



## Building Community Resilience to Flooding

### Anchoring Phenomenon

Floods have destroyed peoples' homes and taken their lives throughout history. Flooding is the most common and costly natural hazard, with an average cost of \$1.9 billion dollars annually in the United States ([Pew Research Center](#)). The causes of floods are well known, yet they are difficult to predict. The way that we choose to design our communities can increase or decrease the risks of damage from floods.



Photo Credit: [National Park Service](#)

### Lesson Overview

Students will identify a resilience strategy to make their community more resilient to flood.

- *Activity 1 - Identify (30 minutes) What strategy will you investigate, and for which area?*  
Students review the virtual expo, and review the areas they identified as at-risk for flooding, and a resilience strategy they would like to focus on.
- *Activity 2 – Research (30 minutes) Would your strategy work? Is it needed?*  
Students interview family and friends about what they know about flooding, and look into the feasibility of their idea.
- *Activity 3 – Prototype (45 minutes) Create a pitch for your idea*  
Students create a draft of their idea proposal.
- *Activity 4 - Iterate (30 minutes) Improve your idea based on feedback*  
Students present their prototypes to their peers, and/or a community expert for feedback.
- *Activity 5 - Launch (45 minutes) Create your presentation.*  
Students incorporate feedback to create their final presentation for submission.



Instructional Overview	
<b>Grade Level</b>	Middle/High School
<b>Instructional Time</b>	180 minutes
<b>Standards Alignment</b>	NGSS: <a href="#">MS-ESS3-2</a> , <a href="#">HS-ESS3-1</a> CDE: <a href="#">MS3.ESS.GLE9</a> , <a href="#">HS3.ESS.GLE10</a>
<b>Driving Question</b>	How can we mitigate the impacts of flood and create a more flood resilient community?
<b>Learning Goal</b>	Students will create a project proposal to increase community resilience to flood that they could implement.
<b>Materials</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Computer and internet access are essential for this activity. Ideally each student will have access to a computer or tablet.</li> </ul>
<b>Material Preparation</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Post the <a href="#">Activity 1 Identifying a Flood Resilience Strategy Handout</a> and an editable copy of the <a href="#">Activity 1 Flood Resilience Strategies Class List</a> to Google Classrooms or class website. Students will need digital access to the worksheets to access the links for each activity.</li> <li><input type="checkbox"/> Print copies of the <a href="#">Activity 3 Flood Resilience Strategy Outline</a> for each student.</li> <li><input type="checkbox"/> Optional: Download your Local Hazard Mitigation Plan from here: <a href="https://www.colorado.gov/pacific/mars/approved-plans">https://www.colorado.gov/pacific/mars/approved-plans</a>. Look for a list of hazard mitigation strategies to share with students as examples of projects they could pursue. <i>*Note: Though there are a general set of guidelines for local hazard mitigation plans, not all plans are organized the same. Spend some time exploring the document before teaching the lesson to avoid confusion.</i></li> </ul>
<b>Vocabulary</b>	<p><u>Natural hazards</u> are naturally occurring phenomena such as flood, wildfire, extreme heat, or drought, which may disrupt or damage a community.</p> <p><u>Flood</u> is a rising and overflowing of a body of water especially onto normally dry land.</p> <p><u>Floodplain</u> the generally flat area next to a river or stream which is prone to flooding</p> <p><u>100-year floodplain</u> is the area of land that can reasonably be expected to have a 1% chance of flooding for a given year.</p> <p><u>Preparedness</u> is to have plans in place for communities to respond when a disaster or emergency happens in order to protect lives and community assets (coresiliency.com; i.e., ready to respond).</p> <p><u>Mitigation</u> uses planning tools and strategies to reduce a community's risk to natural and man-made hazards (coresiliency.com; i.e., reduce risk).</p> <p><u>Resilience</u> is the capacity of community members and organizations, such as schools, businesses, or hospitals, to maintain essential functions</p>





	before, during, and after a hazard event (i.e., the ability for a community to bounce back).
<b>Opportunities for Bringing Experts into the Classroom</b>	<ul style="list-style-type: none"> <li>• Activity 1: Kick off the lesson with a local expert (city engineer, city or county planner) talking about flood to give students ideas for resilience strategies.</li> <li>• Activity 2: Compile a list of contact information for local experts for students to interview as they research their idea.</li> <li>• Activity 4: Invite local experts to give students feedback on their project ideas.</li> </ul>

### Activity 1 (Identify)

What strategy will you investigate, and for which area?

Use the [Activity 1 Handout](#) to complete this activity.

- 1) Read the [Guidelines for the Virtual Expo](#).
- 2) Review the vulnerable areas you identified in the Flood Map ArcGIS activity (activity instructions below if you have not completed the activity). Which of these areas do you think it's important to focus on? Choose one, and take a screenshot of a map of the area, showing the flood risk in the area.

Resource:

- Use the Flood Map [GIS Activity Instructions](#) to interact with the Flood Map [ArcGIS](#).

- 3) Next, identify a flood resilience strategy that you would like to focus on in this area. Use the resources below for ideas.

Resources:

- Project Examples and Strategies from Local Mitigation Plans (midway down the [Resilient Colorado Virtual Expo](#) page)
- [Naturally Resilient Communities Flooding Solutions](#)

- 4) Put a screenshot of your area and a 2 sentence description of your resilience strategy in [this document](#).





## Activity 2 (Research)

Would your strategy work? Is it needed?

Use the [Activity 2 Handout](#) to guide students through this activity.

Research the feasibility of your strategy idea, and whether it's needed. Interview 5 friends or family members in your community to get ideas for your proposal, or create a short Google form survey to collect ideas and learn more about the community's need for a solution.

Consider the following questions as you are interviewing or surveying people:

1. Are you concerned about flooding in your community? Why or why not?
2. What areas are at risk for flooding in your community that you know of?
3. *Explain the area you've identified as a risk area.* Do you know anything about flood risk in this area?
4. Do you know what to do if a flood happens?
5. Do you know what resources are available if you need help? (ie. if you were in an area experiencing severe flooding, what would you do? Who would you call?)
6. *Share your idea for a solution.* What do you think of this solution?
7. Do you have ideas of what we can do in our community to be prepared for and mitigate the impacts of a flood?
8. Do you have ideas for solutions that I could implement to increase our community's resilience to flooding?

## Activity 3 (Prototype)

Create a pitch for your idea

Create a poster or a 2-5 minute video to share your proposal idea with your peers. Begin by filling out the [Flood Resilience Strategy Outline](#) to collect your ideas.

The presentation should include:

- Project Description: What is your solution?
  - What do you plan to do?
  - Where do you plan to do it?
  - Who are the stakeholders? Who will you involve and what will their role in the project be?
  - What resources do you need to complete the project? How do you plan to get these resources?





- What is a suggested timeline (and how will you take into account potential social-distancing requirements due to COVID-19?)
- Project Justification
  - Why is your project important? What is your evidence, and/or how do you know this is a need in your community?
  - Who will the project benefit?

## Activity 4 (Iterate)

Improve your project based on feedback

Present your project proposal to your classmates and/or an expert for feedback on the idea. After you've explained your idea (and shown them your poster or video), use the following questions to get feedback.

- 1) What did you like about the project proposal?
- 2) What could we do to improve our proposal?
- 3) Would this project be feasible?
- 4) Does this proposal provide a solution to a demonstrated problem? If not, how could we change it?
- 5) Is there enough information in our proposal?
- 6) Are the stakeholders clearly identified? Is it clear who will be able to complete the work?
- 7) Are the resources to complete the plan readily available? If not, are they easily attainable?

## Activity 5 (Launch)

Create your presentation

Using the feedback you got, revise your prototype and prepare your final presentation to submit to the Virtual Expo.

Submit your poster or video [here](#).

