

## Impact of Soil Erosion on Highway 1

Student-driven lesson with minimal assistance from teachers. For students to successfully complete the activity, they should have some knowledge of how erosion can affect a variety of materials and how to effectively research, write, and discuss. For grades 6-8.

### INTRODUCTION

Culminating Activity:

*You are part of a research team specializing in soil erosion. The state has tasked your team to report on the safety of State Route 1 (SR 1) due to soil erosion. As a team, research and prepare a memo that will be sent to state officials on the effects that erosion could have on the highway. To strengthen the report, you will create and present a working model, physical or electronic, of what could happen to SR 1 to support your findings.*

### Objectives (Students Will Be Able To...)

- Students will model the erosion found affecting SR 1.
- Students will write a memo.

### ACTIVITIES IN THIS LESSON

#### Vocabulary Development

##### Group Work

##### Activity

The lesson begins with vocabulary development, paying attention to the definitions, pronunciation, and spelling of *erosion*, *weathering*, and *deposition*.

Then students watch two short videos or teacher-guided reviews on erosion, ([here](#)) (or here: [https://www.youtube.com/watch?v=E85HMNJix\\_o](https://www.youtube.com/watch?v=E85HMNJix_o)).

The teacher then uses rehearsal (e.g., repeated questioning, note-taking) and elaboration cognitive strategies (e.g., pictures of examples) to instruct students on the effects caused by erosion. (Cognitive Strategies are described on p. 105 of *The Art and Science of Lesson Design*.)

**Checking for Understanding & Engagement**

- Describe in your own words what we mean by erosion.
- What could be some dangers that come from ignoring the effects of erosion?
- What types of erosion are there?
- What type of erosion do you see in the picture?
- How do people typically try to stop erosion?
- What are some examples of erosion that you observe or have noticed in everyday life?
- In the image above, or other erosion images, describe what you think happened.
- What challenges do you think there are in fixing the road?
- Why are fires such a problem when it comes to erosion?

**Culminating Activity Overview***Hooks/Set***Activity**

Next, the teacher explains the culminating activity and how to complete it, and formal groups of 3-4 students are formed.

The culminating activity should be given to every group and read aloud as a class. The teacher then guides students on ways to research and build models.

**Checking for Understanding & Engagement**

- What role are you performing today?
- What is the problem you are focusing on solving?
- Why is it important to understand the effects of erosion?

## Research

### *Research/Annotate*

## Activity

In this part, student groups will research the effects erosion could have on State Route 1.

From their research they will (a) decide what information is relevant, (b) write a report of their findings, and (c) build a working model to strengthen their findings.

## Checking for Understanding & Engagement

- What are some benefits of working in a group?”
- Why is it important to create a working model to support your findings?
- How important do you think it is to keep SR 1 open?

## Modeling and Class Presentations

### *Guided Practice*

## Activity

In this final part, the teacher guides the class in a discussion on the effects of erosion on State Route 1. Students are introduced to the concept of the model using a video (see Resources).

Students brainstorm how they can develop a similar model to model the erosion of a coastline such as the one that borders SR 1 (see Resources.)

They then conduct short class presentation on their findings and their working model. The relation between the model and their research findings is discussed.

## Checking for Understanding & Engagement

- What is a model? How are models useful?
- What could be some dangers that come from ignoring the effects of erosion?
- Do you think that more focus should be placed on preventing erosion or fixing erosion?
- Why are models important in science?
- What is the weakness of a model?

- How does the concept of *scale* affect the usefulness of a model?
- Why is it important to understand the effects of erosion?
- What is the hardest part of building a model to show erosion?
- What effect do you think a model has on the viewing public?

## Resources and Materials

- EmRiver Introduction: Erosion and Deposition in a Self-forming Model River Channel
  - [Here](https://www.youtube.com/watch?v=g65_MgWaBoM): [https://www.youtube.com/watch?v=g65\\_MgWaBoM](https://www.youtube.com/watch?v=g65_MgWaBoM)
- Erosion at the Beach
  - [Here](https://www.youtube.com/watch?v=PlwA9fkK3cl): <https://www.youtube.com/watch?v=PlwA9fkK3cl>
- Erosion and Soil
  - [Here](https://www.youtube.com/watch?v=im4HVXMGi68): <https://www.youtube.com/watch?v=im4HVXMGi68>

## SUMMATIVE ASSESSMENT

The teacher then examines each group's understanding of erosion from their memo, short presentation, and the model's usefulness.

### Lesson Times

**Vocabulary Development:** 15 minutes

**Culminating Activity Overview:** 5 minutes

**Research:** 15 minutes

**Modeling and Class Presentations:** 1 day

### Industries / Subjects / Grades

#### Industries / Pathways

- Transportation

#### K-12 Subjects

- Science
- Earth & Space Science

#### Grade Levels

- 6, 7, 8

## Standards and Objectives

## Standards

## California's 2013 CTE Standards

- **CTE.T.A.7.1** Identify the infrastructure needed to move people, goods, and equipment from one location to another (highways, bridges, waterways, railways).
- **CTE.T.A.7.4** Explain the importance of infrastructure in transporting vehicles, goods, and/or equipment in our everyday lives

## California English Common Core Standards

- **W.6.1a** Introduce claim(s) and organize the reasons and evidence clearly.
- **W.6.1b** Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.

## Next Generation Science Standards

- **SEP.DUM.MK.D** Develop a model to predict and/or describe phenomena.
- **SEP.DUM.MK.D** Develop a model to describe unobservable mechanisms.
- **SEP.DUM.MK.D** Develop and use a model to describe phenomena.
- **SEP.DUM.MK.D** Develop a model to describe phenomena.
- **CC.SSM.M** Models can be used to represent systems and their interactions.
- **CC.SSM.M** Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

## Notes:

- Development of this lesson plan funded by The Fresno State Transportation Institute (FSTI).
- This lesson may involve modest purchase of materials such as soil/sand.
- This lesson plan developed using the approach described in *The Art and Science of Lesson Design* by J. Walkup and S. Squire.
- Throughout the lesson, students will complete a Metacog Log (p. 112, Walkup & Squire) to assess their own understanding and confidence.

**Author:** Eric Madrigal

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