

# AMERICAN Scientist

For High Schools

Developed by:

Mary Lou O'Donnell, M.Ed.

*Albert Einstein Fellow*

## Teachers' Activity Guide

Article: Coexisting with Wildfire

From American Scientist 2016 July-August Issue

Author: Max A. Moritz and Scott Gabriel Knowles



**SIGMA XI**  
THE SCIENTIFIC RESEARCH HONOR SOCIETY

# Teachers' Activity Guide

Article: Coexisting with Wildfire

From American Scientist 2016 July-August Issue

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Wildfires: Nature's Friend and Foe

Pre-Teach Activity: See- Think- Wonder

Choice Board Activity:

Read and Question - Coexisting with Wildfire article

Read and Question - Coexisting with Wildfire: Vocabulary and Comprehension Questions

Read and Question - The Shift to a Bird's Eye View: Vocabulary and Comprehension Questions

Data Analyze: Wildfires: Analyzing Data

# WildFires: Natures' Friend and Foe

## Pre-teach Activity

[See-Think-Wonder](#)

## Goal

Students will be able to observe and measure the impact of fire caused by earth's changing environment. Students will be introduced to new technologies used and discuss real world solutions.

## NGSS Standard

Earth and Human Activity

**MS-ESS3-2:** Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

**MS-ESS3-3:** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

**HS-ESS3-1:** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

**HS-ESS3-3:** Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.

Ecosystems: Interactions, Energy, and Dynamics

**HS-LS2-1:** Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

**HS-LS2-7:** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

**HS-LS2-8:** Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.

## Instructions

This Choice Board provides all the learning materials needed to complete the practice options.

## Practice Options

You must complete 10 points worth of practice by \_\_\_\_\_. Any activity with an \*\* asterisk is MANDATORY, extra credit is also available for completing additional activities.

\*\*4 pts

**Read and Question:**

Read the American Scientist article titled, [Coexisting with Wildfire](#) and answer the [Vocabulary and Comprehension questions](#).

1 pt

**Create:**

Using your new vocabulary words add three terms you consider most important or interesting to this class [mentimeter word cloud](#).

1 pt

**Research Project Ideas:**

[Deforestation | Science Project](#)

4 pts

**Read and Question:**

Read the Sept-Oct 2021 American Scientist article titled, [The Shift to a Bird's-Eye View](#) answer the [Vocabulary and Comprehension questions](#).

\*\*1 pt

Submit your Reflection on what you did and learned completing this Choice Board.

Educator: Find table *Reflection* in Student Response Journal.

\*\*1 pts

**Watch:**

[Wildfires 101 | National Geographic](#), a brief 3 minute background video.

2 pts

**Data Analysis:**

[Wildfires: Analyzing Data](#)

1 pts

**Citizen Science Projects:**

[Projects | US Forest Service](#)

\*\*1 pts

**Collaborative Solution Table**

Educator: Find table *Multipronged Approach to battling Wildfires* in Student Response Journal.

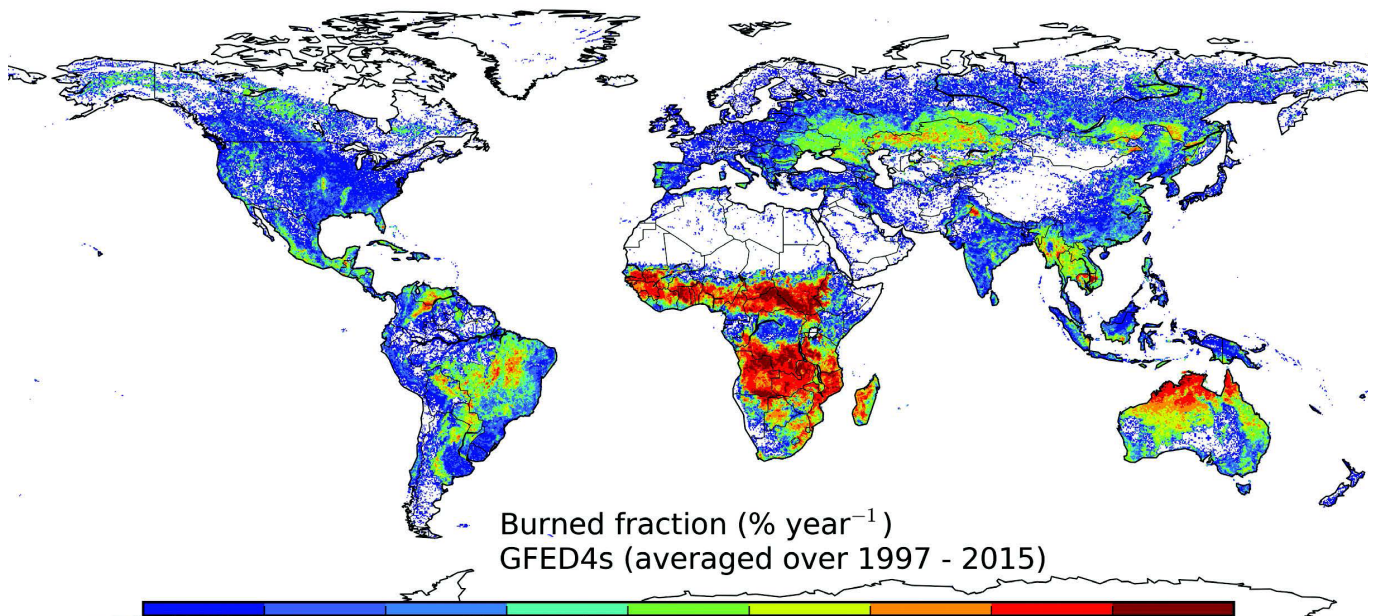
**Pre-Teach Activity:**

**See-Think - Wonder**

**Directions**

Observe this image for 60 seconds. The occurrence of fires around the globe can identify the broadscale environmental variables that affect their likelihood across different ecosystems. Image from [globalfiredata.org](http://globalfiredata.org)

Set countdown timer: [Classroom Timer](#)



The occurrences of fires around the globe can identify the broadscale environmental variables that affect their likelihood across different ecosystems. (Image from [globalfiredata.org](http://globalfiredata.org).)

**Round 1: 60 Sec Quiet Look**

Questions:

What do you see?

What do you think?

What do you wonder?

**Round 2: Following 2 Min Chat**

Questions:

I used to think....

But now I think...

Because...



## Read and Question: *Coexisting with Wildfire*

# Vocabulary and Comprehension Questions

### Directions

After students read “Coexisting with Wildfire” by Max A. Moritz and Scott G. Knowles, they should define the terms below and answer the following questions.

### Article-Based Vocabulary

**Chaparral:**

**Regenerating:**

**Fire-resistant:**

**Biogeographer:**

**Spatial analysis:**

**Ecosystem:**

**Biomass:**

**Pyrogeography:** [Pyro = fire] + [geo=earth] + [graphy=field of study]

**Biophysical controls:**

**Passive Survivability:**

**LEED certified:**

### Article-Based Comprehension, Q&A

Page 1/6

- What do the authors mean when they state “Research has long shown that fire is a necessary, natural disturbance in many ecosystems”?
- Why or why isn’t fuel buildup, the accumulation of dense thickets of younger trees and shrubs, an “outdated notion attributable to the U.S. Forest Service?”
- Discuss “the disconnect between [scientific] knowledge and [intelligent government] policy” that exists when discussing forest fires? Can it be applied to the vaccination issue?
- What are some issues that policy makers need to address in order to explore the issue of forest fires comprehensively?
- List the three basic constraints that determine the level of fire activity?

Page 2/6

- In the section titled “The Right Kind of Fire” the authors discuss how fires can even be essential for seed germination of certain types of trees. Take a moment to read this infographic and discuss at least two plants that benefit from fire. Living with Fire

Page 4/6

- In the section, Trial by Fire, what are some “proactive, long term strategies” proposed by the authors? [hint.... Use one of these in the Collaborative Solution Table!]

Page 5/6 - Retrofitting Vulnerable Structures

- How can we build more fire resistant structures?

**Read and Question:** *The Shift to a Bird's Eye View*

## Vocabulary and Comprehension Questions

### Directions

After students read specific excerpts of “The Shift to a Bird's Eye View” by Elizabeth Madin and Catherine Foley, they should define the terms below and answer the following questions.

### Article-Based Comprehension, Q&A

**Page 288**

- In the section “View from Afar,” define remote sensing and list at least 5 remote sensing technologies.

**Page 290**

- When were the first satellite images captured?
- What is the relationship between computing power and improved image quality?
- Landsat, created by NASA and the U.S. Geological Survey, provides publicly available images of areas. Can you think of a possible research question that you can explore using it? Landsat Science: [Landsat Homepage](#)
- Why is it important for all STEM professionals to have a certain level of experience with computer science? For example, writing algorithms?

**Page 291**

- What are “Watch” projects? Take a moment to explore the citizen science website [Zooniverse platform](#). If you needed a question to research for a school or summer project, this would be a good starting point.

**Page 292 - Bottom**

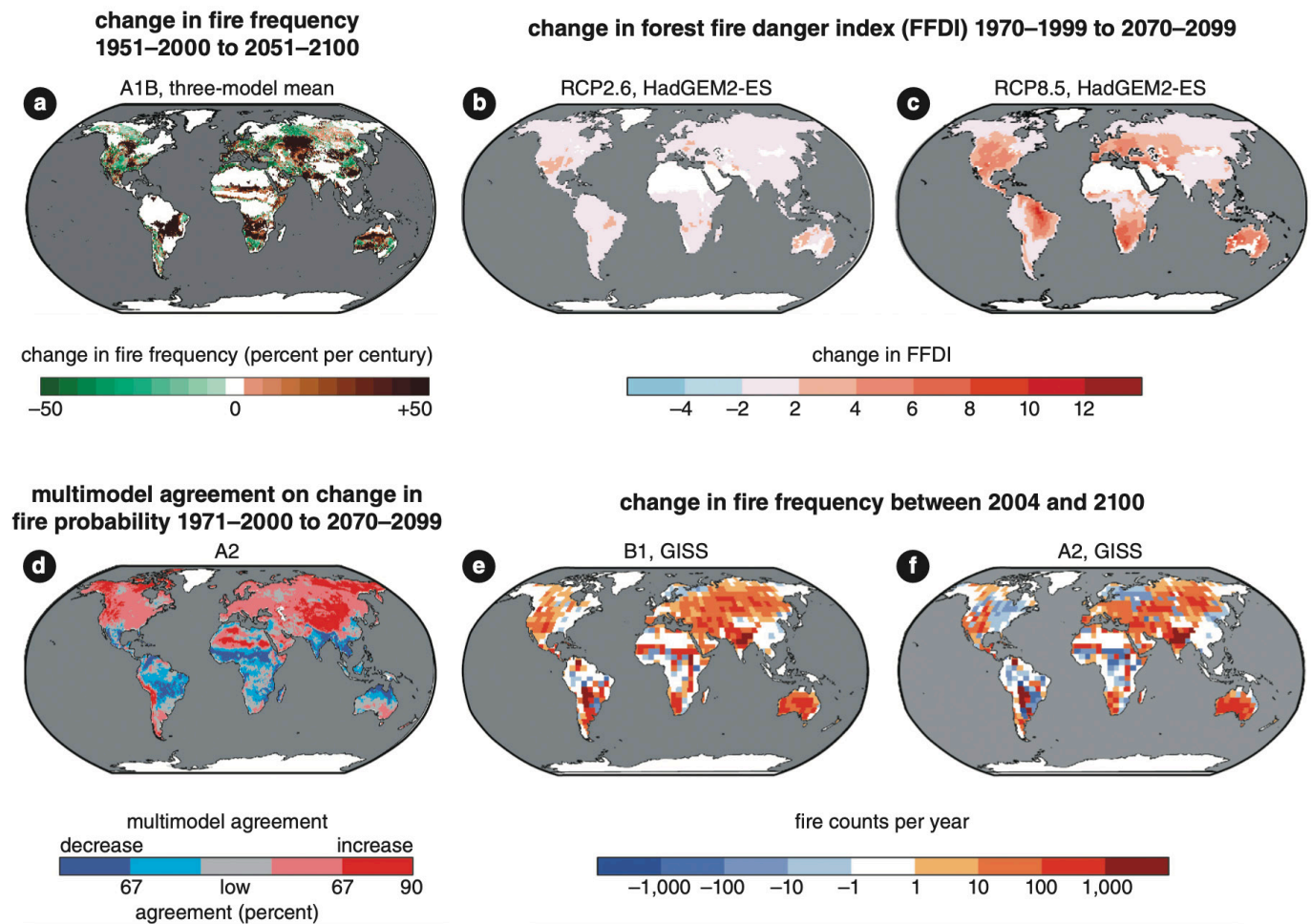
- “A less direct effect of anthropogenic [anthop=pertaining to man + genic=produced by] climate change is the way it is changing fire patterns across the world. Imagery from satellites and drones has proved invaluable at predicting, detecting, monitoring, responding to, and recovering from wildfires globally.” What does anthropogenic mean? Hypothesize how remote sensing can possibly be used during wildfires.

## Data Analysis

# Wildfires: Analyzing Data

## Directions

Five minute LOOK across the seven continents in image e and f, change in fire frequency between 2004 and 2100, and fill in the following chart.



A comparison of global fire projections shows possible increases and decreases in future fire activity. Models show strong agreement that fire probability will increase across much of North America, Europe, and northern Asia. (Maps from Settele, J., et al., 2014. Terrestrial and inland water systems. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.)



	Approximate Fire Counts per year 2004	Approximate Fire Counts per year 2100	Increase or Decrease
Africa			
Asia			
Australia & Oceania			
Europe			
Middle East			
North America			
South America			

What conclusion can you arrive at based on the data above? Which areas will suffer the least and the most from the devastation of wildfires? Why is this type of information key for government/regional policy makers?