



Louisiana Natural Disasters Along the Coast

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Focus on Inquiry

The students are able to analyze text, pictures, and data charts about hurricanes to inform legislation and policy regarding the Louisiana Coastal Master Plan.

Lesson Summary

During this lesson students will explore an interactive map of coastal storm surge and the impact variation based on the category of the storm. Students will read about the impact of Hurricane Katrina on the city of New Orleans in 2005 and view a series of related photographs. Students will also examine graphs showing the economic and human cost of extreme weather events. During this lesson students will brainstorm and develop several ideas about how local communities can work in conjunction with federal and state agencies to prepare for natural disasters. While evaluating initial ideas, students will notice patterns and evaluate solutions for effectiveness through multiple lenses. Finally, we will generate a list of data and information we need to inform our understanding of natural hazards and how we can prepare for them. This information will be revisited throughout the unit as we prepare for the final project of the unit which is to create a disaster preparedness plan.

*This lesson was adapted from an OpenSciEd opening lesson to a unit on natural disasters using Tsunami's as the environmental driving factor. This adaptation aligns tightly to the lesson as it was written but provides a local Louisiana context. The lesson could be adapted to tie into any natural disaster that is significant to a specific region.

Lesson Content Overview

- Subject: Southern Louisiana Natural Disasters
- Duration: 70 minutes (one class period)
- Setting: Classroom
- Grouping: Individuals, pairs, and whole class
- Grade Level: 8th grade

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

Standard	Description
8-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.
8-MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

Student Learning Objectives

- Focus Question: What happens to a community when a hurricane occurs?
- What students will do:
 - Ask questions that are inspired by careful observation of data sources relating to a sudden natural weather event that causes damage to a community.
 - Apply scientific practices and cross cutting concepts to convey ideas in writing which inform decision making about spontaneous natural weather events and mitigation efforts to prepare and protect threatened coastal communities.

Prior Knowledge Needed by Students

Students need geographic awareness of the threat that drought, floods and extreme weather play in our local lives. In addition, students need foundational knowledge of science and engineering practices:

- Asking questions and defining problems in grades 6-8 builds on grades K-5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.
- Analyzing data in 6-8 builds on K-5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.
- Engaging in argument from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Background Information for Teachers

The teacher needs to familiarize themselves with the history of Hurricane Katrina as well as the damage and human impacts from the catastrophic weather event.

Materials Needed

- Computer
- Projector
- Internet access
- Access to sources (digital or in print)

Detailed Lesson

1. Engage (Time: 10 minutes)

Materials

- Computer
- Projector
- Graphs
- Link to website: [National Hurricane Center's Storm Surge Risk Map](#)

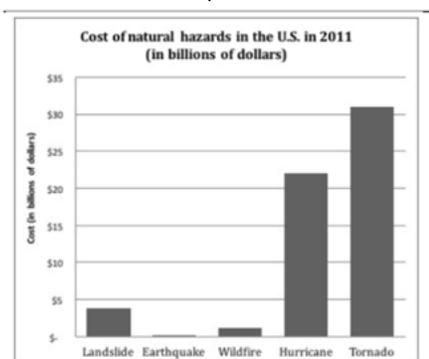
Accommodations

Supporting empathy and emotions: Be aware that a unit on natural disasters may elicit emotional stress for some students, where they have been impacted directly or through experiences with friends and family.

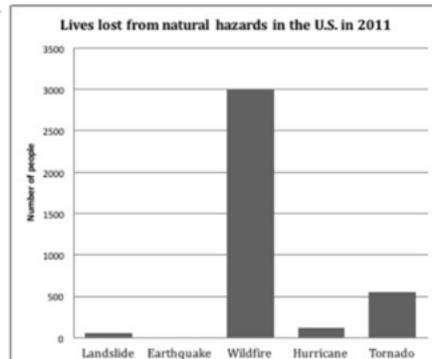
Directions

Introduce the Phenomenon: Hurricanes

- Project graphs showing economic and human impact from natural disasters. Project graphs showing economic and human impact from natural disasters. Introduce hurricanes and allow students to explore the National Hurricane center interactive storm surge map while recording notice and wonderings.
- Say something like "I want to share some information with you about a phenomenon that impacts us here in Louisiana. This phenomenon is called a hurricane." Ask students to recall a hurricane in their recent memory and allow for brief sharing. (2 minutes)



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- Ask students to set up a blank page in their science notebook and title the page *Hurricane Phenomenon*. Then, have them make a two-column chart to record their notices (left column and wonderings (right column).

- Ask students to reflect on the project graphs and add to their notice and wonder chart. (3 minutes)
- Provide time for students to explore the National Hurricane Center’s interactive [National Hurricane Center’s Storm Surge Risk Map](#), looking at storm surge risk areas for different categories of hurricanes. (5 minutes)
- Ask students to make a notice and wonder chart and to begin thinking about the impact of natural disasters such as hurricanes on coastal areas. Tell them we will share noticings and wonderings after we read the article and review pictures.

2. Explore (Time: 10 minutes)

Materials

- Digital or print copy of article and photos. [How Levee Failures Made Hurricane Katrina a Bigger Disaster](#)

Accommodations

Previewing or pausing to discuss technical or unfamiliar terms can be helpful to emergent multilingual learners, students with dyslexia and students who read below grade level. In addition, remind students to use annotation strategies such as underlining or circling, taking notes or writing questions about unfamiliar words on their notice and wonder chart.

Directions

Read text source on Hurricane Katrina

- Provide students time to read about the impact of Hurricane Katrina on the New Orleans area in 2005 and look at pictures while recording noticings and wonderings.
- Say something like, “Now I would like you to read about a major hurricane that made landfall in Louisiana in 2005, causing catastrophic damage to Southeastern Louisiana.”
- Provide a link or a printed copy of an article from The History Channel about Hurricane Katrina: [How Levee Failures Made Hurricane Katrina a Bigger Disaster](#). After reading the article and viewing pictures, ask students to add to their notice and wonder chart.

3. Explain (Time: 10 minutes)

Materials

- Notice and Wonder Poster
- Markers

Directions

Share Noticing and Wonderings

- Explain to the class that every state needs to create an emergency plan for natural hazards. You have been asked to show leaders from across the United States how data can be used to help develop a disaster preparation plan.
- Post a large Notice and Wonder chart for the class to add in the front of the classroom.
- For 10 minutes, facilitate a whole-class discussion by calling on student volunteers to share their noticings and wonderings from the graphs, interactive map, reading, and photos. Record student's thoughts on the class Notice and Wonder poster. After 5 minutes, ask students to reflect on what has been shared, notice commonalities and categorize information. Finally, ask the class to identify any themes that appear on the chart.
- Keep this Notice and Wonder poster visible to reference as you transition into an Initial Ideas Discussion. Tell the class we will revisit it during the lesson so more students can share their observations and questions.

Formative Check: This is a point in the lesson where you can begin to assess students' understanding of the performance expectation.

- What to look for/listen for:
 - Observations or questions about types of damage to communities
 - Observations or questions about what causes damage and the variability of damage
 - Observations or questions about how communities could prepare or be protected from hurricanes.

4. Expand (Time: 15 minutes)

Accommodations

Additional Support: If your student is struggling to think about engineering ideas, ask them to consider what is dangerous about hurricanes by reviewing the pictures and then use that information to support brainstorming.

Directions

Initial Engineering Ideas

- Remind students that, as they say in the data sets, natural hazards like hurricanes affect people and communities. Scientists and engineers use their understanding of these events to come up with solutions to protect people and communities. Prompt students to think about hurricanes from an engineering perspective. Allow students work in teams to brainstorm ideas around technologies for warning people and reducing damage due to hurricanes. Remind students to use what they have already recorded on their notice and wonder chart to inform their ideas.

Sharing of Initial Ideas

- Explain to students that it is important to listen to other people's ideas so that they can see things from different perspectives. Remind them that in the real world, scientists often collaborate with engineers and community stakeholders to problem solve around complex issues impacting their communities.
- Students rotate around the room sharing a one minute "elevator" pitch of their ideas for a disaster preparedness plan in order to survey other people's ideas. (This activity could also be done in a scientist's circle).

Additional Guidance: As students rotate around the room, avoid interrupting groups but rather use this time to notice general patterns that emerge from the discussions. Consider using a watch or timer and establishing a procedure for students to rotate from one person to another. Once the one-minute timer goes off, prompt students to switch partners and continue this pattern until the time allotted has expired so that students have the opportunity to hear from several students in the class.

5. Evaluate (Time: 20 minutes)

Materials

- Handout with directions and prompt for DBQ. (Appendix A).

Directions

Evaluate Initial Engineering Ideas

Individually students evaluate their own ideas and those of their peers in order to identify the goal of a disaster preparation plan, identify the need for the plan based on the sources, explain thinking and present promising ideas for a disaster preparedness plan. (May be completed during home learning time).

- Prompt students to add any additional ideas to their notes page and then, pause to reflect and highlight one or two ideas from their discussions with peers that would be helpful in preparing or protecting coastal communities from a major hurricane.

Summative Check: Summative Check: Identify the goal of a disaster preparation plan and identify the need for the plan based on the sources. Explain thinking and present promising ideas for a disaster preparedness plan.

Individually students evaluate their own ideas and those of their peers in order to identify the goal of a disaster preparation plan, identify the need for the plan based on the sources, explain thinking and present promising ideas for a disaster preparedness plan. (*May be completed during home learning time*)

Extend learning using primary and secondary sources: (Optional as time permits)

- Provide access to the Louisiana [Coastal Protection and Wetland Authority Website](#) and encourage students to explore this site while adding to their notice and wonder chart.
- Provide access to an article about the 2023 Louisiana Coastal Master Plan: [Legislature approves Louisiana's 50-year coastal master plan; here's what's included](#). Encourage students to explore this site while adding to their notice and wonder chart.

6. Lesson Closure (Time: 5 minutes)

Materials

Graphs

Directions

Connect learning to other natural disasters:

Discuss Related Phenomena

- Return to the graphs shared at the beginning of class and explain that the same question applies to other related phenomena that we will be considering during this unit. Ask students to share what additional information they would need to better inform their disaster preparedness plan. Add this information to the Notice and Wonder poster.

Check for Understanding: *Describe how you will check for understanding (CFU) for the lesson. (How will you measure learning throughout the lesson)?*

- Informal checks for understanding will be garnered through peer to peer and whole class discussions throughout the lesson.

Assessment: *Describe your formative pre- and post-assessment. (How will you measure learning at the end of the lesson, such as a project, quiz, assignment, etc...?)*

Explain Formative Check: Explain notice and wonders. This is a point in the lesson where you can begin to assess students' understanding of the performance expectation.

- What to look for/listen for:
 - Observations or questions about types of damage to communities
 - Observations or questions about what causes damage and the variability of damage
 - Observations or questions about how communities could prepare or be protected from hurricanes.

Evaluate Summative Check: DBQ: Individually students evaluate their own ideas and those of their peers in order to identify the goal of a disaster preparation plan, identify the need for the plan based on the sources, explain thinking and present promising ideas for a disaster preparedness plan.

References

Baurick, T. (2023, May 25). *Legislature approves Louisiana's 50-year coastal master plan; here's what's included*. NOLA.com.

https://www.nola.com/news/environment/louisiana-legislature-approves-50-year-coastal-master-plan/article_9bed793c-fb2b-11ed-9a93-3fa0afe355e6.html

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National Hurricane Center. *National Hurricane Center Storm Surge Risk Maps* [Interactive Maps]. NOAA.

<https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-4/>

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Appendix A

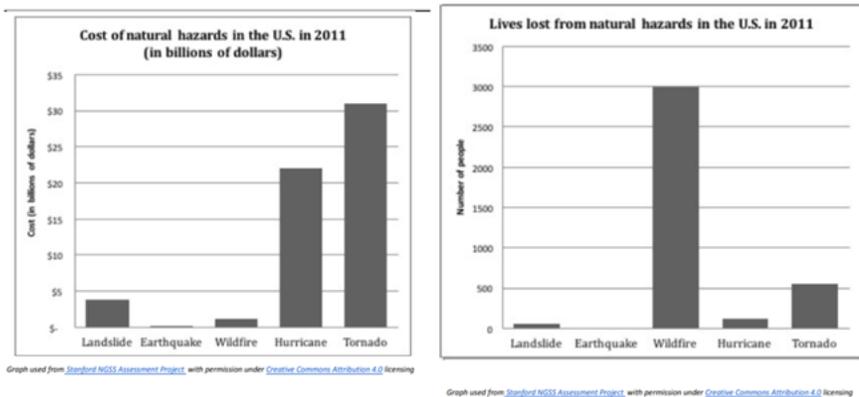
Creating a Disaster Preparation Plan

Every state needs to create an emergency plan for natural hazards. You have been asked to show leaders from across the United States how data can be used to help develop a disaster preparation plan.

Focus Question: What happens to a community when a hurricane occurs?

Survey your sources to determine the goal of your plan, the need for the plan and identify promising solutions to prepare and protect a coastal community at risk this hurricane season. Cite sources and explain your thinking.

Source 1:



Source 2: [National Hurricane Center's Storm Surge Risk Map](#)

Source 3: [How Levee Failures Made Hurricane Katrina a Bigger Disaster](#)