fire in Colorado.
2. Introduce students to the “Wildfires in the United States” graph (slide #6) which shows the number of wildfires on the primary y-axis (red line) and the area burned by these fires (acres) on the secondary y-axis (gray area) for each year during the period of 1990-2019.
  - a. Students work in pairs to analyze and interpret the “Wildfires in the United States” graph and answer questions on their student worksheet.
  - b. Reinforce the concept that wildfires are burning more of the landscape
3. Students explore [NASA satellite imagery](#) documenting the 2020 wildfire season.
  - a. Facilitate a discussion in which students share what they observed/learned while engaging with NASA resources.
    - i. Ask students to consider what will become of these burned landscapes.



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- b. Note: the “Colorado Wildfires Intensify” video, “Wildfires in the United States” graph, and the NASA satellite imagery are resources designed to set the stage for introducing the unit driving question.
4. Introduce the unit driving question, “How do landscapes recover after a wildfire?”
5. Students work in pairs to create a bulleted list of 2-3 possible explanations (initial ideas) for the unit driving question.
  - a. Create a public record of student-generated initial ideas.
    - i. Display and use this public record in each lesson thereafter to add or cross off ideas as new evidence arises.
6. Preview Day 2 by telling students that they will be tasked with developing initial models to represent their thinking as it relates to the unit driving question

## End Day 1

## Day 2

### Part 3 - Initial Model Construction (50 minutes)

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Refer to Part 3 slides including in the [Landscapes on Fire PPT](#). See PPT presenter notes for additional information.

1. Use Part 3 of the [Landscapes on Fire PPT](#) to introduce students to scientific models
2. Students work in **pairs** to identify and list relevant parts/components they’d like to include in their model (these parts/components will likely come from the initial ideas public record).
3. Students work in pairs to [construct their initial models](#).
4. Students share their initial models.
  - a. Model sharing can be facilitated as a gallery walk, in small groups, or as a whole class.

### Part 4 - Next Steps (10 minutes)

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Refer to Part 4 slides including in the [Landscapes on Fire PPT](#). See PPT presenter notes for additional information.



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1. Students reflect on the lesson by creating a list of questions they still have related to the unit driving question, and proposing investigations that may address questions raised in this lesson.
2. Describe the Model-Based Inquiry unit framework say,

*The goal of this unit is to construct an evidence-based model and explanation of a real-world phenomenon: landscape recovery after a wildfire. We will work together to identify information/evidence from each lesson that helps explain this phenomenon. We will keep track of new information/evidence throughout the unit in a summary table.”*

3. Distribute the [summary table worksheet](#) (hard copy or digitally) to students.