



Environmental Education Curriculum

August 2021

MIGRANT CLINICIANS NETWORK



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1. CONTEXT

A force for health justice

Somos una fuerza dedicada
a la justicia en salud

1.1. Migrant Clinicians Network

Migrant Clinicians Network (MCN) is a force for health justice, creating practical solutions at the intersection of vulnerability, migration, and health. We develop clinical programs and resources for patients; we provide mobile case management, technical assistance, and continuing education for doctors, community health centers and other institutions. Our goal is to improve the quality of health care and to reduce disparities for immigrants and other vulnerable, underserved populations. MCN has a long history of partnering with Puerto Rico's community health centers and regional and community organizations to address environmental health, workplace health and safety, infectious diseases, emergency preparedness, and vaccines. Our office in Puerto Rico focuses on health and equity with an emphasis on tackling the impacts of climate change, using a community mobilization approach.

1.2. Community Mobilization

Community mobilization uses a participatory, cross-sectoral, and community-based approach to address social, environmental, and health issues, empowering individuals and groups to take action to bring about change, including policy change. This model has been utilized by the Centers for Disease Control (CDC) and the

World Health Organization (WHO) to successfully address specific diseases or health issues in communities in the United States and abroad.

Dr. Marysel Pagán Santana, Senior Program Manager for MCN Puerto Rico, posits that there are a variety of components to community mobilization that are adapted to meet the needs of a community in the context of emergency preparedness; this helps ensure a more equitable disaster response process. Components like community-led management, resource identification and mapping, SWOT analysis, among other components, promote community empowerment while structuring a response that is sensitive to the community's competencies and cultural dynamics. In a similar way, the model identifies systemic barriers to emergency preparedness and response with the goal of minimizing their impact in this context. The community mobilization model promotes the idea that local communities should have a role in the development of plans to manage emergencies, while government agencies and other institutions should provide support to address the barriers or concerns identified by the community. [Read the entire article: "Community Mobilization as a Model for Preparedness with Equity" (<https://www.migrantclinician.org/community-mobilization-as-a-model-for-preparedness-with-equity>)].

1.3. Environmental Education Curriculum

The primary goals of this project to be achieved through this curriculum are: 1)

Increasing the capacity of students and community to think critically about environmental problems and the related decisions that affect human health and the environment as it relates to disaster preparation and response; 2) Increase community participation and collaboration with the goal of improving protections for human health and the environment as it relates to disaster preparation and response; and 3) ensure chemical safety and safe water as it relates to disaster preparation and response.

In this environmental education project, we will emphasize community mobilization as a means to address emergency management, safe water, and chemical safety post-disaster.

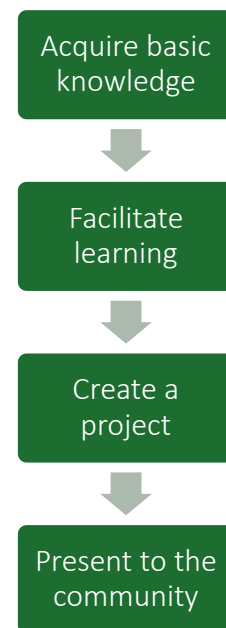
2. INTRODUCTION

2.1. Environmental Education in Schools

Communities from different parts of the world have taught us that having the necessary knowledge, skills, and attitudes to be prepared for disasters, confronting them and recovering after they occur can be the difference between life and death. As educators, few things are more gratifying than working with students so they can be safe when a disaster happens unexpectedly and make sure that the community members they work with are better prepared as well. By providing students with necessary knowledge, skills, and attitudes in terms of environmental education and disasters, they can save lives. In light of the increasing frequency of disasters and the fact that children are especially vulnerable, their decision to study issues of environmental education with a focus on safe water and chemical safety post-disaster is an important way to participate.

As an educator trained for disaster situations and resilience, you can have a decisive influence in the lives of your students. Taking on this role will be beneficial for your teaching activities and even for your own family. You do not have to be an expert to teach your students about these topics; you just have to be willing to get trained and to familiarize yourself with some of the basic concepts and facts. If you acquire this basic knowledge, you will be ready to give these trainings and to create an environmental health project to impact the community (See Graphic 1).

Once you become a facilitator, you can allow your students to facilitate many of the suggested activities or activities that you yourself create. The use of different pedagogical methods makes the lessons more fun and interesting for all participants. Environmental education lends itself to collaboration with other colleagues and to their adaptation as complementary or extracurricular activities in which parents or other community members can participate. All of these lessons will allow you to learn much more about emergency response, which will lead to an increase in safety for you and your family in the face of disasters.



Graphic 1: Implementation of the Environmental Education Curriculum

2.2. Applicable Education Standards

We want to ensure the applicability of this environmental education curriculum within the standards laid out by the Department of Education in Puerto Rico. Below we highlight some of the standards whose objectives are compatible with this curriculum:

Table 1. Educational standards by school grade, subject, and topic.

Grade	Expectation Indicator	Standard
6th grade	SCIENCES Conservation and Change	
	6.T.CT3.CC.1	Design a conservation plan for the biosphere, geosphere, and atmosphere, specifically focused on Puerto Rico.
	6.T.CT3.CC.2	Utilize knowledge about Earth systems to predict and plan what to do in the face of the effects of natural phenomena.
7th grade	BIOLOGICAL SCIENCES Engineering Design	
	El.B.IT1.IT.1	Define the specifications and limitations of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the environment, which might limit possible solutions.
	El.B.IT1.IT.2	Develop a model to generate data by performing interactive tests and modifications to an object, tool, or process, in order to document and obtain the optimal design.
	El.B.IT1.IT.3	Analyze the test data to determine the similarities and differences between various design solutions, and identify the best characteristics of each, and combine them into a new solution that better meets the criteria for their success.
	El.B.IT1.IT.5	Learn the fundamental concepts inherent in the creation of a research proposal. The emphasis is on an awareness of the scientific method and the bases for development of a research proposal. Emphasis should be placed on identification of research problems, identification of variables, development of hypotheses, tools for measurement, strategies to collect and interpret the data, and aspects of ethics and safety.
8th grade	PHYSICAL SCIENCES Structure and Levels of Organization of Subject Matter	
	El.F.CF1.EM.6	Design and conduct an experiment to show the difference between a compound and a mixture based on the methods (chemical or physical) used to separate them (mixtures) or break them down (compounds). Highlight the fact that a mixture is separated by physical methods (filtration, chromatography, decantation, crystallization, distillation, among others), while a compound is broken down by chemical methods (heating, electrolysis, photolysis).
	El.F.CF1.EM.7	Collect evidence to show the difference between a diluted, saturated, and supersaturated solution, explain their properties, and provide examples and uses of each of these types of solutions in everyday life.
	El.F.CF1.EM.8	Analyze the general properties of acids and bases (alkaline substances) and apply them in the qualitative determination of the pH of different materials (mixtures and substances) as a means of classifying them as acidic or alkaline, as well as providing examples of their uses and applications in science and everyday life. Examples can be the use of antacids to control the pH of gastric juice, the pH of swimming pools, acid rain, hygiene and cleaning products.
	El.F.CF1.EM.9	Collect evidence from a variety of sources to construct an explanation of the risks and dangers of chemicals in everyday life. Examples of hazards can include flammability, corrosivity, and radioactivity.

Grade	Expectation Indicator	Standard
9th grade	EARTH AND SPACE SCIENCES Interactions and Energy	
	EI.T.CT1.IE.4	Describe the causes of earthquakes and volcanoes on the earth's crust, as well as how these phenomena function. Highlight their relationship to tectonic plates and on the work carried out by the Puerto Rico Seismic Network.
	EI.T.CT3.IE.1	Analyze and interpret data on natural hazards to forecast catastrophic events and makes an oral and written report on the development of technologies to mitigate their effects.
10-12th grade	ENVIRONMENTAL SCIENCES	
	Structure and Levels of Organization of Subject Matter	
	ES.A.CT2.EM.2	Explain the importance of water for organisms and the need to protect this resource.
	ES.A.CT2.IE.5	Examine why earthquakes occur and how their intensity is measured.
	Interactions and Energy	
	ES.A.CT3.IE.7	Describe patterns of change and the action steps that would protect them in case of natural phenomena, such as earthquakes and hurricanes, according to the different geographic zones of Puerto Rico. Examples of natural phenomena could include hurricanes, earthquakes, tidal waves, and storms.
	ES.A.CT3.IE.8	Identify the effects of hurricanes according to the geological zones of Puerto Rico.
	Conservation and Change	
	ES.A.CT3.CC.1	Using scientific evidence, describe how the availability of natural resources, past natural disasters, and climatic changes have influenced human activities. Examples of key natural resources include access to clean water (such as rivers, lakes, and groundwater), regions of fertile land such as deltas, high concentrations of minerals, and fossil fuels. Examples of natural disasters can be internal processes (such as volcanic eruptions or earthquakes), surface processes (such as tsunamis, mass erosion, and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of climate change that can affect populations or lead to mass migrations include changes in sea level, regional patterns of temperature and precipitation, and the types of crops that can be grown.
	ES.A.CT3.CC.8	Propose solutions that take into account the scientific and economic development of Puerto Rico in relation with the well-being of the natural environment. Examples could include pollution caused by solid waste, biomedical waste, air and water pollution, and conservation of non-renewable resources.
	ES.A.CT3.CC.10	Analyze the patterns of change that occur in nature, and discuss effective ways to use knowledge of science and the scientific method to lessen the effects of those changes. Examples of the patterns might include data on air pollution, atmospheric phenomena, and changes in the populations of various species.
	Engineering Design	
	ES.A.IT1.IT.3	Propose effective ways to raise awareness and promote possible solutions to environmental problems such as air pollution, soil water, waste management, protection of species and resources, as well as sustainable development.
	ES.A.IT1.IT.6	Analyze situations and make individual and group decisions regarding environmental problems.

Grade	Expectation Indicator	Standard
	BIOLOGY	
	Conservation and Change	
	ES.B.CB2.CC.1	Identify environmental factors and then develop arguments about their negative and positive effects on population growth.
	ES.B.CB2.CC.5	Evaluate scientific evidence of group behavior of individuals and opportunities to survive and reproduce. Highlight: (1) distinguishing between group and individual behavior, (2) identifying evidence that describes the results of group behavior, and (3) developing logical and reasonable evidence-based arguments. Examples of group behavior could include crowds, herds, and cooperative behaviors such as hunting, migrating, and swarming.
	CHEMISTRY	
	Structure and Levels of Organization of Subject Matter	
	ES.Q.CF1.EM.21	Describe the classification system of matter based on its characteristic properties (homogeneous and heterogeneous materials, substances, mixtures, solutions, etc.) and apply that system to explain matter's behaviors.
	ES.Q.CF1.EM.22	Design and implement a procedure that applies the appropriate methods to separate mixtures and identify the substances present in them, considering their properties. Provide examples of the utility and applications of these processes in the real world (filtration, chromatography, etc).
	ES.Q.CF1.EM.23	Analyze the properties of solutions based on the properties of their components. Examples include solute and solvent, types of solutions (liquid-solid, liquid-gas, etc.), concentration of solutions (dilute, saturated, and supersaturated), factors affecting solubility, solubility curves, colligative properties, solvation process, and forces between solute and solvent.

2.3. Dimensions of Environmental Education Focusing on Disasters



1. Understanding of basic scientific principles and mechanisms of disasters

- Why, how, where, how often, and with what intensity do disasters occur.
- Physical effects.
- Trends and patterns that characterize disasters.



2. Emergency preparedness: Learning and practicing safety measures and procedures.

- Early warning signs.
- Emergency response.
- Exercises and drills.
- Basic notions of immediate response and necessary resources.
- Emergency plan.



3. Understanding of factors that promote risk and the conversion of threats into disasters.

- Environmental conservation: Long-term disaster mitigation mechanism.



4. Strengthening community capacity for disaster risk reduction.

- Promote community resilience through initiatives and projects (community experience in disasters, identification of vulnerabilities / hazards in the community, risk map, action plan).
- Promote participatory citizenship.



5. Creation of school practices of safety and resilience.

- Conversion of the school community into an organization invested in learning about disaster risk reduction and environmental conservation with the goal of implementing practices to build a culture of safety and resilience.

2.4. Cross-disciplinary Concepts for Environmental Education

Disasters can have impacts that are localized or generalized, predictable or unpredictable, with minimal to extensive damage. Depending on the severity of the incident, they can have a long-term impact on the infrastructure (roads, bridges, and utilities). Hazards can arise from natural forces (thunderstorms, floods, hurricanes, landslides, earthquakes, tsunami) or technological hazards that are man-made (include hazardous materials emissions and spills, acts of terrorism, and nuclear accidents).

Our social and economic activities impact the environment and can change the way its components interact with each other. These changes can result in environmental degradation and contribute to an increase in the frequency and intensity of natural disasters and the vulnerability of the environment to them. One of the purposes of environmental protection is to minimize, or at least manage, the negative impacts that we, human beings, make on the environment. Leaders and communities can and do contribute to disaster risk and consequence reduction by effectively utilizing environmental protection measures and better coordinating preparedness, response and mitigation activities.

Emergency preparedness is one of the phases of emergency management, and it includes planning, training, and educational activities for events that cannot be mitigated. It includes developing disaster preparedness plans on what to do, where to go, or who to call for help in the event of a disaster, executing plans through drills, creating a list of supplies and items that are useful in a disaster, and identifying possible vulnerabilities.

Mitigation, as a phase of emergency management, includes actions taken to prevent or reduce the cause, impact and consequences of disasters. Examples of mitigation related to environmental protection include: planting vegetation to absorb water and prevent flooding, planting mangroves to stop coastal erosion, among other approaches. Examples of other strategies focused on emergency preparedness are: securing and modifying properties to withstand disasters, digging water channels to redirect water, construction of dikes or permanent barriers to control flooding, among other tactics.

As we will see later, risk is defined by the hazards to which we are exposed, our vulnerability and our ability to minimize these hazards and our vulnerability. Risk management, related to emergency preparedness, includes strategies at a systemic and social level such as building codes, waste management and environmental impact statements, which increase the disaster management capacity of a nation or community.

Vulnerability—or the situation in which people, communities or property are at risk of being affected by a hazard—can be reduced through the implementation of environmental protection and emergency preparedness strategies. **Reducing vulnerabilities** requires community organization and an

analysis of its population to understand its specific needs and decrease the degree to which they are affected during an emergency or disaster.

Environmental education is located at the intersection of basic scientific principles of disasters, environmental protection and emergency preparedness, as well as mitigation, risk management and vulnerability reduction. It is through environmentally-focused educational interventions that we are able to bring together these principles and strategies and contribute to building awareness for the benefit of the community and its residents, saving human lives, natural resources and social structures necessary to live.



Graphic 2: Environmental education at the intersection of disasters, emergency preparedness, and environmental protection.

3. DISASTERS AND EMERGENCIES

3.1. Lesson

We are part of nature and, like human beings, nature is constantly evolving. This evolution manifests itself in different ways in things we see every day, like the wind, rain and the movement of clouds. Or it can be seen in things that occur less frequently, such as earthquakes, tsunamis, volcanic eruptions, cyclones, or floods. In some parts of the world these phenomena occur on a regular basis and in others they are extremely rare. Each place in the world faces particular hazards, that is, it has the probability that certain events occur with the potential to cause fatalities, injuries, damage to nature or private property, interruption of daily activities, among other potential issues. Hazards become emergencies when they occur locally on a small scale and can be quickly managed using local resources.

Thanks to modern science and centuries of experience and observation, we have learned a lot about emergencies. We know that earthquakes (and most volcanoes) are more frequent in places where two or more tectonic plates meet or nearby that site. In some regions, elders have left stories or markers to indicate where tsunamis occurred and how high they reached. In many regions, records of rainfall, temperatures and extreme events are available, because they have been recorded for more than a century; with this information, scientists can make predictions about how often a particular area is affected by a specific emergency. Determining how likely a specific emergency is to become a reality is important if we want to know what types of hazards it is necessary to prepare for, which ones it is most important to prepare for, and how to reduce the risk of a disaster striking.

Summary

Disasters and emergencies can be scary, but understanding more about them is the first step toward empowering students. Students will explore various disasters that can affect them and their communities, and will become experts on highly likely disasters in their area.

Learning Goals

Students will be able to:

- Identify various emergencies and natural disasters that could affect communities by geographic area (local and national).
- Explain the causes or risks of various disasters according to geography, climate, or the season of the year.
- Describe the environmental and human impact of disasters and emergencies.

Essential Questions

- What is a disaster / emergency?
- How do natural disasters happen?
- What role does geography play in disasters?
- What impact can a disaster / emergency have on a community?

Hazards don't always come from nature. In many cases they are consequences of human activity. Environmental pollution, fires, nuclear disasters, and oil spills are man-made hazards, and so are violent conflict and war.

HAZARDS ARE NOT DISASTERS

Disasters are large-scale events of natural or human origin that require a large amount of resources to manage. Emergencies can turn into disasters if they are not handled properly. When we speak of "disaster risk," we mean the probability that a hazard will turn into a disaster. This risk does not only depend on the severity of the hazard, but also on the vulnerabilities and capacities of the population or a community.

VULNERABILITY

Vulnerability is a situation in which people, communities or things (e.g. buildings) are in danger of being affected by a hazard.

Vulnerability depends on different factors:

- Where people live: Do they live in a danger zone or not?
- The quality of the construction of housing: Are homes strong enough to withstand these hazards?
- Health, age and gender: Can children, the elderly and people with disabilities be evacuated easily? Do disasters affect women and men differently?
- The economic and social situation.

Therefore, vulnerability depends on the way we organize our communities and the type of vulnerable population groups present in them.

One way to reduce vulnerability is to organize our communities, resulting in increased community capacity to handle emergencies. For example, we can learn about the hazards in our community and establish proper alert systems that everyone can understand. We can also identify and coordinate evacuation assistance for the elderly, the sick, pregnant women, and people with disabilities when there is a hazard to the community.

IS IT IMPORTANT TO PREPARE WITH MY FAMILY AND MY COMMUNITY?

Experts recommend that we all be prepared for emergencies for the following reasons:

- The increase in the frequency with which disasters occur on a global scale is related to population growth and the greater number of people living in danger zones (especially in highly densely populated cities).
- In 2012, more than 32 million people were forced from their homes by disasters.

- Unsustainable development ends up causing environmental degradation, which, in turn, leaves communities at increased risk of disasters.
- Communities that protect their forest cover are less exposed to soil erosion and landslides (for example, in coastal towns, mangroves can protect communities when tsunamis strike).

THE ROLE OF CLIMATE CHANGE

It has been established that global warming leads to an increased disaster risk from torrential rains and heat waves, and that it is one of the possible causes of greater cyclonic intensity.

More than 100 years ago, in different parts of the world, large amounts of coal, oil and natural gas (so-called fossil fuels) began to be burned in order to obtain energy for homes, factories, and vehicles. Today, most of the world relies on these fossil fuels for power generation. The burning of fossil fuels is the second biggest cause of heat-retaining carbon dioxide emissions into the atmosphere. Rising temperatures, in turn, cause greater evaporation of water. The combination of these two phenomena increases the probability of extreme weather events, such as torrential rains or droughts, as well as more intense storms and cyclones.

The problem with climate change is not only that it increases the risk of certain extreme weather events. In many regions, it makes it difficult to calculate the risk of a disaster on the basis of what happened in the past, since previously a flood occurred every 20 years, but with climate change the frequency could increase to one every 10 years.

While some of the things we've talked about may be scary, there is a lot we can do to protect ourselves from these hazards. Humanity has lived with natural hazards and disaster risk for hundreds of thousands of years and has survived. Many human communities have shown great resilience, meaning that they bounced back after being affected by a disaster. So what does a community need to be resilient?

We know that disaster risk depends on the hazards to which we are exposed, our vulnerability, and our ability to minimize those hazards and vulnerability. All of this is usually expressed by a simple formula:

$$\textit{Disaster Risk} = \textit{Hazard} \times \textit{Vulnerability}$$

To be resilient, the first thing we need is to be aware of the risks. To become aware, we have to know the risks to which we are exposed and learn to reduce them. This also requires being aware of the effects of

the weather, that is, being informed about climate change and making an effort to adapt to it, in addition to making it progress more slowly. Although we may not be able to eliminate all hazards (it is impossible to prevent an earthquake from happening), we can influence some, for example by building reservoirs or planting trees that reduce flood risks. We can also reduce our vulnerability. We can build safer homes in safer areas, or help those who are most vulnerable to be less so. As we have already pointed out, we can also abandon those practices that endanger our environment and work towards slowing global warming.

Being prepared also helps us to be resilient, that is, by improving our disaster response by building good alert systems and safe houses and evacuation shelters, and to have basic first aid skills, among many other measures. Preparation is something we can all do, and it is easy. The better a family, a school, a community or even a country prepares, the less tragic effects there will be from a disaster. A risk-aware and prepared community will be more resilient when disaster strikes.

You can find the definition of the concepts discussed in the Appendices.

3.2. Activities

BLACKOUT!

A pre-discussion, introductory activity that creates suspense, interest, and an informal atmosphere. It allows for the exploration of people's experiences, the evaluation of activities and risks, and an introduction to the concept of an emergency.

Blackout! Turn off all the lights in your classroom to welcome students. Ask students to share their experiences during a power outage. How was it? How long did it last? Ask students to close their eyes and imagine the power went out suddenly. What would you do? How would you stay cool? How would you take care of your hygiene? How would you keep yourself entertained? Now ask students to imagine that the power went out and they became disconnected from their families. How would you get in touch? Ask students to generate a list of their common communication methods and write them on the board. Then ask students to come up to the board and cross out items that might not be available to them during a power outage. Explain to students that a power outage is an emergency that could take place in any community, sometimes as a result of another emergency / disaster.

BRAINSTORMING ABOUT DISASTERS *(See list of disasters on the next page)*

Dynamic and flexible activity that allows for exploration of shared perceptions of the probability of disasters in a community.

Ask students to think, share, and brainstorm all the disasters they can think of. Keep a record of the list on the board. After the list is generated, have students discuss which disasters they think could affect their community the most. Circle the disasters they selected that are specific to the region.

BREAKING NEWS REPORT!

Exercise on research, reflection, writing and public speaking.

Have the groups do their research and prepare a "Breaking News Report" to talk about disasters, pretending to be news reporters. Presentations should include a definition of the disaster, how it occurs, where it occurs, what impact it has, and an interesting piece of information. Encourage students to write scripts for their skits and practice them ahead of time to prepare. They may also want to incorporate visuals to enhance their report.

Criteria

You can use the following criteria so students can reference them as they work on content:

- Definition of the disaster.
- How the disaster occurs.
- Where the disaster can occur.
- The impact the disaster can have on people and the environment.
- What people must do to stay safe during and after the disaster.
- An interesting fact about the disaster.

Give each group five minutes to share their "Breaking News Report" with the class. After each presentation, ask students to reflect and share something they learned that surprised them about the disaster.

List of Various Emergencies:

(In Annex 1 you will find a glossary that defines some of the emergencies mentioned.)

- Drought
- Earthquake
- Extreme heat
- Floods
- Hurricanes
- Landslides / debris flows
- Electrical storms and lightning
- Tornadoes
- Tsunamis
- Volcanoes
- Forest fires
- Winter storms

REFLECTION

Have you thought about why we build our homes where we do and why some people are more vulnerable than others when a hazard becomes a reality? There are many people in our community who do not get the help they need to ensure that they are safe from hazards.

- Poor people: Often they can only live in unsafe houses located in areas where there are hazards.
- Older people and sick people: Many of these people need special help and can be particularly vulnerable if they have no one to care for them.
- People with disabilities: They may need notices and special assistance. They may be more vulnerable if homes, schools, and roads have not been built to allow for rapid evacuation.

- Migrants, immigrants and tourists: They do not know many people and may have difficulties understanding the language. They can be especially vulnerable if there is no one to inform them of local hazards and where they can find safety.

4. EMERGENCY MANAGEMENT

4.1. Risk Awareness and Awareness-Building Activities

RISK MAP PREPARATION

Important tool that will help in many other suggested activities. Raises awareness and identifies risks within a certain space. Review the resource pack and access additional resources at: <https://www.ready.gov/es/node/432>

Materials:

- Large piece of paper / cardboard.
- Pencil, pens, crayons, colored pencils, markers and other writing instruments.
- Scotch tape.

What to do:

- a) Draw a map of your neighborhood, housing development, or community. Include on the map the places you frequent the most: home, school, and other sites.
- b) Includes natural landmarks such as rivers and mountains, as well as major infrastructure elements (roads, bridges or tunnels) and important public buildings (fire stations, hospitals, police stations). In addition, indicate those buildings that may pose a threat, such as chemical plants.
- c) Once you have finished drawing the map, it's the moment when we become disaster risk detectives. Find out what hazards your community is exposed to. Divide into groups and interview different people in your community, from citizens, journalists, and officials who deal with disaster management to your family and friends. The internet and libraries are also excellent sources of information.
- d) Find the answers to the following questions:
 - What hazards is your neighborhood, housing development, or community exposed to? What areas would be most impacted if said hazards were to become reality?
 - What disasters have occurred in the past in your area? What areas were most affected and why?
 - Does your community already have risk maps for different hazards? If so, were people in the community consulted to prepare them? Are there changes in risk in these maps that are a consequence of climate change?

- e) Next, mark the areas and buildings that are at risk due to a certain hazard. Different groups of students can focus on different risk scenarios (for example, a large flood versus a small flood).
- Are you often in these areas exposed to a hazard?
 - Is your school in an area that is exposed to a hazard?
- f) Next, talk about potential vulnerabilities.
- Why is it that some people in your neighborhood are more vulnerable than others?
 - Why are certain sectors, buildings or infrastructure in your area more vulnerable than others?
 - What activities take place in your neighborhood that lead to increased vulnerability?
- g) Identify buildings and areas where large numbers of people might need help in the event of a disaster (for example, schools, community centers, nursing homes, or hospitals).
- h) Think about accessibility. Identify buildings and infrastructure that are important to disaster response: for example, evacuation routes, safe areas, hospitals, or fire stations. Discuss with your colleagues how these buildings are at risk of being affected by a disaster and how accessible they would be if one were to occur.
- i) The risk map is ready. There are many things you can do with it. Present it to your teachers, family, or emergency services personnel (for example, firefighters). Find out if you can display it somewhere in the community. When you have done so, talk about how your community can begin to reduce disaster risk and how they can better prepare. Consider how you could determine who would be vulnerable in the event of a disaster and how these individuals could be helped to find safety. How can children and youth help?

Some tips:

- If your community is too large to fit on a single risk map, you can form several groups, and each one can be in charge of putting together the map for a specific area of the community. You can also work with other schools in your community.
- The hazards may be different in different seasons of the year. In that case, different groups can develop hazard maps for each season. You can also create a risk map specific to each hazard, rather than representing all hazards on a single map.

- Risk maps are always based on probability and sometimes very unlikely things can happen. So even if the homes and schools in your community are located in areas that are relatively safe, it is wise to be prepared for the possibility of a disaster.

Symbols

	Meeting place		Trees		Electric Risk
	Evacuation		Water Source		Precaution
	Exit		Water Tap		Light Pole
	First Aid		Fire Extinguisher		Gas Tank
	Dining Area		Bathrooms		Keys
	Safe Zone		Risk Zone		Alarms

MAKE MURALS AND CREATE EXHIBITIONS

Provide the opportunity to choose a topic and conduct research. Offer information to others and encourage the participation of students, families, and the community.

Materials:

The exhibition can take the size and shape you want, so the materials you use will depend on what you want to present and what elements are available to you. You could use:

- Large or medium-sized sheets of paper or cardstock for making collages.
- Pens and paints, watercolor and oil paint in different colors (for the murals).
- Scissors, rulers and glue.
- Newspapers and magazines (from which you can cut out interesting articles, figures or photos).
- Printed material from the Internet.
- Old pieces of cloth and thread or wool.
- An exhibition space or a wall on which to draw the mural.

What to do?

- a) Brainstorm with your teacher and your classmates about the theme for the mural or exhibition and also about who the audience would be. For example, you could paint a mural by the river to remind people that flood risk can be reduced by not dumping garbage into the river, or you could present about the hazards facing your community.
- b) Research the topic so that you can illustrate it in a way that helps people understand what you are trying to show.
- c) Once you have enough information, think about the appearance of the mural or the exhibition piece that you are going to prepare and the materials you need to make it, as well as the information that you are going to emphasize.
- d) Talk to your teacher about where you would like to put the material. It should be highly visible and easily accessible to the public. Make sure you have permission to paint or mount the exhibit at that location.
- e) Be creative when painting the mural or making the piece for the exhibition and don't forget to ask for help.
- f) Get people to participate. Send out invitations and put up posters for people to come to see the mural or exhibit. Host an opening ceremony and try to get as many people as possible in attendance, from members of our families to community leaders. Try to get the local media to report on your work.

Prepare the exhibition space so that you can present your pieces. Display or arrange them in such a way that they look good. People will understand your work better if you put an explanatory text next to the piece (what it is about and who made it). You and your friends could also make it into a guide for the exhibition, so there will always be someone who can answer questions from visitors. Think of a good day or time to open the show. A special occasion, such as International Day for Disaster Reduction (October 13), could be a good time.

START AND SUPPORT RISK REDUCTION ACTIVITIES: PLAN, CARRY OUT AND SUPPORT RISK REDUCTION ACTIVITIES IN YOUR COMMUNITY

Raise awareness about behaviors that are harmful to the environment and that increase the risk of disasters in the community (cleaning, planting trees, etc.).

Materials:

- For a clean-up activity, bags and trash cans will be needed to transfer the garbage to the bins set up for this purpose. Work gloves or gloved used in the household can also be useful. Having a small cart, wheelbarrow, or van will make it easier to remove larger items.

- To plant trees or mangroves, you will need shovels to dig holes and buckets to water the new plants.

What to do?

- As a starting point, you should examine the risk map that you have drawn up. Talk to your teacher, other classmates, and family about human activities that result in higher risk in certain areas. These activities may include those that cause the obstruction of rivers and streams due to the accumulation of garbage, the removal of vegetation on lands exposed to landslides, and the extraction of stones and gravel from rivers.
- Make a list of what could and should be done to minimize risks in your community. Here are some examples:

HAZARD	WHAT MAKES IT MORE PROBABLE TO OCCUR?	WHAT COULD BE DONE?
River flooding	Cutting down trees near the river or throwing garbage in or near the river.	Plant trees near the river. Organize a clean-up and garbage collection activity.
Tsunami	Cutting down forests and mangroves that act as barriers.	Revitalize the mangroves.
Landslide	Soil erosion due to the removal of vegetation.	Plant shrubs and trees.

- Also in this case, you should visit the people you consulted during the preparation of the risk map (for example, community leaders, community health centers, local governments, among others). Ask them if there are activities in your neighborhood or city that aim to mitigate disaster risk. If they are organizing, help them! With all that you have learned, you will make these activities even more effective.
- If these activities are not being carried out, organize some.

Some tips:

- You can use these activities to raise awareness about behaviors that are harmful to the environment and cause an increased risk of disasters in our community.
- These activities can go hand in hand with the development of posters, murals and signs designed to inform community members of practices that are dangerous or risky and how they could do things in a more sensible way, keeping in mind the risks that are present.
- For some of these activities you may need to raise money or request donations. You can talk to business owners in the area and ask if they would be willing to provide financial support for these projects.

4.2. Disaster and Emergency Preparedness Activities

DEVELOP A DISASTER PREPAREDNESS PROGRAM:

To be prepared whenever a hazard becomes reality and in any place where one might occur. Review the resource packet and access resources at: <https://www.ready.gov/be-informed>

Materials:

- Map of risks.
- A large piece of paper or several smaller pieces if you have not prepared a risk map
- Pens or pencils (if possible, in different colors).

What to do?

- a) List all the places you go throughout the week. Indicate what time of day you are in each of those places.
- b) Locate and mark those places on your risk map. If you don't have a risk map yet, draw a map of your community showing all the places on the list.
- c) Examine the hazards that exist in your community and where you would be most exposed to those hazards. You may have done the latter when developing the risk map.
- d) Write down the hazards that you have identified and locate them in relation to the places that you have indicated in step a.
- e) Add a column in which you can write down the type of warning that would indicate each type of hazard in each of these places. Go over the list with your teacher and parents.
- f) Write down what you would do and where you would go if a certain hazard were reported in a certain place (there are some examples below).

- g) Add to the risk map all evacuation routes or safe routes for each of these places and for each of the hazards.

PLACE	TIME	HAZARD	WARNING	MEASURES
School	8:00 a.m. – 2:00 p.m.	Earthquake	There would probably not be a warning.	<ul style="list-style-type: none"> • Duck, cover, and hold on. • When the shaking is over, exit the school building calmly and carefully. • Meet up with my classmates at the assigned evacuation point.
Home	2:00 p.m. – 4:00 p.m.	Tsunami	Tsunami warning sirens, radio, television or text messages.	<ul style="list-style-type: none"> • Evacuation to the hill closest to my house.
Sports field	4:00 p.m. – 6:00 p.m.	Flooding	Sirens, verbal warnings, or text messages.	<ul style="list-style-type: none"> • Evacuation to a higher area on the northwest side of the sports field.
Grand mother's house	6:00 p.m. – 8:00 p.m.	Landslide	Neighbors or firefighters. Watch the hill next to the grandmother's house if the rain is very heavy.	<ul style="list-style-type: none"> • Evacuation through the back door of my grandmother's house as soon as I see signs there might be a landslide. • Warn neighbors and call the fire department. • Take both my grandmother's and my bag for emergencies. • Help grandmother during the evacuation.

Some tips:

- Go through your list with your family members; they may also want to make a list. Talk to them about where you would meet them and how they would communicate with each other if one of these disasters were to occur.
- Talk in class and with authorities about how warnings in different parts of the neighborhood or our city could be improved.

DEVELOPING A FAMILY DISASTER PREPAREDNESS PLAN

Review the resource pack and access resources at <https://www.ready.gov/es/haga-un-plan>

Materials:

- Pens and paper.
- Risk map.

What to do?

- a) Take the needed time to ensure that all members of our family participate in conversations about the plan.
- b) Exchange impressions with them about natural hazards and man-made hazards that exist in your home, the places where your family members work, schools, or places where you play. Develop a plan focusing on “Where? When? and How?” as it relates to these hazards for each one of the members of your family.
- c) Examine how safe your home is and if it can withstand various disaster situations and analyze whether it would be safer to stay inside the house or to move if a given disaster took place.
- d) Inspect every room in the house to see if there are items that, in the event of a disaster, could become dangerous (for example, objects that could cause a fire or fall and prevent the use of an exit). Make sure all hazardous materials are safely stored.
- e) Draw a sketch of your house. Include important information, such as where the main electrical panel is located and where the gas and water lines can be turned on and off.
- f) Analyze and come to an agreement on the safest evacuation routes from each of the rooms in the house. Ideally, you should have two different evacuation routes planned from each part of the house. Decide who will be responsible for helping family members in need of assistance and how they can be helped to evacuate.
- g) Examine the different ways you could make your home more resistant to hazards and what you can do to prepare it before a hazard becomes a reality
- h) Prepare emergency supplies, an emergency (or disaster preparedness) bag, or at the very least, a list of important things you need to take with you if a disaster strikes and you have to evacuate.

- i) Prepare a map of your surroundings. Think about the places that may pose a hazard, the secondary hazards that could cause injury during an evacuation or prevent you from evacuating your home (large trees, power lines that could fall, ditches and rivers that could overflow, dangerous bridges, buildings that could collapse, etc.).
- j) Decide on the best evacuation/escape routes and where you should head in the case of each different disaster. Coordinate and plan more than one escape route.
- k) Decide where to meet or how to get in touch with each other in case you get separated.
- l) Talk about what to do with your pets in the event of a disaster.
- m) Make a list of people and institutions that can help you if a disaster strikes. Write down important phone numbers (fire department, police, ambulance service, relatives, neighbors, doctors, etc.) and make a copy of that list for each family member. Record these phone numbers in your phone and keep a copy of the list on paper.
- n) Write down your plan. Make sure all family members know what their responsibilities are and that there is always someone willing to take care of those duties if the person in charge is absent.
- o) After some time, review and, if necessary, reconsider your plan.

Some tips:

Agree on two meeting points:

- One should be right outside your house, in case of a sudden emergency (e.g. a fire).
- The other meeting point should be located outside the neighborhood, for those situations when you cannot return home or are asked to evacuate the area.
- Practice evacuation from your home or neighborhood twice a year (on foot and also in a vehicle).
- Include your neighbors in planning for emergencies. Perhaps you can help each other in an emergency situation.
- Make arrangements with a family member or friend who lives elsewhere with whom you can communicate if your family members become separated.

PREPARING AN EMERGENCY BACKPACK

Review the resource packet and access resources at: <https://www.ready.gov/be-informed>

There are certain things you should always include in your emergency backpack:

- Important medicines and first aid kit.
- A light source (battery-powered or solar flashlights , candles, and matches).
- Water and food.
- Important documents or copies of those documents.
- Some money.
- A change of clothes and a towel.
- Soap, toothbrush, and other personal hygiene items.
- If it is not too big or heavy, you can always put one of your favorite toys, books or objects in the backpack.
- A cordless or battery-operated radio that allows you to receive information in case of a power outage after the disaster.

REMINDER: If your house is in a danger zone and you are already in a safe place, you should not go home to collect your emergency backpack! In addition, a disaster could occur while you're at school. Consider the possibility with your teachers of preparing an emergency backpack for school.

4.3. Activities for Developing Resilience

Being resilient means being able to marshal resources and recover well after a disaster.

1. Sharing experiences

Space to express oneself in regards to lived experiences of emergencies, to develop empathy, and to compare with other children in the world.

When you are affected by a disaster, you feel many things. Sometimes it is difficult to discuss these feelings with adults. In that case, you can try to express what you feel and what you think in a postcard, letter, or drawing. Exchange it with other children who have also been affected by disasters, in your community or in another place. Your teachers and parents will be willing to help you find other children with whom you can share your experiences. And you might even end up with a pen pal for the rest of your life.

Another way to share your experiences is to write stories or compose songs. You can make up entirely new stories or songs, or adapt existing stories or create new lyrics for a song that has already been composed. These stories and songs can help you share with others how you feel and what you have been through during the disaster, and they can help you tell how you managed to get back to normal or at least how you tried to do so. And they can also contain messages about what you learned from the disaster and how to be better prepared if another occurs.

2. Disaster postcards

Ask students to create and write postcards for another community that has recently been affected by a disaster to show your support and encouragement to those affected. Identify a school, fire department, or recovery center in that community where the postcards can be sent.

3. Blogs, social media

Creation of a blog for the class, posting on social media and on informational networks.

Invite students to create and contribute to a class blog or post class research, information, and projects to their online networks. They can also “report” on events related to emergencies happening in their communities or across the country.

4. Current events

Selection of a disaster reported on in the news and a presentation on said event.

Invite students to choose a disaster currently in the news and read an article about it. Students can prepare a short presentation on current events or a report on the disaster.

5. Improving school safety

Creation of a risk map for the school, along with a discussion about vulnerabilities to include school and community leaders.

As students, you must be involved in improving the safety of your school. After a disaster, you can help rebuild and renovate the school and ensure that it is built in a safe place and in a way that makes it resilient. You spend a lot of time in school and therefore you know what kind of school you want. It is only fair that you be included in the planning process when the school you attend is reinforced, relocated, or rebuilt. It is always very beneficial to learn from participation in a real project (and not just from textbooks).

5. CHEMICAL SAFETY

5.1. Lesson

NON-POINT SOURCE POLLUTION

Non-point source pollution (NPS) generally results from runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. It is usually caused by the rain that moves through the soil that collects and carries natural and artificial pollutants, finally depositing them in lakes, rivers, wetlands, coastal waters and groundwater.

Non-point source pollution can include:

- Excess fertilizers, herbicides and insecticides from agricultural land and residential areas.
- Oil, grease and toxic chemicals from urban runoff and energy production.
- Sediments from poorly managed construction sites, agricultural and forest lands, and eroding streambanks.
- Salt from irrigation practices and acid drainage from abandoned mines.
- Bacteria and nutrients from livestock, pet waste, and faulty septic systems.
- Atmospheric deposition and hydro-modification.

During emergencies like hurricanes and flooding, chemicals products with domestic, medical, and industrial uses can be released into the environment.

- Stay out of from flood water. It can contain human and livestock waste, coal ash, and other contaminants that can lead to illness.
- Call 911 or the national poison control center if you suspect someone has been poisoned by a chemical.
- Call local authorities to report oil and chemical spills, abandoned containers, or other containers that you suspect may contain chemicals. Do not touch or move unfamiliar containers.
- Listen for announcements or alerts from authorities about chemical safety and disposal issues.
- Listen to local announcements for guidance on what to do in the event of a chemical release. You may need to evacuate or stay indoors (shelter in place) until you are told it is safe to leave.
- Wash skin that may have come in contact with chemicals or flood water with soap and clean water as soon as possible. Your clothing may need to be removed and discarded, then decontaminated to reduce or eliminate the chemical so it is no longer a hazard.
- Before you start cleaning, make sure you are prepared with the correct equipment: hard hat, goggles or goggles, N-95 respirators or face masks, heavy work gloves, and waterproof boots.

HANDLING CHEMICALS FOR HOUSEHOLD USE

Knowing how to handle household products that contain hazardous chemicals or materials can reduce the risk of them contaminating the water in our home after an emergency or disaster, as well as reduce the risk of injury. Below are some recommendations.

BEFORE AN EMERGENCY WITH CHEMICALS IN THE HOME

It is essential to store household chemicals in places where children cannot access them. Remember that products such as hairspray and deodorant, nail polish and nail polish removers, toilet bowl cleaners and furniture cleaning products belong to the category of hazardous materials.

Hazardous household products can include:

- Cleaning products.
- Pesticides.
- Automotive products like antifreeze and motor oil.
- Miscellaneous items such as batteries, mercury thermometers, and fluorescent bulbs.
- Flammable products such as kerosene, home heating oil, propane tanks, and lighter fluid.
- Shop or painting supplies, such as paint thinner and turpentine.
- Lawn and garden products such as herbicides and insecticides.

Below you will find recommendations for purchasing and storing chemical products safely in the home:

- Store products containing hazardous materials in their original containers and never remove the labels unless the container is rusty. Rusty containers must be repackaged and clearly marked with a label.
- Never store dangerous products in food containers.
- Never mix hazardous household chemicals or wastes with other products. Incompatible substances such as chlorine bleach and ammonia can react, ignite, or explode.
- Never use hairspray, cleaning solutions, paint products, or pesticides near open flames.
- Clean up any chemical spills immediately. Let the fumes from the rags evaporate outdoors, then dispose of them in the trash can wrapped in newspaper and in a closed plastic bag.
- Dispose of hazardous materials properly.
- Save the poison center phone number in your cell phone.

DURING A CHEMICAL EMERGENCY IN THE HOME

Leave the residence immediately if there is a risk of fire or explosion.

- Stay upwind and away from the residence to avoid breathing toxic fumes.
- Recognize and respond to symptoms of toxic poisoning including:
 - Difficulty breathing.
 - Irritation of the eyes, skin, throat or respiratory tract.
 - Changes in skin color.
 - Headache or blurred vision.
 - Dizziness, clumsiness, or lack of coordination.
 - Cramps or diarrhea.
- If a person suffers from symptoms of poisoning or has been exposed to a household chemical, call the National Poison Control Center at 1 (800) 222-1222 and look for any container of the substance that is nearby so that you can provide the necessary information to the operator or employee.
- Follow the first aid directions given by the emergency center operator or employee. First aid advice on packaging may be out of date or incorrect. Do not give anything by mouth to the affected person, unless directed to do so by a medical professional.

AFTER A CHEMICAL EMERGENCY IN THE HOME

- Discard clothing that may have been contaminated. Some chemicals may not be completely eliminated from the clothing.

5.2. Activities

NON-POINT OR DIFFUSE SOURCE POLLUTION

The suggested activity is designed to show students what an average storm drain collects during a rain event and how water from storm drains can affect the water quality and aquatic environments of local streams, rivers, and bays.

Materials:

To simulate runoff and water drains:

- Two transparent boxes
- Water
- Water hose
- Spray bottle or atomizer

To simulate "pollutants":

- Green food coloring (pesticides / fertilizers)
- Vegetable oil (motor oil)
- Dirt / sand / small stones (erosion)
- Grass clippings (or shredded paper) and twigs
- Garbage from the kitchen or tablescraps

What to do?

- a) Fill one transparent box halfway with water and place it in an accessible area where students can see it easily. Make a large hole at the bottom of the second transparent box transparent and place it on top of the first box. The hole in the second box represents the drainage point, and the first transparent box represents the waterway in which rainwater mixes with the rain runoff and the body of water they flow into. Leave the sides of the first box uncovered so the students can see the contents.
- b) Introduce this activity with a discussion about storm drains and storm drainage systems and their purposes. Discuss where the water and floating objects go in a storm drain. Have students make a list of all the things they can think of that could get into a storm drain during a storm.
- c) Assign a group of students to each pollutant. Analyze each pollutant, including its use or source and how it could enter the storm drain.

- d) Have each group of students place their pollutant in the storm drain. Use the hose to create rain and wash the pollutant into the gutter. As each pollutant flows into the waterway, discuss each the pollutant and its use or source. Discuss the following questions: How does the pollutant harm the environment? Do the people responsible for the pollutant want to harm the environment? Why did they do what they did? How can this type of pollution be stopped?
- e) After adding all the pollutants, examine the contents of the channel. Discuss how the waterway has changed and how the students feel about seeing this change.

Follow-up questions:

- What types of pollution are natural?
- What types of pollution do people living in local communities contribute?
- How can we eliminate water pollution?
- What could be done to prevent pollutants from entering storm drains?

Possible adaptations:

Have the groups of students responsible for the pollution think of ways to remove the pollution from the box that represents the waterway? Try some of the removal methods. What contaminants were easy to remove? Which ones were difficult to remove?

SURVEY OF CHEMICALS AND DISINFECTANTS IN THE HOME

Review the resource packet.

Invite your students to make a list of the chemicals and disinfectants found in the home and to rate whether they are:

- Appropriately labeled
- Stored in a safe place
- In a safe container
- In a container without leaks or spillage
- Not mixed with other products

6. SAFE WATER

6.1. Lesson

Review the resource packet.

During a water-related emergency or outbreak, potable water may not be available. Prepare for an emergency by creating and storing a water supply that meets your family's needs.

- Unopened commercially bottled water is the safest and most reliable source of water in an emergency.
- Store at least 1 gallon of water per person per day for 3 days for drinking and sanitation.
- Try to store a 2-week supply, if possible.
- Consider storing more water for hot climates, pregnant women, and people who are sick.
- Take note of the expiration date on store-bought water.
- Replace non-store bought water every 6 months.
- Save a bottle of unscented liquid chlorine bleach (the label should say it contains 5% to 9% sodium hypochlorite) to disinfect the water, if necessary, and to use for general cleaning and disinfecting.

When storing safe water (water that has been treated for safe use), it is best to use food-safe water storage containers, which do not transfer toxic substances into the water they contain. FDA approved food grade storage containers can be found at camping supply or surplus stores. Contact the manufacturer if you are unsure whether a storage container is food-safe. If you can't use a food-safe water storage container, make sure your selected container:

- Has a lid that can be hermetically closed.
- Is made of durable and unbreakable materials (that is, not glass).
- If possible, use a container with a narrow neck or opening so that the water can be poured.

DO NOT USE containers that have previously been used to hold liquid or solid toxic chemicals (chlorine, pesticides, etc.).

Storage for these containers with water is also important. Here are some recommendations:

- Label the containers "Potable Water" and include the storage date.
- Replace stored water every six months.
- Keep water stored in a cool place (50 ° to 70 ° F).
- Do not store containers of water in direct sunlight or in areas where toxic substances are present.

In an emergency, you can make water drinkable, that is you can make sure that the water you drink is not contaminated with certain bacteria or polluting substances. This is especially crucial in a disaster situation, when access to medical care may be limited. Be careful when you choose the source of the water you are going to make drinkable. Don't use water that has particles floating in it, has an odor, or is dark in color. All of these are signs that the water is heavily contaminated and may be dangerous to drink, regardless of what you do to make it drinkable and kill bacteria. That said, it is easy to remove a small amount of dirt present in the water, which does not represent a danger to anyone.

If water becomes contaminated during an emergency, use bottled water whenever possible. Bottled water is the safest option for drinking and for all other uses. It is important to always have uncontaminated water stored in your emergency backpack. If you don't have bottled water available, the following methods can help to make your water safe to drink.

IMPORTANT: Water that is contaminated with fuel or toxic chemicals cannot be made safe by boiling or disinfecting. Use bottled water or a different source of water if you know or suspect that the water may be contaminated with fuel or toxic chemicals.

* Note: The methods are listed in order starting with most effective one for making water safe to drink.

6.2. Activity

1. Water storage

Invite your students to evaluate or to create a drinking water storage system in their homes following the recommendations below:

- Store at least 1 gallon per person per day (store enough for 3 days or up to 2 weeks).
- Check the expiration date of water purchased at the store.
- Replace any water that you did not purchase at the store every 6 months.
- Save a bottle of unscented liquid chlorine bleach (the label should say it contains between 5% and 9% sodium hypochlorite) to disinfect the water, if necessary, and to use for general cleaning and disinfecting.
- All containers for the water should have a lid that closes hermetically.

- All containers for the water should be unbreakable and made of durable materials (no glass).
- Use a container with a narrow neck or opening so that the water can be poured.
- Label the container "potable water" and write down the date the water was stored.
- Replace stored water every six months.
- Keep water stored in a cool place (50 to 70 ° F).
- Do not store containers of water in direct sunlight or in areas where toxic substances are present.

2. Boil water

If you don't have safe bottled water, you should boil the water to make it safe to drink. Boiling water is the most effective method of killing disease-causing organisms, including viruses, bacteria, and parasites.

You can improve the flavor of boiled water by transferring it from one container to another and then letting it sit for a few hours, or by adding a pinch of salt for every quart or liter of boiled water.

If the water is **cloudy**:

- Let the water stand between 12 and 24 hours so that all dirt has time to settle at the bottom of the container. When it has finished settling, transfer the water above the dirt to another clean container. Filter it through a clean cloth, paper towel, or coffee filter.
- Separate the clear water.
- Bring the clear water to a boil and allow it to boil for one minute (at altitudes above 6500 feet, boil it for three minutes).
- Let the boiled water cool down.
- Store boiled water in clean, sanitized containers with tight lids. Remember that boiled water may not taste as good because of the oxygen it has lost. Transfer the water from that container to another so that it becomes oxygenated and tastes better.

If the water is **clear**:

- Bring the clear water to a boil and allow it to boil for one minute (at altitudes above 6500 feet, boil it for three minutes).
- Let the boiled water cool down.
- Store boiled water in clean, sanitized containers with tight lids.

3. Disinfectants

If you don't have safe bottled water or if you can't boil your water, a chemical disinfectant, such as household unscented bleach, can sometimes be used in a small amount of already filtered and settled water to make it safer to drink. Disinfectants can kill most harmful or disease-causing viruses and bacteria, but they are not as effective at controlling the most resistant organisms, such as parasites. **If the water is contaminated with a chemical, adding a disinfectant will not make it drinkable.**

To disinfect water with unscented household liquid chlorine:

If the water is **cloudy**:

- a) Filter it through a clean cloth, paper towel, or coffee filter OR allow to settle.
- b) Separate out the clear water.
- c) Follow the instructions for disinfecting drinking water on the chlorine label.
- d) **If the instructions are not printed on the label**, look at the “active ingredients” part of the label to find the percentage of sodium hypochlorite and use the information in the table below as a guide. Generally, unscented liquid household bleach will have a concentration of between 5% and 8.25% sodium hypochlorite, although it can vary. Using the table below, add the appropriate amount of bleach using a dropper, teaspoon, or metric (in milliliters) meter.
- e) Mix well.
- f) Let the water stand for at least 30 minutes before using it.
- g) Store disinfected water in clean, disinfected containers with hermetically-sealed lids.

If the water is **clear**:

- a) Follow the instructions for disinfecting drinking water on the chlorine label.
- b) **If the instructions are not printed on the label**, look at the “active ingredients” part of the label to find the percentage of sodium hypochlorite and use the information in the table below as a guide. Generally, unscented liquid household bleach will have a concentration of between 5% and 8.25% sodium hypochlorite, although it can vary. Using the table below, add the appropriate amount of bleach using a dropper, teaspoon, or metric (in milliliters) meter.
- c) Mix well.
- d) Let the water stand for at least 30 minutes before using it.
- e) Store disinfected water in clean, disinfected containers with hermetically-sealed lids.

How can we make water safe using chlorine with a concentration of 1% sodium hypochlorite?

* If the water is cloudy, contains sediment, has a color to it, or is very cold, add twice the amount of chlorine listed below

1 quart / 1 liter of water	1 gallon of water	5 gallons of water
If you have a dropper: Add 10 drops of bleach	If you have a dropper: Add 40 drops of bleach	If you have a dropper: Add 200 drops of bleach
If you have a milliliter (ml) meter: Add ½ ml bleach	If you have a milliliter (ml) meter: Add 2½ ml bleach	If you have a milliliter (ml) meter: Add 12½ ml bleach
If you have a measuring spoon: Add ⅓ teaspoon bleach	If you have a measuring spoon: Add ½ teaspoon bleach	If you have a measuring spoon: Add 2½ teaspoons bleach

How to make the water safe to use if you use chlorine with a concentration of 5-8.25% sodium hypochlorite?

* If the water is cloudy, contains sediment, has a color to it, or is very cold, add twice the amount of chlorine listed below

1 quart / 1 liter of water	1 gallon of water	5 gallons of water
If you have a dropper: Add 2 drops of bleach	If you have a dropper: Add 8 drops of bleach	If you have a dropper: Add 40 drops of bleach
If you have a milliliter (ml) meter : Add 0.1 ml of chlorine	If you have a milliliter (ml) meter : Add ½ ml bleach	If you have a milliliter (ml) meter: Add 2½ ml bleach
If you have a measuring spoon: Amount too small to measure	If you have a measuring spoon: Add a little less than 1/8 teaspoon	If you have a measuring spoon: Add ½ teaspoon bleach

A FEW TIPS

- Discuss the issue of safe water with your family when you make your family disaster preparedness plan. Think about how much water you need to have stored and who will be in charge of periodically checking the available reserves. Reflect on the importance of having drinking water in your community and on which of the methods described provides an appropriate solution for your family, both from a practical and economic point of view.

APPENDICES

GLOSSARY

Concept	Definition
Hazard	A dangerous phenomenon or human activity that can cause death or impairment of health, or cause damage or disruption to, or loss of, property, livelihoods or social or economic services. Hazards have multiple origins and sometimes act in combination.
Extreme heat	Very hot and humid period with high temperatures. In extreme heat, the body works harder to maintain a normal temperature, which can lead to death.
Climate change	In the United Nations Framework Convention on Climate Change (UNFCCC) it is defined as a “change in climate attributed directly or indirectly to human activities that alter the composition of the world's atmosphere, and that adds to the natural variability of the climate. observed over comparable periods of time.”
Capacity	The combination of all the strengths, attributes and resources available within a community, a society or an organization that can be used to achieve the agreed objectives. Comment: Capacity can include the physical infrastructure and means, institutions and coping skills of society, as well as human knowledge, skills and collective attributes such as social relationships, leadership and management.
Landslides / debris flows	Masses of rocks, dirt, or debris move down a slope. Debris and mudflows are rivers of rock, dirt, and other water-saturated debris. They develop during heavy rains, runoff, or rapid thaw, transforming the land into a flowing river of mud or "mudflow." They can flow quickly, hitting with little or no warning at avalanche speeds (faster than a person can run).
Hurricanes	A tropical cyclone, formed in the atmosphere over warm ocean areas, in which the wind speed reaches 74 miles per hour or more and blows in a large spiral around a relatively quiet center or "eye."
Forest fires	Unplanned fires burning in natural areas such as forests, grasslands, or prairies. These dangerous fires spread rapidly and can devastate not only wildfires and natural areas, but also communities.
Floods	A temporary overflow of water on normally dry terrain. Floods are one of the most common natural disasters. Failure to evacuate flooded areas or enter floodwaters can result in injury or death.

Preparation	The knowledge and capacities that governments, communities and individuals acquire to effectively anticipate, respond to and recover from the consequences of events or conditions—probable, imminent or current—related to a hazard.
Disaster risk reduction	The practice of reducing disaster risk through systematic efforts aimed at analyzing and managing the causal factors of disasters, including reducing the degree of exposure to hazards, reducing the vulnerability of the population and assets, sound management of soils and the environment; and improvement of disaster preparedness. In the area of education, it involves a systematic analysis of disaster-related risks and an attempt to reduce them in order to allow the education system to provide quality education for all (and students can continue their learning and children out of school, access to education) before, during and after emergencies.
Resilience	Resilience is the ability of an education system (at its various levels) to minimize the risks of a disaster or conflict, maintain its functions during an emergency, and recover from shocks. On a personal level, resilience is the ability to apply knowledge to minimize risks, adapt to emergencies, withstand shocks, and quickly resume learning and other activities necessary for survival. Resilience can be strengthened by addressing the factors underlying vulnerability. Resilience is the opposite of vulnerability.
Risk	In common parlance, the use of this term emphasizes the concept of probability or possibility ("the risk of an accident"). In a technical context, consequences are often emphasized, in terms of "possible losses". The relationship between vulnerability, on the one hand, and the probability and intensity of hazards, on the other, can be represented by the following equation: $\text{RISK} = \text{HAZARD} \times \text{VULNERABILITY}$ The worse the hazard, the greater the risk. Similarly, the risk also increases when a community, a system or even a school is more vulnerable.
Drought	Period of low rainfall.
Earthquake	A sudden and rapid shaking of the ground caused by the movement of rocks far below the earth's surface. Earthquakes can cause fires, tsunamis, landslides, or avalanches.
Winter storms	They bring extreme cold, freezing rain, snow, ice, and strong winds. Winter storms create an increased risk of car accidents, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion.
Thunderstorms and lightning	Dangerous storms that include lightning and can include high winds over 50 MPH, create hail, and cause flash floods and tornadoes. Lightning is a leading cause of injury and death from weather-related hazards. Although most lightning victims survive, people struck by lightning often report a variety of long-term debilitating symptoms.

Tornadoes	Columns of violently rotating air that extend from a storm to the ground. Tornadoes can destroy buildings, flip cars, and create deadly flying debris.
Tsunamis	A series of huge ocean waves caused by earthquakes, underwater landslides, volcanic eruptions, or asteroids. A tsunami can kill or injure people and damage or destroy buildings and infrastructure when waves arrive and then subsequently recede.
Volcanos	An opening in the earth's crust that allows molten rock, gases, and debris to escape to the surface.
Vulnerability	The characteristics and circumstances of a community, a system, or an asset that make it susceptible to the damaging effects of a threat. There are many aspects related to vulnerability, derived from various physical, social, economic and environmental factors. In the sphere of the educational system, vulnerability is the combination of exposure to hazards—whether of natural or human origin or conflict-related—and the degree to which the different levels of the educational system are susceptible to a collapse or its functions are disturbed. For students, vulnerability is the combination of exposure to hazards and the degree to which students are susceptible to the interruption of access to good quality educational opportunities or the total loss of those opportunities. Example: the vulnerability that a student from the southern area of the island suffers interruptions in receiving virtual classes versus the vulnerability of a student from the metro area due to a tremor / earthquake.

TEACHING STRATEGIES

- Brainstorming
- Small group discussion
- Whole class discussion
- Multimedia presentation
- Research for case studies
- Surveys / interviews
- Analysis of data
- Media analysis / response
- Conceptual maps
- Investigation / action
- Resource mapping
- Table games
- Role plays, short skits, dramatic plays, puppet theater
- Simulation games
- Field experiences
- Community participation / community campaigns
- Image-based learning (visualizations)
- Artistic expression (poems, painting, drawing, among others)

APPLICATIONS TO SCHOOL SUBJECTS

Matter	Examples
Agriculture	<ul style="list-style-type: none"> • Study and put into practice the adaptation of crops in response to increasingly dry / wet climatic conditions. • Learn about food preservation and food safety. • Learn about soil degradation.
Visual arts and performing arts	<ul style="list-style-type: none"> • Create murals, collages, posters, and exhibits on the theme of hazards and disasters. • Compose and perform songs, dances, puppet shows and plays in order to promote community awareness of disaster risk reduction. • Use mimicry and body language to act out the nature of threats and people's possible responses.
Biology	<ul style="list-style-type: none"> • Learn how a healthy ecosystem, such as a forest or mangrove, can protect a community against threats such as landslides and tsunamis. • Examine the role of wetlands in absorbing excess rainwater and preventing downstream flooding. • Analyze how deforestation in your area has increased threats to communities.
Civic / Citizenship Education	<ul style="list-style-type: none"> • Meet with local officials to ask about disaster preparedness strategies and structures. • Carry out advocacy projects related to disaster risk reduction in the local community. • Participate in community initiatives to build resilience.
Geography	<ul style="list-style-type: none"> • Redraw the national maps to show the effects of sea level rise on the coastline. • Study the different effects of natural disasters in urban and rural communities. • Examine changes in land use as a means of building resilience and as a potential threat.
Education for health / welfare	<ul style="list-style-type: none"> • Acquire notions of first aid. • Learn the security practices and procedures to follow when affected by a threat. • Gain knowledge of the health threats that can arise after a disaster. Learn how to stay safe and maintain hygiene after a disaster.

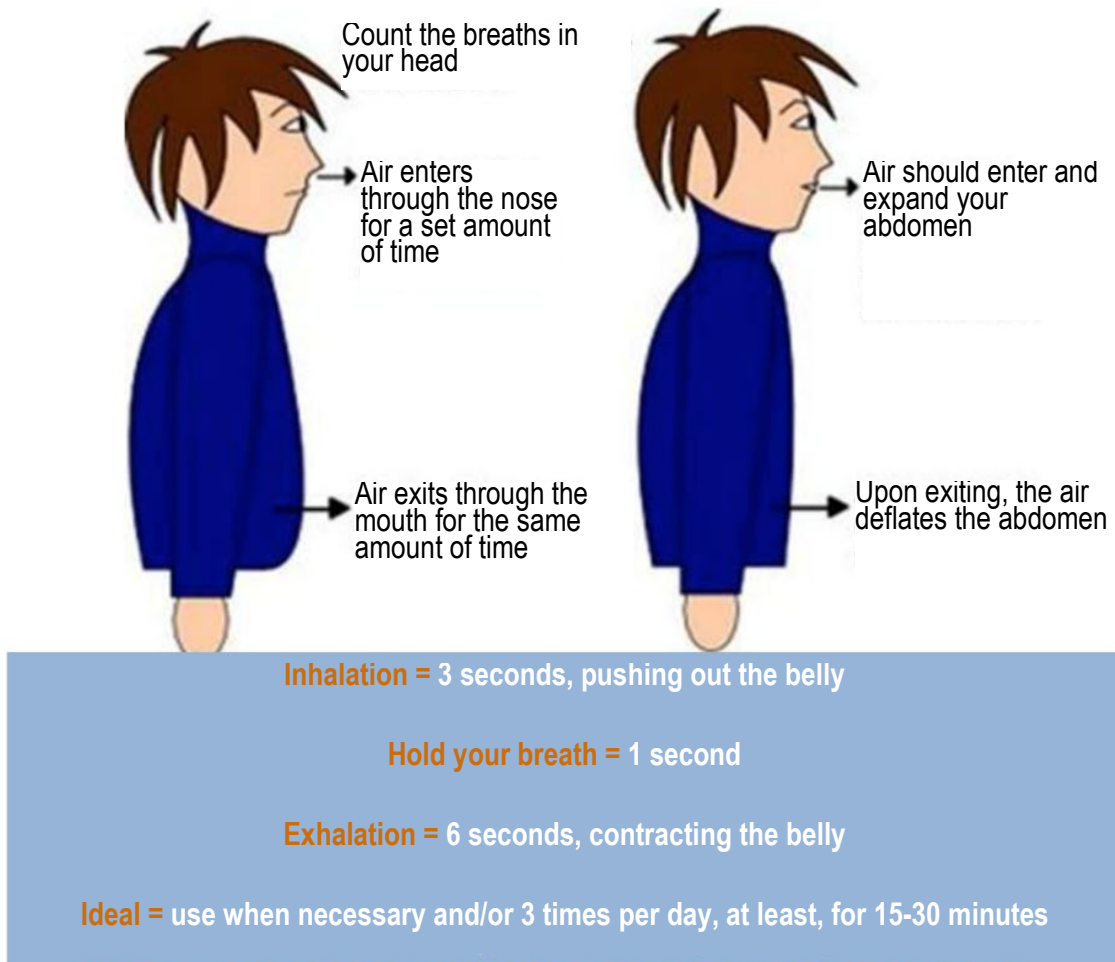
<p>Story</p>	<ul style="list-style-type: none"> • Analyze the consequences of natural hazards and climate change on past civilizations. • Study major disasters that have occurred in the country or community and identify good practices. • Inquire about indigenous or traditional wisdom or practices regarding disaster risk reduction and consider whether they are applicable today.
<p>Language and literature</p>	<ul style="list-style-type: none"> • Read stories, fables, poems and press reports about disasters and threats and discuss them. • Write essays, poems, and stories in response to photos, news, or video recordings. • Write letters to newspapers and local agencies on issues related to disaster risk reduction.
<p>Life skills</p>	<ul style="list-style-type: none"> • Organize a debate contest on disaster-related topics. • Organize a simulation of the climate change negotiations held in preparation for the United Nations Framework Convention on Climate Change. • Create a family disaster preparedness plan.
<p>Math</p>	<ul style="list-style-type: none"> • Address aspects related to measuring safety at home and at school. • Graph the data on natural hazards (for example, the total number of people affected and the total economic cost of cyclones in different periods). • Extrapolate disaster trends based on recent statistics.
<p>Science and Technology</p>	<ul style="list-style-type: none"> • Learn about the ways natural weather and geo-seismic phenomena work. • Build models and conduct experiments to understand the basic principles of disaster-resistant building. • Acquire knowledge about the effects of human activities on ecosystems.
<p>Social Sciences</p>	<ul style="list-style-type: none"> • Review vulnerability to disasters from the point of view of human rights and the rights of the child. • Interview members of the local community about their views, memories and past practices in the field of hazards and disasters. • Conduct field visits to review local disaster support services.
<p>Training technique / professional</p>	<ul style="list-style-type: none"> • Study and practice adaptation to climate change through tree or mangrove planting projects. • Build teams to measure rainfall in the area where the school is located. • Learn the principles of disaster resistant building and design.

CRISIS MANAGEMENT

Paused diaphragmatic breathing is one of the most effective techniques for reducing physical and mental anxiety or tension. We recommend using it in case a student has a reaction to the discussion of emergencies and disasters based on some traumatic event they have experienced in their life. This technique will serve as a quick response to handling the situation as you are able to contact the designated school authority to work with the student.

DEEP DIAPHRAGMATIC BREATHING

Activating our Parasympathetic Nervous System for states of Relaxation and General Well-being



Graphic 3: Deep diaphragmatic breathing steps.

Sources Consulted and Additional Resources

FEMA:

- “Be a Hero!”: Curriculum
 - 6th – 8th Grade: https://www.ready.gov/sites/default/files/2020-08/ready_emergency-preparedness-curriculum-grades-6-8.pdf
 - 9th – 12th Grade: https://www.ready.gov/sites/default/files/2020-08/ready_emergency-preparedness-curriculum-grades-9-12.pdf
- <https://www.ready.gov/kids/be-ready-kids>
- <https://www.ready.gov/kids/teens>
- <https://www.ready.gov/es/emergencias-con-productos-quimicos-en-el-hogar>

UNESCO:

- Curriculum - “Stay Safe and Prepared: A Student’s Guide”
<https://unesdoc.unesco.org/ark:/48223/pf0000231084>
- Curriculum - “Stay Safe and Prepared: A Student’s Guide”
https://unesdoc.unesco.org/ark:/48223/pf0000231085_spa

CDC:

- <https://www.cdc.gov/healthywater/emergency/es/drinking/making-water-safe.html>
- <https://www.cdc.gov/es/disasters/cleanup/facts.html>
- <https://www.cdc.gov/disasters/chemicals.html>

EPA:

- <https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution>
- https://www3.epa.gov/safewater/kids/pdfs/activity_grades_4-8_nonpoint_pollution.pdf