

**By: Kara B. Erickson**

## Focus on Inquiry

Students will utilize the Chalk Model, the Pumice Model, and a Sand Model to see how water affects landforms such as cliffs (Oceanside Recreation Center cliff) and **landforms closer to home such as the Louisiana Coastline.**

## Lesson Summary

Students return to the Chalk Model they investigated in Lesson 2.2 to add details to their understanding of how water changes landforms. They spray chalk with water as they did in Lesson 2.2, but this time, they pay close attention to the size of the pieces that break off the chalk. This leads students to discover that water causes tiny pieces to break off landforms. Then, students rub two pumice rocks together and observe how the pumice breaks down into very fine powder or very tiny pieces. This experience gives students a sense of the scale of the pieces that break off real landforms during erosion. At the end of the lesson, students reflect on some of the activities they've done in Chapter 2 and the evidence each of the activities has provided to support the idea that water erodes landforms. The teacher uses students' ideas to populate the Evidence for How Water Erodes Landforms chart. The purpose of this lesson is for students to learn that water hitting a landform causes tiny pieces of the landform to break off.

**Unit Anchor Phenomenon:** The cliff where Oceanside Recreation Center is situated appears to be receding.

**Chapter-level Anchor Phenomenon:** The rock of the cliff where Oceanside Recreation Center is situated receded.

**Investigative Phenomenon:** Small pieces of chalk break off a chalk formation when water is sprayed on it, and small pieces of pumice rock break off larger rocks when they are rubbed together.

## Lesson Content Overview

- Subject: Understanding how water changes landforms.
- Duration: 2 days, 45 minutes per day
- Setting: Classroom
- Grouping: Tables, heterogeneously grouped, students with reading challenges partnered with proficient readers.
- Grade Level: 2<sup>nd</sup> grade

**Louisiana Standards** (Use the Louisiana Student Standards from the Academic Standards Library. Identify the code and full verbiage for the standard(s) used).

<b>Standard (Science)</b>	<b>Description</b>
2-ESS1-1	Use information from several sources to provide evidence that EArth events can occur quickly or slowly.
2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
2-ESS2-2	Develop a model to represent the shapes and kinds of land and bodies of water in the area.
2-ESS2-3	Obtain and communicate information to identify where water is found on Earth and that it can be solid or liquid.
<b>Standard (Social Studies)</b>	<b>Description</b>
2.1.1	Create simple timelines to describe important events in the history of the local community: focus: hurricane disasters and correlation to land loss of Louisiana Coastline.
2.1.2	Students use historical thinking skills to explore continuity and change in their community and the US: Compare and contrast the present day coastal community to that of the past using sources such as maps.
2.2.1	Locate and identify poles, equator, continents, oceans, and the United States, Louisiana, and the local community: Focus: Gulf of Mexico.
2.2.2	Interpret physical maps.
2.2.4	Identify major geographical features in the local region, state, and country: Focus: Mississippi River, Lake Pontchartrain, Lake Maurepas.

2.2.5	Describe how location, weather, and physical features affect where people live and work.
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### Student Learning Objectives

Students will utilize the Chalk Model, the Pumice Model, and a Sand Model to see how water affects landforms such as cliffs (Oceanside Recreation Center cliff) and landforms closer to home such as the Louisiana Coastline.

### Prior Knowledge Needed by Students

Key Concepts covered thus far:

- Landforms are made of rock.
- Water can change rock.
- Scientists may not see changes to landforms because they happen very slowly.
- Some changes may happen a little faster than others.

### Background Information for Teachers

Connection between the concept of erosion of the Oceanside Recreation Center's Cliff and erosion of the Louisiana coastline. Since this lesson as written focuses more on the mechanics of erosion rather than the erosion of a specific area, multiple days will be used to focus on mechanics, specific area, and finally (later in the unit) mitigation. Two days initially will be devoted to learning about 1). the mechanics of erosion per the Amplify lesson and 2). The erosion of the local coastline through saltwater intrusion. In this particular lesson we will simply discuss the erosion of the coastline. At the end of the unit, Amplify focuses its lessons on mitigating erosion. At this time we will focus on how sediments are no longer being deposited by the Mississippi River due to levees being built to stem flooding.

### Materials Needed

- Chalk, Container, and Spray Bottle (chalk model) Teacher Only
- Pumice stone, 2 stones per table
- Kinetic sand, container, spray bottle (sand model) 1 set per table
- Recording sheets (Appendix A)
- Louisiana land loss pictures (Appendix B)
- Sea Level Rise Viewer <https://coast.noaa.gov/slr/#/layer/slr> (TT will type in our address at GW Carver)
- Videos describing effect of sea level rise/Miss. River levees erosion of coastline <https://www.youtube.com/watch?v=CYPJmMm6ULc> (Land loss over 100 years)
- [Louisiana Coastal Land Loss Simulation 1932-2050](#) (start a 2:00 to show southeast Louisiana)
- <https://youtu.be/uE1Vpb7p2o0> (for use when we discuss mitigation steps to stop land loss)
- USGS video showing Isle de Jean Charles [Image of the Week - Isle de Jean Charles, Louisiana](#)

## Detailed Lesson

### 1. Lesson Opening - Day 1 (Time: 15 minutes)

**Materials:** Computer with internet access.

#### Directions

Review of Chalk and Pumice models. Introducing the Local Correlation:

Show students a video of the Louisiana Coastline to open a discussion about land loss.

<https://youtu.be/uE1Vpb7p2o0>



Students discuss what they learned in the previous lesson about the Chalk/Pumice Models. TT shows students how this phenomenon can affect them locally through coastal erosion.

\*Question: What do you think is causing the Louisiana coastline to disappear?

### 2. Engage (Time: 15 minutes)

#### Materials

- Spray bottle
- Chalk and Pumice models

**Directions:** Students use a spray bottle to simulate waves to see how waves can erode sand and silt from a coastline. Students will see a sped-up version of what is happening to the Louisiana coastline due to hurricanes.

### 3. Explore (Time: 15 minutes)

#### Materials

- NOAA simulation

#### Directions

Making Sense of the Coastal Problem:

Show NOAA simulation of sea-level rise and land loss and how close it comes to our particular location on Legacy Oaks Lane.

Students discuss with partners how this will affect the people who live in these affected areas and make predictions about what will happen if erosion is not mitigated (leading into Chapter 4)

### 4. Engage - Day 2 (Time: 5 minutes)

#### Materials

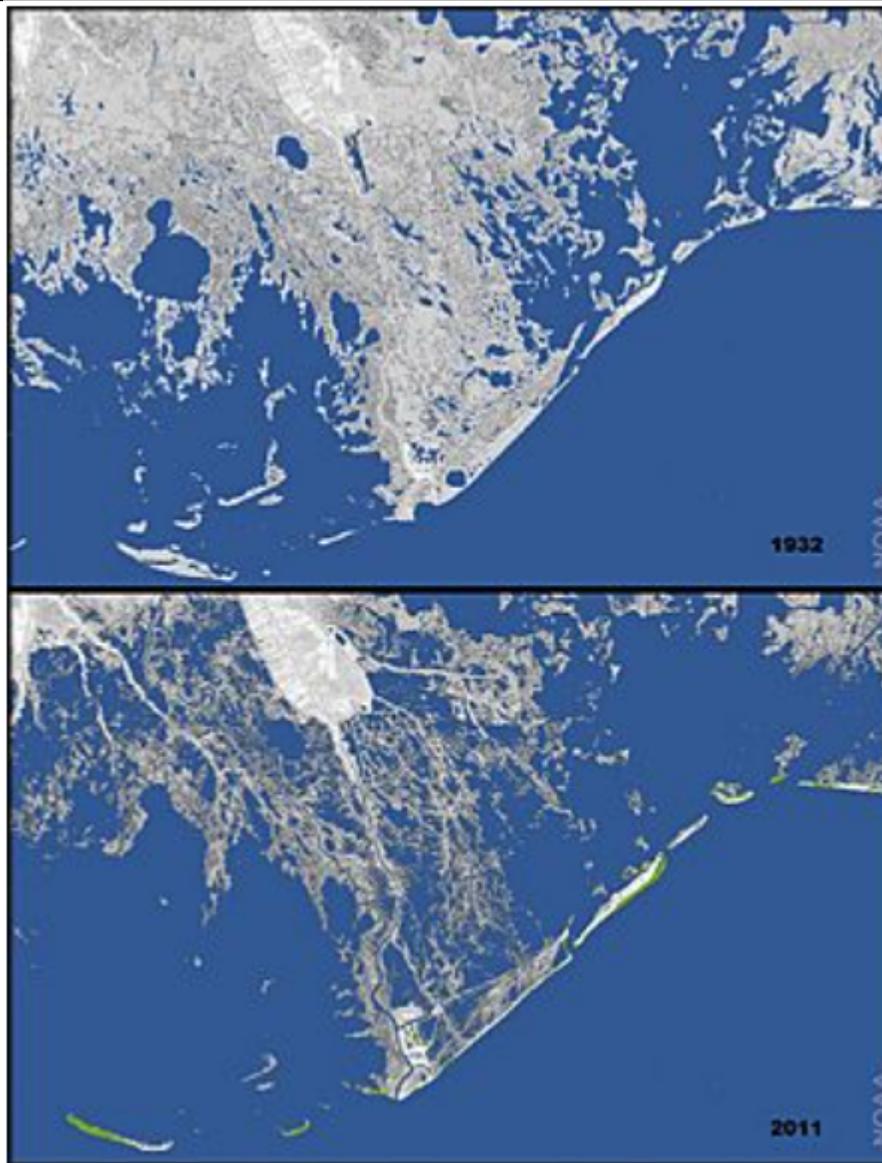
- Unit question
- Chapters 1 & 2 questions
- Louisiana land loss pictures (Appendix B)

#### Directions

1) Teacher will start the lesson by reviewing Unit Question, Chapters 1 and 2 questions, results of investigations, and the corresponding Scientific Explanations we have written.

- Exploration question: How do you think erosion can affect us here in Louisiana? Our land seems stable. Students will discuss with table teams for 1 minute. TT will then allow students to speak to what their team discussed.
- Hook: What if I told you that erosion can totally change the way our area looks over time?

à Show Pictures (Appendix B)



### Land loss in coastal Louisiana since 1932

- Discussion: What will happen if the land along the coastlines erodes away and the level of the Gulf rises? What do you think will happen to us here in Ascension Parish? Students will discuss for 1 minute before it shows simulation from NOAA <https://coast.noaa.gov/slr/#/layer/slr>

## 5. Explore (Time: 10 minutes)

### Materials

- Containers with kinetic sand and water
- Spray Bottle
- Paper
- Pencils

### Directions

1) Teacher will pass out containers. In each container there will be a compacted handful of kinetic sand along one side. There will be a small amount of water in the container already to simulate a water source like the Gulf of Mexico. (kinetic sand will not wear away as quickly as loose sand. More effort of the sprays from the spray bottles will be needed to wear away the sand). TT will discuss how the small amount of water is not overtopping the sand due to the action of the sand acting as a dam or water-stop. Students will diagram what the sand/water model looks like before we begin to spray.

Questions:

- When we sprayed the chalk what did the spray represent?
- What will the spray represent in this model?
- What will happen to the sand as we spray it?
- What will happen to the water already in the model as the sand is sprayed?

Students will each get 5 sprays on the sand. They will discuss what they notice with the sand, and the water already in the container.

Questions:

- What is happening to our coastline?
- Why is the water already in the container covering more of the sand?
- What do you think will happen if more water is added to the container? What would have happened if the sand had stayed as it was? What will happen now? Why?
- What if people lived on the other side of our sand bank on the coastline? What would happen to their homes?
- Is this change happening quickly or slowly? How does this change compare to the change happening at the Oceanside Recreation Center? What about the change that happened at the Nearby Cliff?

## 6. Explain & Expand (Time: 20 minutes)

### Materials

- Paper
- Pencils
- Erosion video

### Directions

Students will diagram what is happening to the land mass as they spray it with water. The final diagram will show what has happened to the landmass as it has been eroded away and how the water source in the container has been allowed to encroach on the land due to land loss.

Name \_\_\_\_\_ Date \_\_\_\_\_ # \_\_\_\_\_

**Diagramming How a Coastline Can Erode**

Directions: Use the sand model experiment to diagram how a coastline can erode and the resulting encroachment of the water source due to the shrinking land mass.

**A long time ago...**

\_\_\_\_\_ is causing  
this landform to change.

\_\_\_\_\_ is causing  
this landform to change because

\_\_\_\_\_

\_\_\_\_\_

**Now...]**

Now this landform is a different shape  
than before. More water is all around  
the landform because

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1) How can this affect humans? TT will show the original sand model. However, TT will create a cut or canal in the simulated sand bank to mimic human activity with oil and gas exploration. TT will then show the effect of how this activity exacerbates coastal land loss through erosion with the video describing the effect on Isle de Jean Charles. [Image of the Week - Isle de Jean Charles, Louisiana](#)

2) Students will discuss at tables how this can affect human populations. This will create anticipatory set for Chapter 4: How can erosion be mitigated?

## 7. Evaluation and Lesson Closure (Time: 10 minutes)

### Materials

- Paper
- Pencils

### Directions:

1) Writing: Students will evaluate how coastal erosion is affecting the Louisiana coastline.

Name \_\_\_\_\_ Date \_\_\_\_\_  
Evaluation

What will happen to Louisiana's Coastline over time?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Thinking about our experiment, the videos we've watched and our discussions, draw a picture of how water can change the Louisiana coastline. Include how the change occurs and what happens as water begins to intrude on the area affected.



2) Discussion:

- Is this change happening quickly?
- Is it happening quicker than the erosion of a mountain?
- Why is understanding this important?

## References

- CWPPRAclips. (2012, June 14). *Louisiana Coastal Land Loss Simulation 1932-2050*. [Video]. YouTube. <https://www.youtube.com/watch?v=zQhrgqaQiwQ>
- NOAA. (2024). *Sea Level Rise Viewer*. [Interactive Map]. NOAA. <https://coast.noaa.gov/slr/#/layer/slr/0/-11636351.884230701/5166134.50315271/4/satellite/none/0.8/2050/interHigh/midAccretion>
- SGS. (2017, November 9). *Image of the Week - Isle de Jean Charles, Louisiana*. [Video]. YouTube. <https://www.youtube.com/watch?v=9MhG41gmMTA>
- Jones, R. [Rebekah Jones, Whistleblower & Scientist]. (2016, June 6). *100 Years of Land Loss in South Louisiana* [Video]. YouTube. <https://www.youtube.com/watch?v=CYpJmMm6ULc>

## Appendix

### Appendix A: Recording Sheets

Name \_\_\_\_\_ Date \_\_\_\_\_ # \_\_\_\_\_

#### Diagramming How a Coastline Can Erode

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**A long time ago.....**



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\_\_\_\_\_ is causing  
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**Now...]**



Now this landform is a different shape  
than before. More water is all around  
the landform because

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Name \_\_\_\_\_ Date \_\_\_\_\_

### Evaluation

What will happen to Louisiana's Coastline over time?

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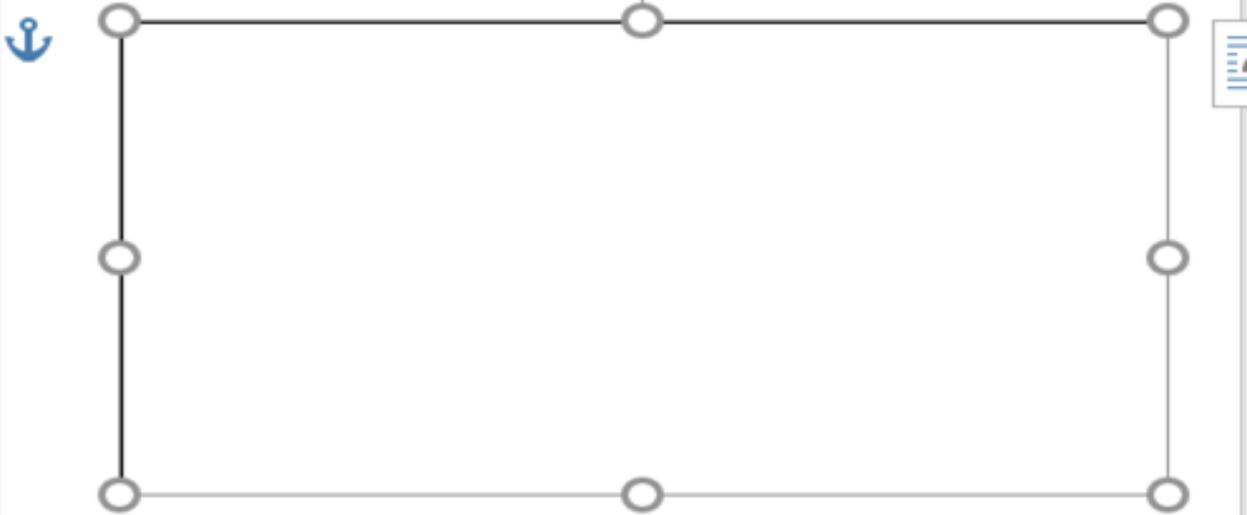
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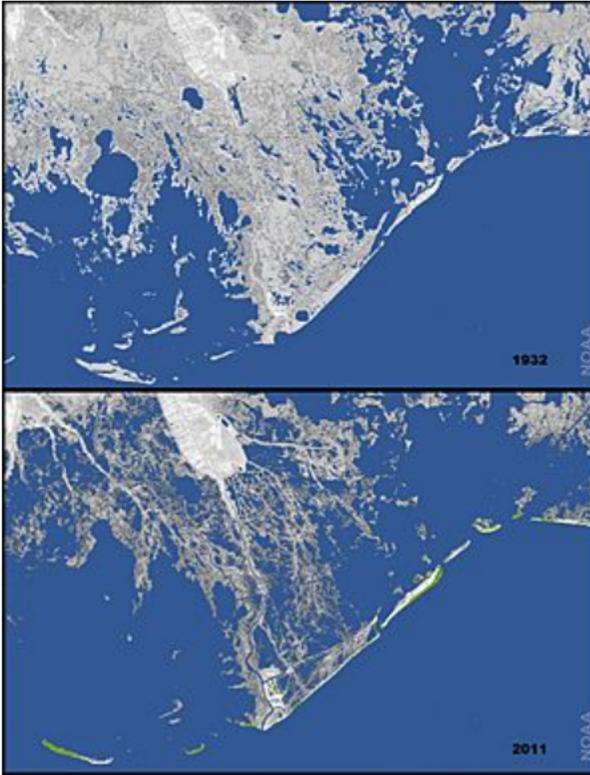
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Thinking about our experiment, the videos we've watched and our discussions, draw a picture of how water can change the Louisiana coastline. Include how the change occurs and what happens as water begins to intrude on the area affected.



## Appendix B: Land Loss Images



Land loss in coastal Louisiana since 1932