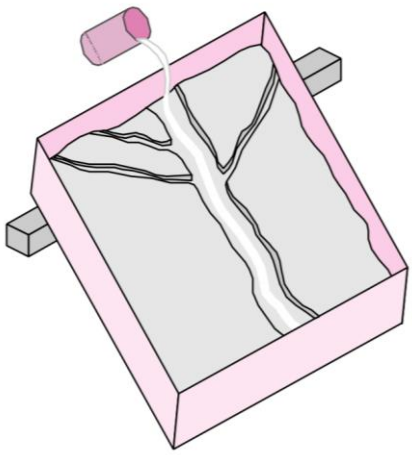
FLOOD MANAGEMENT

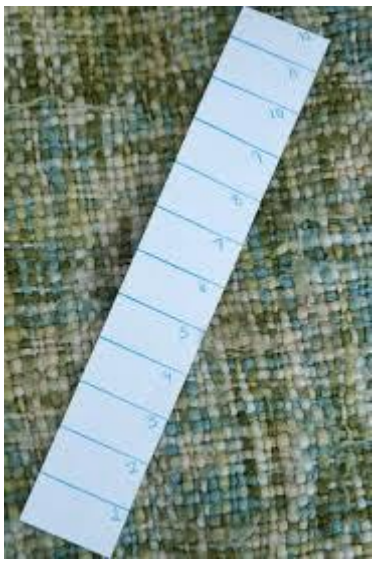
Ages 4 to 7 (Level 1)

Description:	Learners will explore the most frequent natural disasters that are floods by beginning to understand their causes and far-reaching effects. They will research the effect of floods on plants, animals and people, and design an emergency response kit including a safety guide and disaster kits
Leading question:	Can you help manage a flood in your community?
Age group:	4– 7 years
Subjects:	Geography (Social Sciences), Literacy and Numeracy
Total time required:	~4 hours over 5 days
Self-guided / Supervised activity:	Medium
Resources required:	- 1 large flat container or tray with sides (a deep tray), soil or modelling clay, sponge, little rocks, - Empty plastic container and marker - Plastic bottles, rope, thread and large plastic bag

Day	Time	Activity and Description
1		Learners will be introduced to the most frequently occurring natural disasters globally: floods, and begin to understand some of the reasons they occur. We will explore floods that are natural disasters created by extreme weather conditions Learners will think of a flood as extra water in a usually dry land
	15 minutes	Learners will make an illustrated list of the natural sources of water and water bodies that they know: - Rain - Sea - Rivers - Lakes - Glaciers etc.
	45 minutes	Learners will make models to explore the impact of our human activity on creating floods. Learners should record what they see with each experiment with drawings and / or a few descriptive sentences on the floods. Flood Model Set Up:

EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

		Learners will take any large flat container or tray with sides. Place sufficient modelling clay or soil at the bottom of the pan. Carve a river path for water in the container in the clay/soil. They will place little stones or toy houses alongside the river to define the path and also make these the “homes” of people.  Learners can pour water into the model in the river and observe the water staying within the river path. They can then add a rainstorm by increasing the volume and flow of the water. Experiment 1: Learners can observe what will happen to the neighboring areas. Learners can move the little stone homes around their model and notice that those closest to the river get more flooded Learners will then begin to explore the multiple human factors causing floods including: Experiment 2: Straightening river channels and paths Learners should try keeping a straightened river path as shown above and testing the speed of the water flow and the amount of flooding. Learners should then attempt to create a meandering or zig-zag / curved river path and test the speed of water flow and the amount of flooding Learners will observe that the curving river path slows down the speed and the intensity of the water flow and reduces the amount of flooding. Learners will complete their drawings and notes from the different experiments to understand what happens when it rains a lot. For younger learners, they can orally voice over their understanding based on the experiments and drawings.
2		Learners will explore and measure the intensity of natural hazards

	15 minutes	Learners will understand how rain and water levels are measured and build scientific instruments to measure hazards. Numeracy extension: Learners will now make their own ruler / scale. A ruler / scale is used to make straight lines or measure distance. Each ruler or scale is marked in equal intervals. Learners can take any rigid object e.g. a piece of wood, cardboard or even thick paper. Learners need to determine the units of measure as cm's or inches – place their index finger horizontally for each mark. While each of the markings will not be exactly a cm or an inch, it is important to make sure that it is equal. Learners should use the unit of familiarity in their context. Older learners can divide each cm or inch into smaller units of measurement including millimeters or centimeters 
	20 minutes	Rain gauge to measure the amount of rainfall. Learners will now use this newly created scale to measure the amount rain or water in a cup. Learners can use any cup (paper or plastic). They will use this scale to mark the outside of the cup. This cup can be places in an open area where it is not disturbed (or on some elevated surface) when it begins raining. As the rain fills the gauge, the students can measure this after each rainfall. In the case that it is not raining, learners can simulate or pretend it is raining and fill the cup with water and do the measurement. Learners will conduct this cup measure experiment 3 times – each time holding the cup under any flowing water for 5-10 seconds. Since it rains with different intensity, learners will do this under a fully open tap or fast flowing water, slightly slower flowing water, until it is just a few drops.

		Learners can be introduced to the terminology: - Hard and fast rain: Downpour - Maximum Rain - Medium amounts of rain: Shower – Medium Rain - Very little rain: Drizzle – Minimum Rain
	15 minutes	Learners will then complete an illustrated report where they can draw the cup for each of the 3 scenarios and write the terminology associated with it and the measured amount of rain in each scenario. Learners will understand that when it rains a lot (e.g. there is fast flowing water into the cup), the cup gets full very fast and sometimes overflows. Learners who are unable to write will vocalize the terminology
	20 minutes	Numeracy Extension: Learners will use their scale to measure 5 different items in the home. They can measure their pencil, eraser, book, finger, vegetable etc. They will then draw and label the items they measured and their lengths. Learners will then solve a few simple word problems: - What is the longest item you measured? - What is the shortest item you measured? - Were there any two items with the same length? - What is the difference in length between the longest and shortest item? (biggest – smallest) - What is the total length of all the items put together? (add all the numbers) - Can you arrange the numbers from biggest to smallest? - What is the difference between the longest two and the shortest two items?
3		Learners will gather research on the impact and result of floods on humans – they will do this through interviewing family members and reflecting on any of their own experiences of the worst flood in their living memory
	20 minutes	Younger learners can ask parents and family members' questions about their experience with the floods. Older learners can create a little survey about the impact of a flood with their family members on any 3 or 4 of the below mentioned areas of impact: - Food Supplies - Plants and Trees - Animals - Homes - Roads - Transportation - Schools
	20 minutes	Learners will illustrate and older learners can write a short note on the 3 scenarios of:

<table>
<tr><td></td><td></td><td>- Too little rain, also known as droughts (Prompts: What would happen to plants, animals and people with too little water? What color would plants be? What would happen to crops?)
- Just enough rain (Prompts: What happens after the rain to plants, animals and people? What are the colors you see after the rain? Etc.)
- Too much rain, could lead to a flood (Prompts: What would happen to fields with plants and trees? What would happen to animals that can or cannot swim? What would happen to homes and buildings? What colors do you expect?)</td></tr>
<tr><td>4</td><td>20 minutes

20 minutes</td><td>Learners will prepare themselves and their communities for floods – by designing an emergency ID card and essential survival kit for the flood

Learners will begin by designing an emergency details card for what they will do when a flood happens:
- What is the number of the emergency number of the fire / police and ambulance? (e.g. 911 or 100)
- What is the safe location in your community area? (e.g. school building, hospital etc.)
- If you were to get separated from your parents – you need to know the details to share with emergency contact: Parents Full Name, Full Address, Contact Number etc.
- What is the name and number of a close relative or friend?

Learners will now design an essential survival kit for when floods happen. Learners will understand the meaning of some words:

- Essential – this is something that is absolutely necessary or extremely important
- Important – this is something of great value
- Optional – this is something that is nice to have

Learners will make a chart with 3 columns: Essentials, Important and Optional. Learners will write or draw 2 - 4 items in each of the 3 columns. They can discuss these categories with their families or parents on what are the items that they really need or would be nice to have in discussion with their parents. Alternatively, learners can identify which things they cannot manage without for the entire day e.g. food, water – these are essentials, what are the things that they really need these things are important e.g. blankets etc. and what are the things that they would like to have, but they are ok without e.g. soap etc.

Some examples would be:

<table><tr><th>Essential</th><th>Important</th><th>Optional</th></tr><tr><td></td><td></td><td></td></tr></table></td></tr>
</table>

		Food (that is more durable e.g. biscuits or canned food)	Blankets	Torch
		Water	Phones and Chargers	Soap and Toiletries
		Medicine	ID card or papers	
	10 minutes	Learners can make colored flags and a help poster to attract attention from the ground		
5	20 minutes	In the final day of the project, learners will pretend to be weather forecasters prepare a script and narrate it – this can be recorded by family members. For younger learners, they can draw or write a few key words to help them prepare for the news report Learners will first have to think of a warning issued by their National Weather Service. The warning has to alert people when bad weather might happen In their news report, learners need to cover: - How do floods happen? - How can you measure the different amount of rain? - What will happen if there is a flood? - How can we be prepared for it with our emergency ID cards and survival kit?		
	10 minutes	Learners will present this weather warning report orally or prepare a report for all their family members		
Assessment Criteria:		- Understanding of the causes of human action on flooding - Design of the scale / ruler and measuring items - Practicality of the emergency protocol - Understanding of different items as essential, important or optional - Demonstrated understanding in the final weather watch report		

Learning outcomes:	- Understanding floods and the impact of excess rains - Understanding standards units of measure and designing your own scale - Identify impact of the flooding - Protective and emergency measures to protect from the consequences of flooding
Required previous learning:	None
Inspiration:	FEMA Resources USAID Resources
Additional enrichment activities:	
Modifications to simplify the project tasks if need be	Learners can reduce the number of models and the instruments being used for measurements

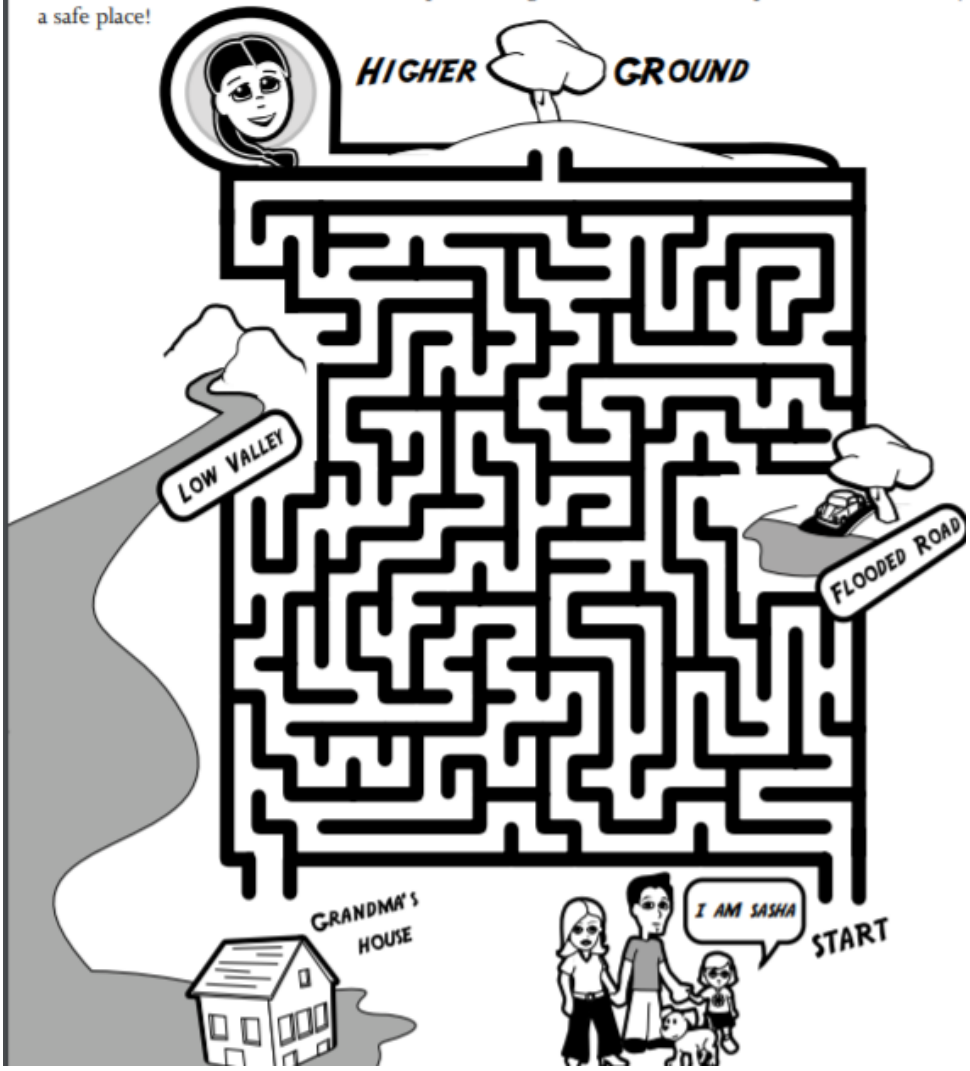
EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

APPENDIX

WATER, WATER EVERYWHE

Hi everyone, my name is Rising Waters. We all know that "April showers bring May flowers," bu showers that turn into heavy rains can also cause floods. I'm here to remind you that during a flo you and your family can get to higher ground to stay safe.

My friend Sasha needs your help! Last week, there was a lot of rain where she lives. Now the river in her town is rising fast. The river is spilling over its banks. There is flooding near her hom Sasha find her route to evacuate. Draw a path through the maze below. Help Sasha and her family a safe place!



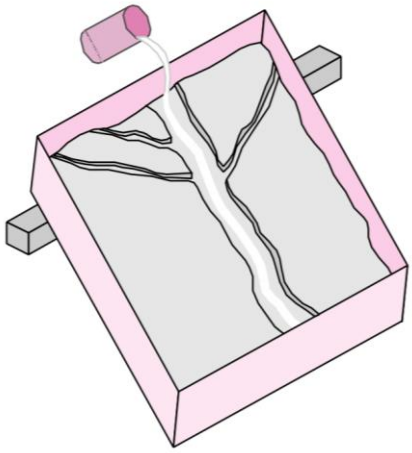
EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

Ages 8 to 10 (Level 2)

Description:	Learners will explore some of the most frequent natural disasters by beginning to understand their causes and far-reaching effects. They will research the effect of the natural disaster on plants, animals and people, and design an emergency response kit including safety guides and disaster kits
Leading question:	Can you manage a flood in your community?
Age group:	8– 10 years
Subjects:	Geography (Social Sciences), Literacy and Numeracy
Total time required:	~5 hours over 5 days
Self-guided / Supervised activity:	Medium
Resources required:	- 1 large flat container or tray with sides (a deep tray), soil or modelling clay, sponge, little rocks, - Empty plastic container and marker - Plastic bottles, rope, thread and large plastic bag

Day	Time	Activity and Description
1	5 minutes	Learners will be introduced to the most frequently occurring natural disasters globally: floods and begin to understand some of the reasons they occur. We will explore floods that are a weather force created natural disaster A flood is an overflow of water that submerges land that is usually dry. Learners can brainstorm and make a list of the causes of flood that they know. Encourage learners to think of reasons beside excessive rain that would result in more than normal water by thinking of other water sources – these would include overflowing rivers, broken dams, storm surges and cyclones and melting ice / snow etc. Learners will make models to explore the impact human activity on creating floods. They will first explore the impact of placing human settlements close to river bodies, straightening river paths and deforestation. Learners should record the outcome of each experiment with drawings and notes on the implications of the floods and draw conclusions.
	15 minutes	Flood Model Set Up: Learners will take any large flat container or tray with sides. Place sufficient modelling clay or soil at the bottom of the pan. Carve a river path for water in the container in the clay/soil. They will place little stones, wood cubes, or toy houses alongside the river to define the path and also define the settlements.

EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

		 Learners can pour water into the model in the river and observe the water staying within the river path. They can then add a rainstorm by increasing the volume and flow of the water. Learners can observe what will happen to the neighboring areas. Learners can place the homes in different parts of the model and test the impact depending on the location and proximity to the river and write these down. Usually the settlements close to the river will get submerged first and there will also be more of an impact on the more downstream settlements Learners will then begin to explore the multiple human factors causing floods including:
	15 minutes	i) Straightening river channels and paths Learners should try keeping a straightened river path as shown above and testing the speed of the water flow and the amount of flooding Learners should then attempt to create a meandering or zig-zag / curved river path and test the speed of water flow and the amount of flooding Learners will observe that the curving river path slows down the speed and the intensity of the water flow and reduces the amount of flooding. Learners can also add more bends to the curvature to test their assumption
	15 minutes	ii) Deforestation of mangroves and wetlands Learners will place some small strips of kitchen sponge (or any other absorbent materials including cotton if unavailable) beside the river path to represent a mangrove or wetland. Pour water along the river and observe how the mangrove

		trees and wetland grasses and vegetation act like sponges and reduce our vulnerability to flooding. Background: Mangroves grow on the edge of warm ocean coasts and their spongy roots soak the water. Similarly, wetland marshes surround rivers and their vegetation soak up water. Mangroves and wetlands can also spread out water over large sections of land, and slow the dangerous flow of water. This plays an important role in protecting the nearby communities. Due to deforestation and urbanization, these important natural features are no longer available to play their important role.
	15 minutes	iii) Reduction of natural vegetation causing landslides Learners can observe how plants can prevent soil erosion by pouring some water on any incline or slope outdoors with soil or dirt. Learners can then try the experiment on a slope with some grass or shrubs. Learners can observe how the grass roots hold the soil in place and keep it from washing away and draw conclusions. Alternatively, learners can try the same experiment using a tray held at an incline first with the soil without grass and then with grass.
	15 minutes	iv) Reduction of natural drainage basins Learners will create a small pit or hole close to the river path and once again pour water into the model. Learners can observe how the water will drain into the basin created and reduce the intensity of flooding. As our human need for land and space increases, we have decreased the number of natural drainage basins increasing the chances of floods
	10 minutes	Learners will complete their notes from the different experiments to understand the human causes for floods
2	5 minutes	Learners will explore and measure the intensity of natural hazards including categorizing these as: - Minor risk: A relatively small possibility of harm. - Moderate risk: A possibility of harm that is neither small nor great, but in between. - Major risk: A serious and significant possibility of harm.

	15 minutes 15 minutes 5 minutes	Learners will understand how hazards are measured and build scientific instruments to measure hazards. Learners will read and record measurements, analyze measurements and understand how these instruments can provide early warning to reduce impacts of disasters Flooding is often caused by strong winds, heavy rains and high tides because of tropical storms called cyclones and hurricanes. Learners will design 2 instruments to measure the impact: i) Measuring flood depth: Learners will learn how scientists record and monitor floods be observing how rain affects the depth and breadth of local streams. Learners can record and mark the water level during the dry (non-flooded) season and then again during rainy season. For example, the recording in the rainy season is 5 fingers or 10 cms above the level during the dry season. If students are unable to go visit a local stream or river, they can use the model made in the first day and mark the levels during the dry and again during the rainy season ii) Rain gauge to measure the amount of rainfall. Learners will mark a large, thin, straight-sided, empty plastic container using a ruler or alternatively using their horizontally placed finger as one unit – they will use a tape or a pen to mark the outside of the container. This gauge will be placed outside in an open area where it is not tampered with (or on some elevated surface) when it begins raining. As the rain fills the gauge, the students can measure this after each rainfall. Learners should make a permanent measuring post that can also withstand winds, make a stable base to hold the container above the ground. Learners will use these instruments to predict the weather changes and also contribute to understanding how scientists are able to measure changes and keep track of changes to put out warnings.
3	20 minutes	Learners will gather research on the impact and result of floods on humans – they will do this through interviewing family members and reflecting on any of their own experiences of the worst flood in their living memory Learners will design a questionnaire to capture the different types of impacts of flooding including: - Emotional: How can we prepare ourselves emotionally for a disaster? Prompts: How do people feel when disasters happens? How do people get through a disaster? - Infrastructure: What happened your home and what was permanently or temporarily damaged? Prompts: What happened to homes and belongings? What could be salvaged and how?

		- Health and Life: Were people affected and how? Prompts: Was there any loss of life? What were the common injuries or illnesses and how did these happen? - Basic Needs: Were there disturbances to all the basic needs? Prompts: Was the clean water supply disrupted? What happened to the connectivity through phone, internet, TV or radio? How quickly were you able to access healthcare and schools? What was the access to food supplies and ration?
	20 minutes	Learners will ask family or community members who have experienced the devastating floods and collect all their responses
	20 minutes	Learners will capture all these results and impacts in a report of the floods that includes a section compiling strategies on how families' best dealt with the disaster and draw an image of the same
4		Learners will prepare themselves and their communities for floods
	20 minutes	Learners will begin by designing an emergency protocol for their families, by brainstorming how a flood would typically play out Some prompt questions can be answered based on the initial model that include: - If there is a flood, what would be safest part of your home? (answer: a higher floor or roof) - If your home has no higher floor or access to the roof, where in the community would they gather? (an elevated area in the community) - How would you reach these safe higher grounds? - What are the most dangerous areas in the community? E.g. proximity to the water bodies etc.? - What at the emergency phone numbers required?
	10 minutes	Optional: Learners can answer the questions in the worksheet in the appendix
	20 minutes	Learners will design a survival kit Learners will begin choosing all the essential items that are needed to stay alive and healthy and make a list. Learners will mark whether these items are: i) essential, ii) durable / long lasting, iii) can be easily carried and iv) water-proof including: - Food (esp. long lasting non-salty high energy food and / or canned food) - Water - Medicine and / or first aid kit - Clothing and blankets - Flashlight - Radio - Batteries - ID card and papers

	10 minutes	- Cash or credit cards - Toiletries (soap) - Whistle or colored flag to attract attention Learners can make the colored flags and a help poster to attract attention from the ground Learners can also put all of these items together in a survival kit
5	40 minutes 20 minutes	In the final day of the project, learners will pretend to be weather forecasters prepare a script and narrate it Learners will first have to put together a script as a warning issued by their National Weather Service. The warning has to alert people when bad weather might happen In their news report, learners need to cover: - Where is the flood happening and why? - Where is there the most danger? - What severe is the intensity of the flood and how is being measured? - What might be the consequences? - How can you prepare for it? Learners will present this weather warning report to all their family members
Assessment Criteria:		- Understanding of the causes of human action on flooding - Analysis of the measurements recorded by the scientific instruments to predict weather conditions - Details of the report with holistic understanding of the impact of flooding - Practicality of the emergency protocol - Demonstrated understanding in the final weather watch report

Learning outcomes:	- Exploring impact of human action on creating natural disasters - Understanding how hazards are measured to provide early warning to reduce impacts of disasters - Identify consequences of the flooding - Protective and emergency measures to protect from the consequences of flooding
Required previous learning:	None
Inspiration:	FEMA Resources USAID Resources
Additional enrichment activities:	- Learners can design their own personal flotation devices if floods are a reality in their context - Learners will design their own makeshift personal flotation device (PFDs) from clothing, thick plastic bags, plastic bottles and ropes. - Learners need to first use a plastic backpack, or make a life-jacket (sleeveless t-shirt that they can wear) from an existing one

	at home or cut it out using any thick plastic bag. They will create "pockets" within this life jacket using thick thread or rope. They will then tie multiple empty plastic bottles (with their caps on) upside down together and secure it in the pockets of the lifejacket with the rope. - Try floating this life jacket in water to observe the concept of density in action. Since the life-jacket is filled with light material i.e. the plastic bottles it can displace a lot of water compared to its light weight and therefore can float
Modifications to simplify the project tasks if need be	Learners can reduce the number of models and the instruments being used for measurements

APPENDIX

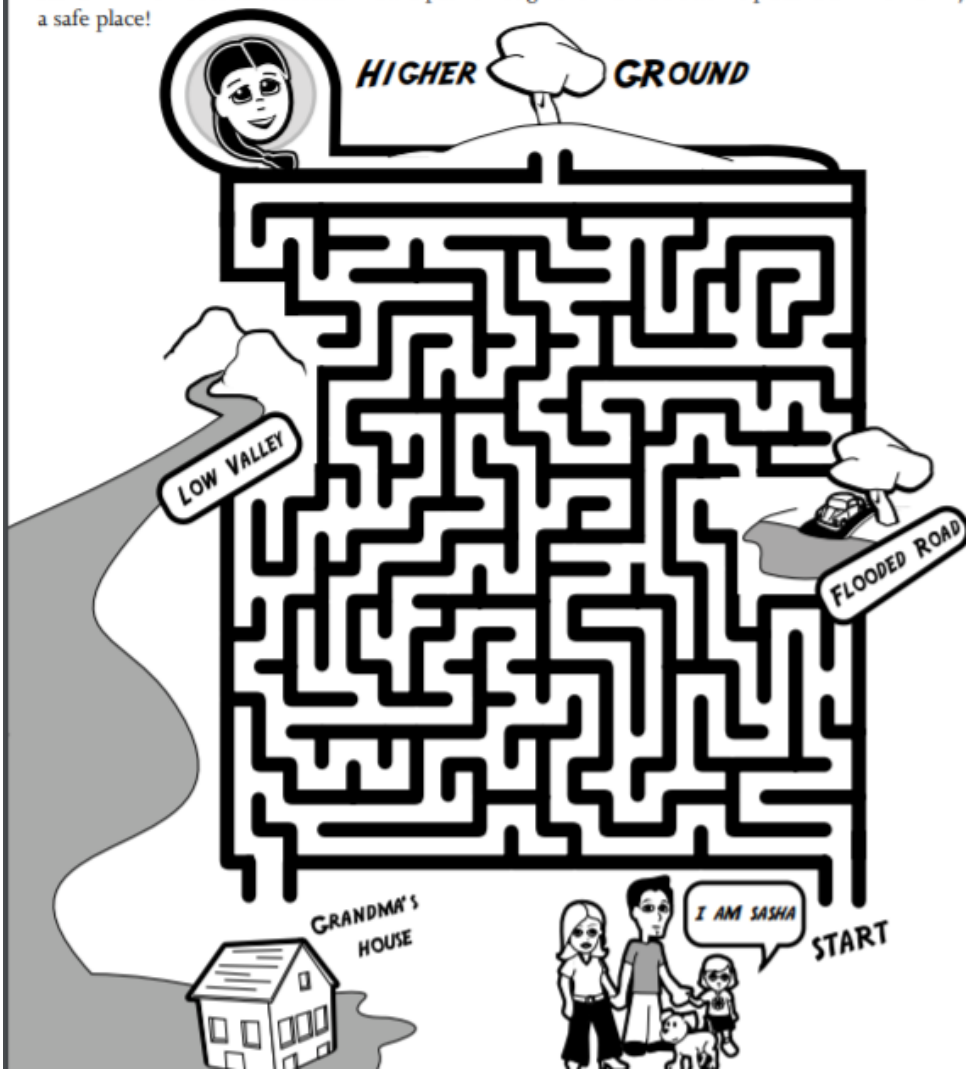
1. How many people are in your family? _____
2. Water: You need a 3-day supply. Each person needs 1 gallon per day. How many gallons will your family need? _____
3. Food: You need a 3-day supply of canned foods. List some foods you might put in your supplies kit: _____
   _____
4. 4. Medicine and Supplies for your First Aid kit:
   _____
   _____
5. How will you listen to the news for weather updates and official instructions?
   _____
6. If the power goes out, what will you use to see in the dark?
   _____
7. What will you need to open cans of food?
   _____

EAA welcomes feedback on its projects in order to improve, please use this link:
https://forms.gle/LGAP9k17fMyJrKJN7

WATER, WATER EVERYWHE

Hi everyone, my name is Rising Waters. We all know that "April showers bring May flowers," bu showers that turn into heavy rains can also cause floods. I'm here to remind you that during a flo you and your family can get to higher ground to stay safe.

My friend Sasha needs your help! Last week, there was a lot of rain where she lives. Now the river in her town is rising fast. The river is spilling over its banks. There is flooding near her hom Sasha find her route to evacuate. Draw a path through the maze below. Help Sasha and her family a safe place!



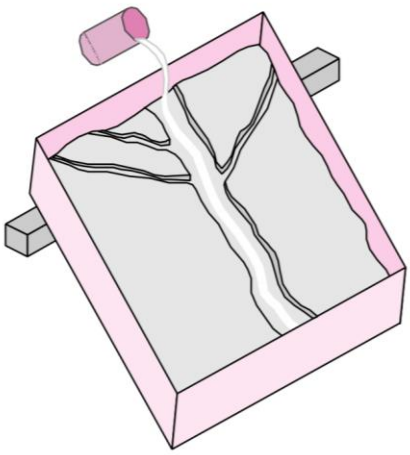
EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

Ages 11 to 14 (Level 3)

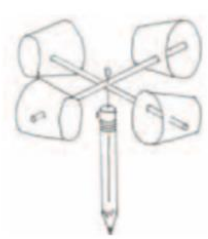
Description:	Learners will explore some of the most frequent natural disasters by beginning to understand their causes and far-reaching effects. They will research the effect of the natural disaster on plants, animals and people, and design an emergency response kit including safety guides and disaster kits
Leading question:	Can you manage a flood in your community?
Age group:	11 – 14 years
Subjects:	Geography (Social Sciences) and Literacy
Total time required:	5 hours over 5 days
Self-guided / Supervised activity:	Medium
Resources required:	- 1 large flat container or tray with sides (a deep tray), soil or modelling clay, sponge, little rocks, - 4 paper cups, straws/chopsticks, a pin, rubber band and a pencil - Empty plastic container and marker - Rubber from a broken balloon or a piece of plastic wrap over the top of a glass jar or metal can - Plastic bottles, rope, thread and large plastic bag

Day	Time	Activity and Description
1		Learners will be introduced to the most frequently occurring natural disasters globally: floods and begin to understand some of the reasons they occur. We will explore floods that are a weather force created natural disasters A flood is an overflow of water that submerges land that is usually dry.
	5 minutes	Learners can brainstorm and make a list of the causes of flood that they know. Encourage learners to think of reasons beside excessive rain that would result in more than normal water by thinking of other water sources – these would include overflowing rivers, broken dams, storm surges and cyclones and melting ice / snow etc. Learners will make models to explore the impact of human activity on creating floods. They will first explore the impact of placing human settlements close to river bodies, straightening river paths and deforestation. Learners should record the outcome of each experiment with drawings and notes on the implications of the floods and draw conclusions.
	15 minutes	Flood Model Set Up:

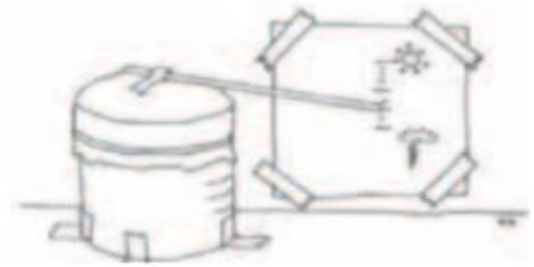
EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

		Learners will take any large flat container or tray with sides. Place sufficient modelling clay or soil at the bottom of the pan. Carve a river path for water in the container in the clay/soil. They will place little stones, wood cubes, or toy houses alongside the river to define the path and also define the settlements.  Learners can pour water into the model in the river and observe the water staying within the river path. They can then add a rainstorm by increasing the volume and flow of the water. Learners can observe what will happen to the neighboring areas. Learners can place the homes in different parts of the model and test the impact depending on the location and proximity to the river and write these down. Usually the settlements close to the river will get submerged first and there will also be more of an impact on the more downstream settlements Learners will then begin to explore the multiple human factors causing floods including:
	10 minutes	i) Straightening river channels and paths Learners should try keeping a straightened river path as shown above and testing the speed of the water flow and the amount of flooding Learners should then attempt to create a meandering or zig-zag / curved river path and test the speed of water flow and the amount of flooding Learners will observe that the curving river path slows down the speed and the intensity of the water flow and reduces the amount of flooding. Learners can also add more bends to the curvature to test their assumption
	10 minutes	ii) Deforestation of mangroves and wetlands

	10 minutes 10 minutes	Learners will place some small strips of kitchen sponge (or any other absorbent materials including cotton if unavailable) beside the river path to represent a mangrove or wetland. Pour water along the river and observe how the mangrove trees and wetland grasses and vegetation act like sponges and reduce our vulnerability to flooding. Background: Mangroves grow on the edge of warm ocean coasts and their spongy roots soak the water. Similarly, wetland marshes surround rivers and their vegetation soak up water. Mangroves and wetlands can also spread out water over large sections of land, and slow the dangerous flow of water. This plays an important role in protecting the nearby communities. Due to deforestation and urbanization, these important natural features are no longer available to play their important role. iii) Reduction of natural vegetation causing landslides Learners can observe how plants can prevent soil erosion by pouring some water on an any incline or slope outdoors with soil or dirt. Learners can then try the experiment on a slope with some grass or shrubs. Learners can observe how the grass roots hold the soil in place and keep it from washing away and draw conclusions. Alternatively, learners can try the same experiment using a tray held at an incline first with the soil without grass and then with. iv) Reduction of natural drainage basins Learners will create a small pit or hole close to the river path and once again pour water into the model. Learners can observe how the water will drain into the basin created and reduce the intensity of flooding. As our human need for land and space increases, we have decreased the number of natural drainage basins increasing the chances of floods Learners will complete their notes from the different experiments to understand the human causes for floods
2		Learners will explore and measure the intensity of natural hazards including categorizing these as: - Minor risk: A relatively small possibility of harm. - Moderate risk: A possibility of harm that is neither small nor great, but in between. - Major risk: A serious and significant possibility of harm.

	15 minutes 15 minutes 15 minutes	Learners will understand how the risk of hazards are measured and build scientific instruments to measure hazards. Learners will read and record measurements, analyze measurements and understand how these instruments can provide early warning to reduce impacts of disasters Flooding is often caused by strong winds, heavy rains and high-tides because of tropical storms called cyclones and hurricanes. Learners will design 4 instruments to measure the impact i) An Anemometer rotates as the same speed as the wind to measure wind speed. Learners will use 4 paper cups, straws/chopsticks, a pin and a pencil. Learners will use straws/ chopsticks that are inserted horizontally into paper cups piercing both sides. Each chopstick or straw will have a cup on either side. These two sticks will be inserted with a pin to form an X shape. The pin will be tied to the pencil with a rubber-band. Wind-speed can be recorded based on counting the revolutions of the anemometer for one minute. Wind speed is usually measured in knots, but in this case we will be observing how many times the anemometer rotates in 30 seconds to test how fast the wind speed is. Learners will try this at different times in the day or across a few days to test the speed.  ii) Measuring flood depth: Learners will learn how scientists record and monitor floods be observing how rain affects the depth and breadth of local streams. Learners can both record and mark the water level during the dry (non-flooded) season and then again during rainy season. For example, the recording in the rainy season is 5 fingers or 10 cms above the level during the dry season. If students are unable to go visit a local stream or river, they can use the model made in the first day and mark the levels during the dry and again during the rainy season iii) Rain gauge to measure the amount of rainfall. Learners will mark a large, thin, straight-sided, empty plastic container using a ruler or alternatively using their horizontally placed finger as one unit – they will use a tape or a pen to mark the outside of the container. This gauge will be placed outside in an open area where it is not tampered with (or on some elevated surface) when it begins raining. As the rain fills the gauge, the students can measure this after each rainfall.

		Learners should make a permanent measuring post that can also withstand winds, make a stable base to hold the container above the ground.
	15 minutes	i) Barometer to measure atmospheric pressure (Atmospheric pressure is the force pushing against objects from the weight of the air above it) and is used to measure storms or cyclones. If there is low or rapidly falling pressure, this will contribute to the formation of clouds and suggest a storm or cyclone approaching. Learners can make a barometer by stretching the rubber from a broken balloon or a piece of plastic wrap over the top of a glass jar or metal can. Tape the bottom of the glass jar/metal can to secure it on the surface on which it is placed. Tightly secure the balloon rubber with a rubber band. Tape a straw horizontally at the center of the balloon so that at least half of the straw hangs out over the edge of the jar. Place the jar against a wall with the straw parallel to the wall and tape a piece of paper to the wall. Make a mark on the card to show the current air pressure. As the barometric pressure rises or falls, the balloon will expand and contract. Higher pressure will make the balloon sink down, causing the straw to go up; lower pressure will make the balloon expand and cause the end of the straw to go down.
	10 minutes	Learners will observe the movement of the barometer over several weather changes to determine the high, low, and midpoint of the barometer's movement. Learners can then monitor and record their barometer several times a day along with changes in weather



Initial position of barometer stick	Barometer Stick Movement		
	Rising or steady	Slowly falling	Rapidly falling
↗	Fair weather	Fair weather	Cloudy, warmer
→	Continuation of present weather	Continuation of present weather	Precipitation likely
↘	Clearing, and cooler	Precipitation	Storm coming

		In times of low pressure – warm and high speed winds usually rush in to fill in the gaps – and so it is really important to be able to predict cyclones / hurricanes based on changes of atmospheric pressure Learners will use these instruments to predict the weather changes and also contribute to understanding how scientists are able to measure changes and keep track of changes to put out warnings
3	 20 minutes 20 minutes 20 minutes	Learners will gather research on the impact and result of floods on humans, trees and animals – they will do this through interviewing family members and reflecting on any of their own experiences of the worst flood in their living memory Learners will design a questionnaire to capture the different types of impacts of flooding including: - Emotional: How can we prepare ourselves emotionally for a disaster? Prompts: How do people feel when disasters happens? How do people get through a disaster? What does it take to make yourself feel the way you felt before the disaster? - Infrastructure: What happened to all the physical and electrical infrastructure and what was permanently or temporarily damaged? Prompts: What happened to electrical appliances? What happened to homes and belongings? What could be salvaged and how? - Health and Life: Were people affected and how? Prompts: Was there any loss of life, and how? What were the common injuries and how did these happen? What were the longer-term diseases or illnesses that were a result of the flooding? How were these treated? - Economic: What was the impact on life-style? Prompts: What jobs and livelihood was lost? What happened to accumulated asset and wealth? - Basic Needs: Were there disturbances to all the basic needs? Prompts: Was the clean water supple disrupted? What happened to the connectivity through phone, internet, TV or radio? How quickly were you able to access healthcare and schools? What was the access to food supplies and ration? - Plants and Animals: What was the impact on wildlife, pets, cattle and vegetation? Prompts: How were they impacted? What could be done to save them? Learners will ask family or community members who have experienced the devastating floods and collect all their responses Learners will capture all these results and impacts in a report of the floods that includes a section compiling strategies on how families best dealt with the disaster
4	 20 minutes	Learners will prepare themselves and their communities for floods Learners will begin by designing an emergency protocol for their families, by brainstorming how a flood would typically play out

EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

		Some prompt questions can be answered based on the initial model that include: - If there is a flood, what would be safest part of your home? (answer: a higher floor or roof) - If your home has no higher floor or access to the roof, where in the community would they gather? (an elevated area in the community) - What would happen to plugged in electrical appliances when wet? - What the emergency escape routes to reach these safe higher grounds? - What are the most dangerous areas in the community? E.g. proximity to the water bodies etc.? - What at the emergency phone numbers required?
	20 minutes	Learners will set up safety protocol for everyone if they are caught during the flood by designing their own makeshift personal flotation device (PFDs) from clothing, thick plastic bags, plastic bottles and ropes. Learners need to first use a plastic backpack, or make a life-jacket (sleeveless t-shirt that they can wear) from an existing one at home or cut it out using any thick plastic bag. They will create "pockets" within this life jacket using thick thread or rope. They will then tie multiple empty plastic bottles (with their caps on) upside down together and secure it in the pockets of the lifejacket with the rope.  Try floating this life jacket in water to observe the concept of density in action. Since the life-jacket is filled with light material i.e. the plastic bottles it can displace a lot of water compared to its light weight and therefore can float
	20 minutes	Finally, learners will design a survival kit Learners will begin choosing all the essential items that are needed to stay alive and healthy and make a list. Learners will mark whether these items are: i) essential, ii) durable / long lasting, iii) can be easily carried and iv) water-proof including: - Food (esp. long lasting non-salty high energy food and / or canned food) - Water

		- Medicine and / or first aid kit - Clothing and blankets - Flashlight - Radio - Batteries - ID card and papers - Cash or credit cards - Toiletries (soap) - Whistle or colored flag to attract attention Learners can also put all of these items together in a survival kit. In places of frequent flooding, it is important to keep the survival kit ready so that you can evacuate immediately to elevated ground.
5	40 minutes 20 minutes	In the final day of the project, learners will pretend to be weather forecasters prepare a script and narrate it Learners will first have to put together a script as a warning issued by their National Weather Service. The warning has to alert people when bad weather might happen In their news report, learners need to cover: - Where is the flood happening? - Which communities and settlements are most susceptible to damage? - What is the cause of this flood? - What is the intensity of the flood? What instrument is it being used and how is it being measured? - What might be the consequences? - How can you prepare for it? Learners will present this weather warning report to all their family members
Assessment Criteria:		- Understanding of the causes of human action and natural factors on flooding - Analysis of the measurements recorded by the scientific instruments to predict weather conditions - Details of the report with holistic understanding of the impact of flooding - Creativity in designing the personal flotation device and measurement instruments - Practicality of the emergency protocol - Demonstrated understanding in the final weather watch report

Learning outcomes:	- Exploring impact of human action on creating natural disasters - Understanding how hazards are measured to provide early warning to reduce impacts of disasters - Identify consequences of the flooding - Protective and emergency measures to protect from the consequences of flooding
Required previous learning:	None
Inspiration:	FEMA Resources

	USAID Resources
Additional enrichment activities:	
Modifications to simplify the project tasks if need be	Learners can ignore the activities for the second day of the project involving designing instruments for measurement

EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7

APPENDIX

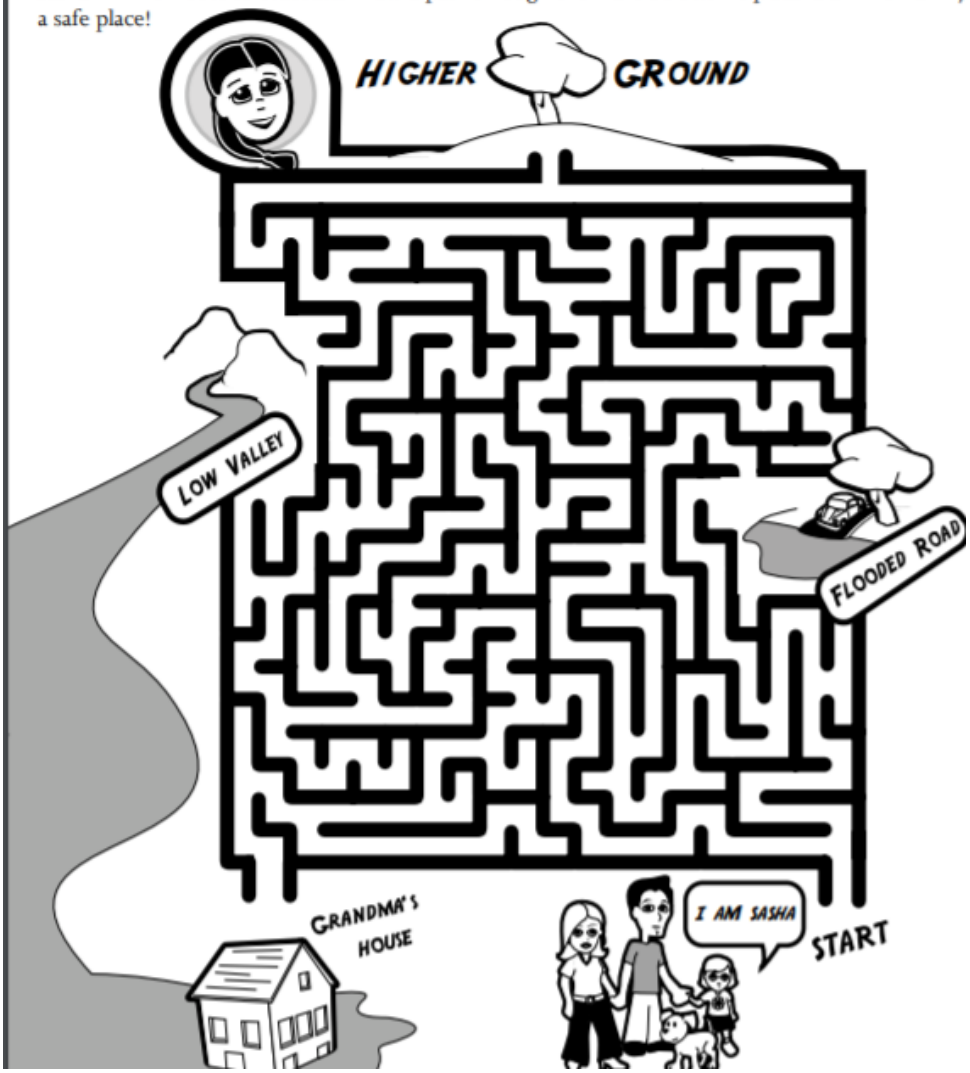
1. How many people are in your family? _____
2. Water: You need a 3-day supply. Each person needs 1 gallon per day. How many gallons will your family need? _____
3. Food: You need a 3-day supply of canned foods. List some foods you might put in your supplies kit: _____
   _____
4. 4. Medicine and Supplies for your First Aid kit:
   _____
   _____
5. How will you listen to the news for weather updates and official instructions?
   _____
6. If the power goes out, what will you use to see in the dark?
   _____
7. What will you need to open cans of food?
   _____

EAA welcomes feedback on its projects in order to improve, please use this link:
https://forms.gle/LGAP9k17fMyJrKJN7

WATER, WATER EVERYWHE

Hi everyone, my name is Rising Waters. We all know that "April showers bring May flowers," bu showers that turn into heavy rains can also cause floods. I'm here to remind you that during a flo you and your family can get to higher ground to stay safe.

My friend Sasha needs your help! Last week, there was a lot of rain where she lives. Now the river in her town is rising fast. The river is spilling over its banks. There is flooding near her hom Sasha find her route to evacuate. Draw a path through the maze below. Help Sasha and her family a safe place!



EAA welcomes feedback on its projects in order to improve, please use this link: https://forms.gle/LGAP9k17fMyJrKJN7