



GRADE 4



COAST ^{TO} CACTUS

IN SOUTHERN CALIFORNIA

Curriculum and Lesson Plan Resource Guide



theNAT
SAN DIEGO NATURAL HISTORY MUSEUM



Grade 4 Wildfires and Mudslides

Essential Question

How can humans prevent mudslides after wildfires?

Green chaparral scrub covers more than 20,000 square miles of California's hillsides. It's a habitat shaped by drought, made up of plants that can withstand months without water. Months without water can mean fire. Natural fires that happen every 30 years or so help keep chaparral habitat healthy. Fires enrich the soil and open the ground to sunlight. There are even plants and insects in the chaparral that can reproduce only after a fire. More frequent wildfires destroy vegetation that in turn can destabilize soil. This loose soil promotes landslides that can destroy homes during winter rains.



Activity: Mudslide Model

In this activity, students make a model of pre-wildfire and post-wildfire hillsides to understand the relationship between wildfires and mudslides. Using engineering and design skills they will create solutions to prevent the effects of these natural hazards.

Materials

- 20-quart clear plastic storage box (about the size of a shoe box)
- Pipe cleaners (chenille stems)
- Dirt or soil (2–3 cups per pair or group of students)
- Green construction paper or cotton balls
- Masking tape
- Newspaper
- Printed house template sheets

- Printed student sheets
- Room-temperature water
- Scissors
- Watering cans or spray bottles

This activity can be done by students working in pairs or in groups, before or following a visit to the *Coast to Cactus in Southern California* exhibition. This model can also be created by the teacher as a demonstration for the class while students follow along and answer questions on the activity sheet. (See Page 2 for activity instructions.)

Mudslide Model

Before the activity:

Gather material and divide enough for each pair or group. Each pair or group will need:

- 1 watering can or spray bottle filled with room-temperature water
- 2 six-quart plastic boxes
- 4–6 cups of dirt or soil
- Pipe cleaners (chenille stems)
- Green construction paper or cotton balls
- Masking tape
- Newspaper
- Printed house template sheet
- Printed student sheets
- Scissors

Activity Directions

1. Using images from past San Diego wildfires (Cedar Fire and Witch Fire are two major examples), let your students know that southern California has dry, windy, and hot weather conditions from late spring through autumn that can contribute to moderate to devastating wildfires. **What do your students think can start a wildfire?** Wildfires can be caused by many things, both natural and unnatural. People can accidentally start a fire the spreads out

NGSS Alignment for Grade 4

Performance expectation: 4-ESS3-2

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing explanations and designing solutions	ESS3.B: Natural Hazards	Cause and Effect Interdependence of Science, Engineering and Technology

Interdisciplinary Common Core Connections: W.3.2, SL.3.4

of control, or lightning can strike in a dry area and start a fire. Let your students know that fires are dangerous when they spread out of control and damage forests, cities, or suburban areas. Wildfires can also cause damage even after they are put out, in the form of mudslides.

2. Let your students know that they will be creating a model of a mudslide to learn the relationship between mudslides and wildfires. Explain to students that models are not perfect examples of events; they are imitations that help us understand science concepts and how things relate to each other.
3. Follow along with the student sheet instructions to help guide students during the model-making process.
4. After the students finish creating their models and answering the questions, go through each question and have students share their findings. Initiate a discussion about why one hill had a mudslide and the other did not.
5. What kinds of solutions did your students come up with to prevent the mudslide?

Extension

Have your students create a third hillside model, and have them test their ideas for preventing a mudslide. Provide extra materials to make more trees, or add gravel or rocks to build walls. Have students record their observations.

What will they learn?

Students learn how to create and use a model to increase their understanding of events that occur on a larger scale in nature.



Key words

Chaparral

A type of southern California habitat made up of bushes and short trees that can tolerate long periods of drought.

Drought

A long period of time during which there is very little or no rain.

Eliminate

To remove.

Erosion

The gradual destruction of something by natural forces (such as water, wind, or ice); the process by which something is eroded or worn away.

Root

The part of a plant that grows underground, gets water from the ground, and holds the plant in place.

Vegetation

Plants in general; plants that cover a particular area.

Mudslide

A large mass of wet earth that suddenly and quickly moves down the side of a mountain or hill.

Wildfire

A fire in a wild area (such as a forest) that is not controlled and that can burn a large area very quickly.



During this activity, students gain an understanding of how wildfires contribute to mudslides. Students learn that wildfires resulting from natural and unnatural causes destroy vegetation, such as trees and bushes. The roots of that vegetation hold soil together, reducing the amount of soil carried away in a mudslide after heavy rains. By planting trees and other vegetation that has deep root systems on hillsides, humans can reduce the impact that wildfires have on mudslides.

Additional Resources

- Check out a specimen from our Nature to You Loan Library. For more information visit sdnat.org/specimenssearch or contact the Loan Library at loanprogram@sdnhm.org or 619.255.0236.
- Use the *Explore the Region from Coast to Cactus* website to learn more about the different habitats in the southern California region. Visit coasttocactus.sdnhm.org to journey through coastal areas, mountains, and deserts, and to learn more about San Diego's amazing diversity of plant and animal life.
- Visit the San Diego Natural History Museum and explore our *Coast to Cactus in Southern California* exhibition. San Diego is known for its incredibly diverse terrain, ranging from the beaches and chaparral near the coast, to the mountains and the desert farther afield. Using specimens from the Museum's scientific collections alongside immersive environments (hands-on exhibits, live animals, and innovative media), *Coast to Cactus in Southern California* illustrates that richness by taking visitors on a journey through these habitats to explore the plants and animals that live in them.

Mudslide Model Instructions

Name: _____

1. In each plastic box, start to create your hillside by crumpling up newspaper and placing it toward the back of the box.
2. Mix some water into your dirt and lay the dirt over the newspaper to create a smooth hillside.
3. Cut out the houses from the template and build them. Place your houses at the top of each of the hillsides.
4. Make trees using pipe cleaners and cotton balls or construction paper. Twist a few pipe cleaners around each other, leaving about 2" at the bottom to represent the tree roots.
5. Place all of the trees on one of the hillsides. Make sure to push the roots into the dirt.
6. Place a piece of masking tape on the front of each box. Writing on the masking tape, label the model with trees "Before Wildfire." Label the model without any trees "After Wildfire."
7. Make your predictions. Answer the first three observation questions.
8. Make it rain! Use your spray bottle to spray water onto the model with the trees until the bottom of the box starts to fill with water.
9. Answer observation question 4.
10. Make it rain again! Use your spray bottle to spray water onto the model without the trees until the bottom of the box starts to fill with water.
11. Answer observation questions 5–7.

Observation Questions

1. Looking at your models, which hillside do you think will be most affected by rainfall? Why?

2. What do you think will happen to the hillside with trees? Why?

Mudslide Model Instructions

Name: _____

3. What do you think will happen to the hillside without trees? Why?

4. What happened when you sprayed the hillside with the trees?

5. What happened when you sprayed the hillside without the trees?

6. How do you think a wildfire helped to cause the mudslide?

7. What do you think you could do or build to prevent the mudslide?

Instructions:

1. Cut along solid lines.
2. Fold along dashed lines.
3. Use tape or glue to build the house.

