



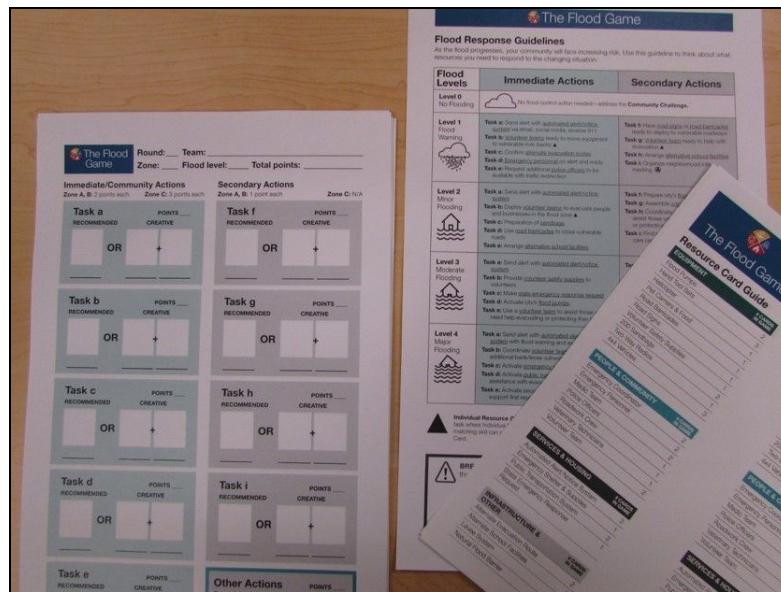
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Teacher Guide
Middle & High School
Hazard Game: Flood

Role-Playing Game to Build Community Flood Response Skills

Setting the Stage

It's autumn and it has been raining for days! The risk of a flood is high in your community. In this game, you will need to act fast and work together to prepare for and respond to an extreme flooding event. As a community, you will need to assess strengths and vulnerabilities, take stock of available resources, and allocate them during the emergency.



Materials for HEART Force Flood Game

Game Overview

Students will solve the challenges that their community faces during the course of an extreme flooding event by using available individual and community resources. Students work in three “zone response teams” to determine the responses they will take in each round as the flood situation evolves. Students use resource cards to respond to increasing flood severity and to unanticipated challenges that arise.



These materials were developed by CIRES Education & Outreach at CU Boulder.
<https://cires.colorado.edu/outreach/projects/HEARTForce>





Instructional Overview	
Grade Level	Middle/High School
Instructional Time	50-70 minutes
Standards Alignment	NGSS: MS-ESS3-2 , HS-ESS3-1 CDE: MS3.ESS.GLE9 , HS3.ESS.GLE10
Anchoring Phenomenon	<ul style="list-style-type: none"> • During a flood, community members can use their skills and resources to help their community. • A flood can have both anticipated and unexpected challenges.
Driving Question	<ul style="list-style-type: none"> • What skills do youth in your community have that can contribute to a successful flood response? • How can community resources be used in creative ways to solve challenges that arise during a flood event?
Learning Goals	<ul style="list-style-type: none"> • Students will explore factors that increase or decrease the vulnerability of their community to an extreme flooding event. • Students will develop an understanding for how community members can prepare for and contribute to effective community response to flooding events. • Students will explore roles that youth can take during a flooding event.
Materials	<p>Materials can be ordered from the HEART Force program staff or printed from the HEART Force website.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Facilitator script (included in this document) <input type="checkbox"/> Large <i>map of the community</i>, either projected or printed and posted <p>Each team will need (at least 3 teams needed to play):</p> <ul style="list-style-type: none"> <input type="checkbox"/> One <i>game board</i> <input type="checkbox"/> One copy of <i>Flood Response Guidelines</i> <input type="checkbox"/> One copy of <i>Resource Card Guide</i> <input type="checkbox"/> One copy of each <i>Emergency Updates</i> for each round (to be handed out only in the round in which they are used) <input type="checkbox"/> Community resource cards (one set per group) - in <i>Resource Cards</i> pdf <input type="checkbox"/> Individual resource cards (one per student) - in <i>Resource Cards</i> pdf
Material Preparation	<ul style="list-style-type: none"> <input type="checkbox"/> Read the complete facilitator script before playing. <input type="checkbox"/> Print copies of game materials (see above). Cut out the resource cards. Laminate game materials if you want to reuse them. <input type="checkbox"/> Project or post the large <i>map of the community</i>. <input type="checkbox"/> Organize handouts for each zone response team so that they are easy to distribute between each round. <input type="checkbox"/> Community resource cards will need to be collected, shuffled, and redistributed between rounds. This is a good task to delegate to a student.





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Vocabulary	<p><u>Flood</u> is a rising and overflowing of a body of water, especially onto normally dry land.</p> <p><u>Levee</u> is a barrier, either natural or made by people, that helps to contain and redirect the flow of water in a river or stream.</p> <p><u>Levee breach</u> is the failure of the barrier keeping water in the river. A breach leads to flooding.</p>
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Scoring

After each round, zone response teams should total up the number of Immediate/Community Actions that they successfully addressed in that round, as well as the number of Secondary Actions, Other Actions, or Collaborations. Keep track of zone response team scores between rounds on a whiteboard or projected spreadsheet.

Team	Round 1	Round 2	Round 3
Zone A	4	5	
Zone B	5	6	
Zone C	4	6	

Example scoreboard

Facilitation tips

- The *Emergency Update* for each round of the game requires participants to address an immediate flood challenge, as well as a *Community Challenge* that causes additional disruption in the hazard response.
- Each zone has different challenges and will require different resources to address them. Zones A and B will always be focused on addressing flood, while Zone C will never experience flood but instead will always be in charge of the *Community Challenge*.
- Solving a challenge requires having either the resource card specified or coming up with a creative solution (optional; see below). You can assume that if you have the indicated resource card, you have all the supporting resources needed to use it. For example, if your task is “Deploy volunteer teams to evacuate people,” you only need the *Volunteer Teams* card, without any additional communication resources, vehicles, etc.
- Using creative solutions (optional): Each round, students can solve their tasks using a creative solution (a creative combination of community and individual resource cards), but they must fit the challenge. For example, a “road barricade” could potentially be





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solved by the “road signs” and an Individual Resource card with “construction help” specified. Some students may try to abuse the flexibility around the option to use creative solutions. You can increase accountability by having zone teams report out on their creative solutions at the end of the round or have teams evaluate or vote on each other’s creative solutions. The creative solutions option can be omitted for younger or larger groups to simplify the game.

- Each round stands alone in terms of solving challenges. Challenges and resources do not carry between rounds.



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Facilitator script

The facilitator script is shown in blue, to be read aloud or paraphrased.

Introduction to the game (5 minutes)

Facilitator: Good afternoon, members of the [name of your town] community! Thank you for joining us to play a game in which we are going to work together to protect our community from a severe flooding event. Our goal is to learn how to invest in and use our resources wisely to respond to changing conditions during the flood. So, to get started, let's break into three zone response teams.

Tip for assigning teams:

There are three zones, so have students count down numbers from 1-3 and repeat. All students assigned "1" will be Zone A players, all students assigned "2" will be Zone B players, etc. Each group should have 4-5 students. If you have more than 12-15 students, create two groups for each zone.

Break into zone response teams. Post/project/hand out the map of the community.

Facilitator: Find your zone on the map of the community and get a sense for where your zone is located. Each zone response team is in charge of addressing flood impact in your zone.

Notice that:

- Zone A is closest to the river,
- Zone B a little farther away, and
- Zone C is completely out of the floodplain.

Introduction to resource cards (10 minutes)

Facilitator: The game has three rounds and, in each round, the zone response teams must use their available resources to handle the impact of flooding and related challenges. You have two kinds of resources that you can use in each round: *community resources* and *individual resources*. Each round, your team will receive a selection of community resource cards and you will select the most useful ones for your zone. On the other hand, individual resource cards are resources that you personally bring to your community. Community resource cards will be reshuffled and distributed anew for each round.





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Examples of community resource cards (above) and *Resource Card Guide* (below)

I'm going to hand out 13 *community resource* cards to each group. Look them over carefully and be sure you understand what they represent. You can find a list of all the community resources that are in the game on the *Resource Card Guide*.

Hand out *community resource cards* and *Resource Card Guide*.

Facilitator: In each round, the zone response teams will encounter a series of challenges. To solve the challenges, you must have the resource card that corresponds to that challenge. Your team earns points each round for how well you use your resources to address the challenge.

In addition to using the resource cards to solve your own challenges, as you play you may share them with other zone response teams. It strengthens your community response when everyone knows about each other's resources and is willing to share them. Your team can gain a maximum of one point per round by collaborating. But only the team giving the resources gains the point, the receiving team does not.

Facilitator: Now, I'm going to hand out the *individual resource cards*. There is one card for each player. The individual resource cards represent what you as a person can do to help your community during an emergency. You have a lot more valuable skills than you probably realize.

The Flood Game	
Resource Card Guide	
EQUIPMENT	# CARDS IN GAME
Flood Pumps	2
Hand Tool Sets	3
Helicopter	1
Pet Carriers & Food	1
Road Barricades	1
Road Signs	1
Volunteer Safety Supplies	1
200 Sandbags	2
Two-Way Radios	1
4x4 Vehicles	3
PEOPLE & COMMUNITY	# CARDS IN GAME
Emergency Coordinator	2
Emergency Personnel	2
Medic Team	2
Police Officers	1
Roadwork Crew	1
Veterinary Technicians	1
Volunteer Team	2
SERVICES & HOUSING	# CARDS IN GAME
Automated Alert/Notice System	3
Emergency Shelter & Supplies	1
Public Transportation System	2
State Emergency Response Request	1
INFRASTRUCTURE & OTHER	# CARDS IN GAME
Alternate Evacuation Route	2
Alternate School Facilities	1
Levee System	1
Natural Flood Barrier	1



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Think about things you can do like communicating between people, helping take care of people or pets who are displaced, or helping to organize and set up emergency shelters. **Please mark one of the skills listed on your individual resource card.** This is your personal skill for the entire game, so pick the one that best fits you.

Hand out *individual resource cards*.

Facilitator: One of the ways that individual resource cards can be used is by combining your individual resource card with a teammate's individual resource card to make a volunteer team.

If your zone response team does not have a community *Volunteer Team* card, you can use a combination of two individual resource cards that each have a different skills selected to make a volunteer team. And if your team does not have enough individual skill diversity to make a volunteer team, you can share your cards with other zone response teams, as long as both teams agree to share.

INDIVIDUAL RESOURCE



Think about your skills and interests. What is an activity or job that you could do to help your community in an emergency?

- Caregiving
- Construction Help
- Driving/Transporting
- Communications
- Neighborhood Organizer
- First Aid/Medical Assistance
- Other: _____





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Round 1 (10 minutes)

Facilitator: It's autumn in [your community] and it's been raining for several days. It's time to start thinking about how to prepare our community in case the rains continue.

Hand out *Flood Response Guidelines*.

Facilitator: Each zone response team will need to decide which resources you want to use in the first round of the game. You don't yet know exactly what the flooding level and challenges will be in this round, but you know that there have been heavy rains, and you know where your zone is located in the community. Prioritize which resources will be most important to address potential flooding impact in your zone—you can only keep **eight community resource cards**. Use the *Flood Response Guidelines* to help with your decision. You have 3 minutes to decide on the cards that you want to keep. Place the remaining five cards in a pile and set them aside.

Hand out the game boards.

Facilitator: Here is your game board. Please complete the header with your group information. You can select a team name. When you play this round, place the resource cards on or near each task on the game board.

Facilitator: I will now read the *Emergency Update for Round # 1*:

*The rains have been falling for several days and parts of your community are starting to see signs of flooding. In addition, your community experiences a community challenge: a **communication outage** has occurred that will require resources to manage.*

Hand out copies of *Emergency Update #1* to Zone A and Zone B response teams and the *Round 1 Community Challenge* to Zone C response team.

The Flood Game

Flood Response Guidelines
As the flood progresses, your community will face increasing risk. Use the guidelines to think about what resources you need to respond to the changing situation.

Flood Levels	Immediate Actions	Secondary Actions
Level 0 No Flooding	no flood control action needed—address the Community Challenge .	
Level 1 Flood Warning	<ul style="list-style-type: none"> Task 1: Send alert with automated broadcast, update via email, social media, reverse 911 Task 2: Shut down access roads to most equipment to vulnerable river banks A Task 3: Coordinate alternative evacuation routes Task 4: Communicate emergency response needed Task 5: Review alternate public facilities to be available with traffic reduction 	<ul style="list-style-type: none"> Task 6: Have staff alert or assist businesses ready to shut or vulnerable customers Task 7: Shut down access roads to help with evacuation A Task 8: Arrange alternative school facilities Task 9: Organize neighborhood emergency meeting
Level 2 Minor Flooding	<ul style="list-style-type: none"> Task 10: Send alert with automated broadcast, update via email, social media, reverse 911 Task 11: Evacuate vulnerable people to evacuation centers and businesses in the flood zone A Task 12: Prepare for evacuation of buildings Task 13: Arrange alternative school facilities 	<ul style="list-style-type: none"> Task 14: Prepare city's flood zone Task 15: Review alternate public facilities Task 16: Coordinate a volunteer team to assist those who need help evacuating Task 17: Prepare for evacuation of buildings Task 18: Address neighborhood emergency meeting
Level 3 Moderate Flooding	<ul style="list-style-type: none"> Task 19: Send alert with automated broadcast, update via email, social media, reverse 911 Task 20: Evacuate vulnerable people to evacuation centers Task 21: Make alternate emergency response needed Task 22: Activate city's flood zone Task 23: Have alternate public facilities to assist those who need help evacuating or protecting their homes A 	<ul style="list-style-type: none"> Task 24: Organize alternative evacuation route Task 25: Set up emergency shelter(s) & supplies Task 26: Have public transportation, bus(es) on standby Task 27: Address neighborhood power outage
Level 4 Major Flooding	<ul style="list-style-type: none"> Task 28: Send alert with automated broadcast, update via email, social media, reverse 911 Task 29: Coordinate evacuation routes to move additional vulnerable populations Task 30: Activate emergency shelter(s) & supplies Task 31: Activate public transportation bus(es) for assistance with evacuation Task 32: Activate secondary evacuation routes to support last responders (volunteers, etc.) A 	<ul style="list-style-type: none"> Task 33: Deploy alternate evacuation route Task 34: Deploy additional public buses to help with evacuation of evacuation centers Task 35: Deploy medical staff for affected residents A Task 36: Fix leaking roads in neighborhood

Individual Resource Cards: Sorted includes use when Individual Resource Card with Community Card can reduce Community Resource.

Neighborhood Support Cards: Sorted includes use when the card is required. Individual Resource Card cannot replace a Neighborhood Support Card.

BREACH: When a breach occurs (a break in the main dam or levee), your town will need the following to repair it:

- 200 workers
- Equipment used to fill and transport sandbags
- 500 additional to transport sandbags and volunteers to affected area

Plus at least one of the following:

- 1 sandbag to assist
- 1 emergency responder
- 5 sandbag bags (shovels, saws, saw)

OR

You can use a Levee Subject or Natural Flood Hazard card to fix the breach.

The Flood Game

Round: _____ Team: _____
Zone: _____ Flood level: _____ Total points: _____

Immediate/Community Actions Zone A, B: 2 points each Zone C: 3 points each		Secondary Actions Zone A, B: 1 point each Zone C: 1/1/1	
Task a RECOMMENDED OR CREATIVE	POINTS + POINTS	Task f RECOMMENDED OR CREATIVE	POINTS + POINTS
Task b RECOMMENDED OR CREATIVE	POINTS + POINTS	Task g RECOMMENDED OR CREATIVE	POINTS + POINTS
Task c RECOMMENDED OR CREATIVE	POINTS + POINTS	Task h RECOMMENDED OR CREATIVE	POINTS + POINTS
Task d RECOMMENDED OR CREATIVE	POINTS + POINTS	Task i RECOMMENDED OR CREATIVE	POINTS + POINTS
Task e RECOMMENDED OR CREATIVE	POINTS + POINTS	Other Actions Zone A, B: Breach Zone C: Bonus challenge Which resource card(s)?	POINTS

Collaboration? All zones: 1 point for collaboration. Which resource card? _____ Points _____



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The Flood Game

Round #1

The rains have been falling for several days and parts of your community are starting to see signs of flooding. In addition, your community experiences a community challenge: a **communication outage** has occurred that will require resources to manage.

<p>Zone A: Level 2 flooding is already occurring in your zone with a <u>large splash</u> along a 100 meter stretch near the main business area. Lines in other areas are holding, but with water levels rising fast, other areas in your zone are considered vulnerable. Two additional stretches of riverbank are likely to need reinforcement soon.</p>	<p>Zone B: There are no flood warnings in your zone yet; and your Zone is at Level 1 (Flood Warning). With water levels rising quickly, you should assess where flooding will most likely occur and think about potential preparations if these areas flood. You will also be responsible for helping with the Community Challenge.</p>	<p>Zone C: There are no flood warnings for your zone, so your team has bandwidth to take the lead in addressing the Community Challenge.</p>
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The Flood Game

Community Challenge #1: Communication Outage

The local cell tower is hit by lightning and most of the town loses the ability to use phones and internet. How do you organize communications and continue evacuation and support efforts? Things to consider in addressing this challenge:

Task a: <u>Two-way radios</u> will help reach some members of the community.	Task d: When you reach people, what do you want them to know? Get the help of an <u>emergency coordinator</u> to develop a list of critical information.
Task b: <u>Volunteer team</u> who could go door-to-door or use <u>Neighborhood Support Systems</u> .	Task e: Can <u>public transportation</u> be used to bring teams of <u>emergency personnel</u> to assist volunteers with people needing help as they are getting them information?
Task c: Do you have access to an <u>automated alert/notice system</u> that you could use that would spread information across many channels?	

Facilitator: You will have 10 minutes to solve your challenges for this round.

- Zones A and B: Refer to the *Flood Response Guideline* and your *Emergency Update* to learn what tasks your team has to accomplish.
- Zone C: Address the tasks from the *Community Challenge*.
- All zones: Use your game board to track which resources you are using to tackle your tasks. You must come up with a plan for your group and a way to use your resources. Check off solved tasks where you have the resource card you need.

Optional creative solutions: Remember, if you don't have the required resource card, but you have at least two other cards that could work together to solve the task, you can use a creative solution. You are accountable as to whether the cards that you are using for the creative solutions are actually solving the challenge.

Set timer for 10 minutes. Give students 2-minute and 1-minute warmings. Remind teams about the option for sharing resources towards the end of the round.

Facilitator: Time is up! Let's add up each zone's total points for Round 1.

See scoring section above for details on scoring.

End of Round 1 Reflection

Have each team share out to the whole class.

- Was your group able to complete all the tasks with the resources you had?
- In what ways could you have used your resources better or more creatively?
- Are there resources you wish you had?



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Round 2 (10 minutes)

Teams stay the same for each round. Each player keeps his/her own individual resource card. Collect and shuffle the *community resource cards*. Hand out 13 random cards to each team. Each team gets a new game board or wipes and re-uses a laminated game board.

Facilitator: The rains haven't stopped, and regional rains are contributing to the upstream tributaries causing the stretch of river through your community to continue to rise. Look at your new *community resource cards* and pick the **eight** you want to work with. The flooding and challenges you dealt with in Round 1 are resolved. In Round 2, you only need to worry about the new flooding and new challenges that you encounter.

I will now read the Emergency Update for Round # 2:

*The flooding is escalating in the areas closest to the river. In addition, your community experiences a community challenge: a **road failure** has occurred that will affect your community's ability to move people and supplies.*

Hand out copies of *Emergency Update #2* to Zone A and Zone B response teams and the *Round 2 Community Challenge* to Zone C response team.

Facilitator: Please complete the header on your game board for Round 2. As with last round, you have 10 minutes to solve as many of your tasks as you can. Work together in your team to strategize how to use your resources wisely. Use your *Flood Response Guide* or *Community Challenge* details to track which resources you need. Use your game board to mark which resources you have used. Check off solved tasks where you have the card that is needed.

Optional creative solutions: Again, if you don't have the required resource card, but you have at least two other cards that could work together to solve the task, you can use a creative solution. You are accountable as to whether the cards that you are using for the creative solutions are actually solving the challenge.

Set timer for 10 minutes. Give students 2-minute and 1-minute warmings.

Facilitator: Time is up! Let's add up each zone's total points for Round 2.

End of Round 2 Reflection

Have each team share out to the whole class.



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- How did your strategy change from Round 1 to Round 2?
- What additional resources did you need that you were unable to get?
- Optional: Did you use any creative solutions?

Round 3 (10 minutes)

Teams stay the same for each round. Each player keeps his/her own *individual resource card*. Collect and shuffle the *community resource cards*. Hand out 13 random cards to each team. Each team gets a new game board or wipes and re-uses a laminated game board.

Facilitator: The flood threat continues to rise and severe effects are present in the community. Evacuations are necessary and State Emergency Response must be requested. Look at your new community resource cards and pick the **eight** cards you want to work with.

I will now read the Emergency Update for Round # 3:

*The river level continues to rise and severe flooding is present in the business district. In addition, your community experiences a community challenge: there are **vulnerable people who must be evacuated**.*

Hand out copies of *Emergency Update #3* to Zone A and Zone B response teams and the *Round 3 Community Challenge* to Zone C response team.

Facilitator: Please complete the header on your game board for Round 3. As with last round, you have 10 minutes to solve as many of your tasks as you can. Use your *Flood Response Guide* or *Community Challenge* to track which resources you need. Use your game board to mark which resources you have used.

Optional creative solutions: Again, if you don't have the required resource card, but you have at least two other cards that could work together to solve the task, you can use a creative solution. You are accountable as to whether the cards that you are using for the creative solutions are actually solving the challenge.

Set timer for 10 minutes. Give students 2-minute and 1-minute warmings.

Facilitator: Time is up! Let's add up each zone's total points for Round 3.





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End of Round 3 Reflection

Facilitator: River levels have stabilized and emergency responders from outside your community have arrived to provide additional supplies, equipment and personnel. Congratulations to your community for pulling together and working to protect your town!

Choose from the following discussion questions as time and interest allow. Questions can also be divided between teams or individuals in a think-pair-share format.

- Before you played the game, you tried to anticipate where you would need resources. Were the resources you thought you would need the ones you actually ended up needing? Are there choices you would have made differently if you were to play again?
- How well did the members of your zone work together? How well did the different zones work together?
- How does having played this game change what you think about disaster preparation in your community?
- Think about the dynamic in the room as zone response teams were working together to find the resources to solve their community challenges. What strategies did you use to communicate with other teams? Were other zone response teams willing to share resources and information with you, or did teams take a more competitive approach?
- What elements of the game felt like something that could happen in real life? What elements didn't feel very realistic? What can we learn about becoming more resilient from a game like this?
- Take a look at the community map. How does the distribution of buildings and parks affect the community's vulnerability and response? How might you design things differently in the community to be more resilient?



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Optional extension activities

Activities	Extensions
Introduction to community resource cards	Each player selects two or three community resource cards to review and answer the question on the front of the resource card.
Creative Solutions	Each round, students can solve their tasks using a creative solution (a creative combination of community and individual resource cards), but it must fit the challenges. For example, a “road barricade” could potentially be solved by the “road signs” and an individual resource card with “construction help” specified. Some students may try to abuse the flexibility around the option to use creative solutions. You can increase accountability by having zone teams report out on their creative solutions at the end of the round or have teams evaluate or vote on each other’s creative solutions. The creative solutions is an optional extension and can be omitted for younger or larger groups to simplify the game.
Model Round	<p>In some cases, it might help to run a quick model round (5 minutes) before Round 1:</p> <p>Facilitator: Let’s play a quick model round to see how the game runs. Your team has already selected eight community resource cards. Let’s play this round with just four of those cards.</p> <p>For this round, all three zones are at Level 2 Flood Risk. How many of the tasks for level 2 risk can your zone accomplish with the four community resource cards you chose?</p> <p>Give teams 2 minutes to play.</p> <p>Facilitator: Time is up! Is there anything you would have done differently in choosing your cards after playing this model round?</p> <p>If you play the model round, make sure the teams go back to all eight cards they chose before starting Round 1.</p>

