

# Climate Change and Organisms Educator Guide

A resource for using QUEST video, audio, blogs and maps in the classroom

## QUEST SUBJECTS

- |                         |   |
|-------------------------|---|
| <b>Life Science</b>     | <b>Biology</b><br>Health<br>Environment |
| <b>Earth Science</b>    | Geology<br><b>Weather</b><br>Astronomy  |
| <b>Physical Science</b> | Physics<br>Chemistry<br>Engineering     |

## CA SCIENCE STANDARDS

### Grade 6

*Ecology (Life Sciences)*  
5. (e) Number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors.

### Grade 7

*Evolution*  
3. (e) Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.

### Grades 9-12

*Ecology (Biology/Life Sciences)*  
7. (b) changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species or changes in population size

### *Earth Sciences*

6. (c,d) Earth's climate has changed over time; computer models are used to predict the effects of the increase in greenhouse gases on climate

## QUEST MEDIA FOR TEACHING ABOUT CLIMATE CHANGE AND ORGANISMS

Read and comment on the blogs for these stories by clicking on the story link and clicking on the blog post link below the video/audio.

### Watch **Resurveying California's Wildlife 100 Years Later**

<http://www.kqed.org/quest/television/resurveying-californias-wildlife-100-years-later>

- A century after researchers from UC Berkeley created detailed records of the wildlife they found during travels around California, scientists are resurveying the same spots to see what global warming and human activity have done to our fauna.

Listen to **Disappearing Plants** <http://www.kqed.org/quest/radio/disappearing-plants>

- Due to global warming and changing rainfall patterns, a new study projects that two-thirds of California's unique plants could be virtually extinct in most of their native habitats by the 22nd century.

### Read **Reporter's Notes: Disappearing Plants Blog Post**

<http://www.kqed.org/quest/blog/2008/07/25/reporters-notes-disappearing-plants/>

- Reporter David Gorn tries to wrap his head around what areas like Marin and Berkeley will look like if new plant-loss projections come to pass.

## TOPIC BACKGROUND

The climate of our planet is changing. The global average temperature has risen by about 1.1 degrees Fahrenheit over the last 100 years, the frost season has shortened by roughly one day per decade since the 19th century and there has been a widespread retreat of glacial ice during the past century. But, why is this happening and what can we do about it?

In 1824, French mathematician Jean Baptiste Joseph Fourier found that the temperature on our planet was slowly increasing. He theorized that solar radiation is trapped in Earth's atmosphere and reflected back at Earth. As science developed ways to measure our climate and analyze global temperatures in the 20th century, this "greenhouse effect" became real. Studies led to a rise in the belief that fossil fuel use creates carbon dioxide emissions that result in global warming. Essentially, human activities are at least in part to blame for the problem.

California began air pollution control programs in the 1940s. Since then, many policies and programs to decrease greenhouse-gas emissions have been adopted, including a ban on residential waste burning and incentives for alternative fuel usage. But there is still concern. Our sea levels are rising, which adversely affects California's coastal marshes and wildlife habitats. Higher temperatures mean an increase in water demand for thirsty plants. Hotter and drier regional climates could create more pest and insect epidemics within California's forested areas. These are but a few of the potential issues associated with global warming and our state.

### Additional background resources:

The Grinnell Resurvey Project <http://mvz.berkeley.edu/Grinnell/yosemite/index.html>

"Climate Change Could Severely Impact California's Endemic Plants," UC Newsroom <http://www.universityofcalifornia.edu/news/article/18141>

Environment California – Global Warming <http://www.environmentcalifornia.org/global-warming>

## VOCABULARY

### Climate

the average course or condition of weather at a place, usually over a period of years as exhibited by temperature, wind velocity and precipitation

### Ecology

the pattern of relations between organisms and their environment

### Habitat

the place or environment where an animal or plant naturally or normally lives and grows

### Naturalist

one who advocates or practices a scientific observation of life

### Pristine

not spoiled, corrupted or polluted

### Specimen

an individual, item or part that is representative of a class, genus or whole

### Species

a category of biological classification comprising related organisms or populations potentially capable of interbreeding

### Survey

to inspect or examine as to condition, situation or value

## INTRO QUESTIONS

- What do you know about global warming?
- What kinds of effects might global warming have on California?
- What areas in California do you think would be most affected by climate change?
- What are some plants and animals that are unique to California? What potential problems might occur if these species disappeared?

## FOCUS QUESTIONS

- What did researchers discover when they resurveyed the Yosemite Transect?
- What does climate change have to do with the discoveries made during the Grinnell Resurvey project?
- According to plant-loss projections, how might global warming affect California's native plants?
- What are some plants and animals native to your region? How do you think climate change will affect them?

*For all media see:*

- Segment Summary Student Sheet  
[http://www.kqed.org/quest/downloads/QUEST\\_SegSum\\_StudentSheet.pdf](http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf)
- Personal Response Student Sheet  
[http://www.kqed.org/quest/downloads/QUEST\\_PersResp\\_StudentSheet.pdf](http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf)

## LESSON PLANS and RESOURCES from PBS, TEACHERS' DOMAIN and NPR

NOTE: Resources from the Teachers' Domain collection require a fast and free registration.

### In Yosemite, Scientists Find Species Movin' on Up NPR

<http://www.npr.org/templates/story/story.php?storyId=95567822>

This October 9, 2008, **All Things Considered** radio story discusses some of the animal discoveries scientists made when resurveying the fauna in Yosemite.

### Climate Change and Species Movement NPR

<http://www.npr.org/templates/story/story.php?storyId=95603499>

How will global warming affect animal species across the planet? Evolutionary biology professor Robert Colwell talks about animals being forced out of their old habitats by climate change in this October 10, 2008, segment from **Talk of the Nation**.

### Climate Connections: A Global Journey NPR

<http://www.npr.org/news/specials/climate/interactive/>

In this interactive map, **NPR** takes a look at how climate changes people and how people change climate around the world.

### Global Warming? Teachers' Domain

[http://www.teachersdomain.org/resource/tdc02.sci.life.eco.lp\\_co2globalwarm/](http://www.teachersdomain.org/resource/tdc02.sci.life.eco.lp_co2globalwarm/)

This lesson examines the issue of global warming, from the gases that contribute to this problem to the role played by our daily activities in creating excess carbon dioxide.

### The Global Warming Debate PBS

[http://www.pbs.org/newshour/indepth\\_coverage/science/globalwarming/index.html](http://www.pbs.org/newshour/indepth_coverage/science/globalwarming/index.html)

This "Science Report" from **Online News Hour** includes reports on the basics of global warming, a climate change timeline and interactive features on the effects of greenhouse gases caused by the emissions of different vehicles.

## VISIT OUR PARTNERS

The Bay Institute  
[www.bay.org](http://www.bay.org)

California Academy of Sciences  
[www.calacademy.org](http://www.calacademy.org)

Chabot Space and Science Center  
[www.chabotspace.org](http://www.chabotspace.org)

East Bay Regional Park District  
[www.ebparks.org](http://www.ebparks.org)

Exploratorium  
[www.exploratorium.edu](http://www.exploratorium.edu)

Girl Scouts of Northern California  
[www.girlscoutsbayarea.org](http://www.girlscoutsbayarea.org)

Golden Gate National Parks Conservancy  
[www.parksconservancy.org](http://www.parksconservancy.org)

The J. David Gladstone Institutes  
[www.gladstone.ucsf.edu](http://www.gladstone.ucsf.edu)

Lawrence Berkeley National Laboratory  
[www.lbl.gov](http://www.lbl.gov)

Lawrence Hall of Science  
[www.lawrencehallofscience.org](http://www.lawrencehallofscience.org)

Monterey Bay Aquarium  
[www.mbayaq.org](http://www.mbayaq.org)

Monterey Bay Aquarium Research Institute  
[www.mbari.org](http://www.mbari.org)

Oakland Zoo  
[www.oaklandzoo.org](http://www.oaklandzoo.org)

The Tech Museum of Innovation  
[www.thetech.org](http://www.thetech.org)

UC Berkeley Natural History Museums  
<http://bnhm.berkeley.edu/>

U.S. Geological Survey  
[www.usgs.gov](http://www.usgs.gov)

## MORE EDUCATIONAL RESOURCES FOR USING QUEST MULTIMEDIA TO ENHANCE 21st CENTURY SKILLS IN TEACHING AND LEARNING

### Why Use Media in Science Education?

[www.kqed.org/quest/downloads/QUEST\\_Why\\_Media\\_08-09.pdf](http://www.kqed.org/quest/downloads/QUEST_Why_Media_08-09.pdf)

- “As science educators, we know how important critical thinking and new technology skills are in the scientific community...” ([read more](#)).

### Science Multimedia Analysis

[www.kqed.org/quest/downloads/QUEST\\_Science\\_Multimedia\\_Analysis\\_08-09.pdf](http://www.kqed.org/quest/downloads/QUEST_Science_Multimedia_Analysis_08-09.pdf)

- “By increasing students’ awareness of the intersections between media and science, we give them the tools to think like scientists...” ([read more](#)).

### How to Use Science Media for Teaching and Learning

[http://www.kqed.org/quest/downloads/QUEST\\_Media\\_Tips\\_08-09.pdf](http://www.kqed.org/quest/downloads/QUEST_Media_Tips_08-09.pdf)

- If we consider all forms of media “texts” from which students gather information, we can use similar literacy strategies to engage them in video, audio, blogs and Explorations. Once students have obtained information from multiple media sources, how do they share what they have learned? Through their own media-creation projects, of course!

### Using Google Maps to Create Explorations

[http://www.kqed.org/quest/files/download/52/QUEST\\_ExplorationCreation.pdf](http://www.kqed.org/quest/files/download/52/QUEST_ExplorationCreation.pdf)

- Do you like the science hike Explorations on the **QUEST** site? Use this place-based educational guide for educators and group leaders to create similar science-based maps with youth.

## OTHER WAYS TO PARTICIPATE IN QUEST



### LOG ON

[www.kqed.org/quest](http://www.kqed.org/quest)



### LISTEN

KQED 88.5 FM San Francisco &  
89.3 FM Sacramento  
Mondays at 6:30am and 8:30am



### WATCH

KQED Channel 9  
Tuesdays at 7:30pm