Restless Earth

School: none
Teacher: NUCLIO
No of students participated: up to the teacher
Subject domain: Environmental Education, Geography and Earth Science, Sound, Waves

Contact info

Feel

The loudest sound in the history of Earth!

Krakatoa is known to be among the 5 deadliest volcano explosions. However, it also holds a record of its own. The eruption of Krakatoa in 1883 produced the loudest sound ever recorded in history. The sound was so loud it's inching up against the limits of what we mean by "sound." Have a look at the following video to learn more about it.

Additionally, you may read the following article: The Sound So Loud That It Circled the Earth Four Times

Deadly lakes

Even extinct volcanoes can pose a threat sometimes. Some very rare and mysterious phenomena are linked to sleeping volcanoes. Check the following video to learn what happened at Lake Nyos in 1986.

Read more

1816: The year without a summer

What exactly is a volcano capable of? Can a single eruption affect the whole planet?

Reflection

Discuss with your team following the sets of questions below:

How do Earthquakes, Volcanic eryptions and tsunamis affect us and the planet? Are people in the nearby areas the only ones who are affected? What are the long term effects of such a natural phenomenon?

The three stories mentioned earlier have one thing in common. No one saw it coming. Citizents were caught unprepared and uninformed. Do you think these disasters could have been avoided? Could the people have protected themselves?

Getting to the root of the problem

In order to get a better understanding of the effects of natural phenomena on our lives we are going to play the why-why challenge. Find a partner to play the why-why challenge. One of you, should ask a "Why" question related to the topic at hand (the effect of natural hazards on people). After your partner answers, ask "Why" again. For example: Why is there water shortage? - Because people waste a lot of water. - Why do people waste a lot of water? - Because they are unaware of the problem and don't know how to do proper management. Then switch roles and try again. You can repeat the process as many time as you want. Make sure you record every why-why set.

Is your local community prone to disasters caused by natural phenomena like volcanic eruptions, earthquakes and tsunamis? Have there been any related incidents in the recent past? If so what happened? Is there a safety protocol to be followed by the citizens? Write a small summary based on your thoughts and findings. Feel free to add images, videos and relevant references.

Imagine

Natural phenomena like massive earthquakes, volcanic eruptions and tsunamis have not just caused disaster to cities or villages, they are even responsible for wipping out entire civilizations. Before proceeding with our work, let's take a moment and look back in history again and explore the impact of a natural disaster on past civilizations. Let's look into two such stories to get a better understanding.

The demise of the mighty Minoan civilization

The Minoan civilization was a Bronze Age Aegean civilization on the island of Crete and other Aegean Islands which flourished from c. 2700 to c. 1450 BC. It fell to its demise around 1100 BC approximately 50 years after the eruption of the Volcano at Thera (today known as Santorini).

The Minoan eruption of Thera, also referred to as the Thera eruption or Santorini eruption, was a major catastrophic volcanic eruption (Volcanic Explosivity Index (VEI) = 6 or 7, Dense-rock equivalent (DRE) = 60 km3) which is estimated to have occurred in the mid second millennium BCE. The eruption was one of the largest volcanic events on Earth in recorded history. The eruption devastated the island of Thera, including the Minoan settlement at Akrotiri -- as well as communities and agricultural areas on nearby islands and on the coast of Crete.

The eruption seems to have inspired certain Greek myths and may have caused turmoil in Egypt. Additionally, it has been speculated that the Minoan eruption and the destruction of the city at Akrotiri provided the basis for or otherwise inspired Plato's story of Atlantis.

Here are some interesting articles about the destruction of the Minoan civilization:

The Fall of the Minoan Civilisation

The Destruction of the Minoan Civilization

The Great Lisbon earthquake

On the morning of November 1st 1755, the "Feast of All Saints" day , an astonishing earthquake (of magnitude between 8.5 and 9) hits Lisbon. The earthquake, in combination with subsequent fires and a tsunami that roamed the city, almost obliterated Lisbon and the surrounding areas.

Here are some more information about the great earthquake of Lisbon:

1755 The Great Lisbon Earthquake and Tsunami, Portugal

Lisbon earthquake of 1755

Do you think the Minoans or the people of Lisbon where aware of the danger they were in? Could they have predicted what happened? Are there any signs that they had tried to protect their cities from such a devastation? Choose one of the two historic events or a similar event near your location and make a small research on the subject. Make a presentation based on your research to describe the event you investigated, its impact on the people at the time and any connections you can find between that event and the life of the people at that location today. Add your input here in your project.

Based on your observations and reflections so far, what do you think should be done in order to save as many lives as possible when phenomena like the ones mentioned above occur? What about people who live relatively far from areas where such disasters are likely to occur? Write a short piece to gather your thoughts on volcanic activity, earthquakes and tsunamis as natural phenomena and on their impact on humans. To what extend do they affect humans? Is it a local or a global problem? Can we do something about it? Write down any ideas and suggestions you have.

Create

Before thinking and looking closer at the proposed ideas about protection from natural disasters it is essential to get a deeper understaning of these phenomena. Click in the links below to learn about each of them.
(Important note: Before working on the activities below, your teacher should dublicate each space and give you the respective students' link)

Volcanoes | Earthquakes | Tsunamis

As you have probably already realized, the three natural phenomena being discussed here are closely related. Tsunamis can be caused by stong earthquakes or major volcanic eruptions. Active volcanoes also demonstrate seismic activity especially prior to an eruption. Earthquakes and volcanic eruptions are both directly related to the Earth's tectonic plates. If we wanted to monitor all of these phenomena and help protect citizens from them, what would be the best course of action? What should we be looking at in order to monitor such phenomena?

Your mission is to design a citizen's alert programm to help your municipality raise awareness among the locals on natural hazards and how to be protected. You will need to design a programme which will include to main strands:

a) Early Warning

b) Safety actions

Protecting a municipality from natural disasters is not an easy job. It would be good to get a clear idea of what it entails and how difficult it is to perform related tasks before you start your mission. Perhaps you would like to engage in a realistic disaster scenario and see how well you do in protecting the citizens. Click on the image below to visit the simulator.

Time to start your mission! Study the geography of your island (and the nearby area) as well as the local historic events related to natural disasters. Is the local community in direct or indirect danger due to such natural phenomena? Is there an early warning system in place? Is there any safety

training programmes for citizens so they know how to be prepared and/or how to protect themselves in the case of such an event? How can your school help monitor such natural phenomena and alert citizens promptly?

http://i.imgur.com/a81FuEU.jpg - A Beautiful Mind

Look back at your ideas from the previous phase and based on them design your own citizen's alert programm. Start by going through your ideas and deciding which ones have the most potential and are going to be the most effective ones. Make a detailed plan of action and distribute roles across your team.

You can use the Restless Earth globallab project, to collaborate with other schools that are actively involved in the same project.

Have a look at the links below to get some inspiration:

- Building a seismograph from scrap
- Schools Study Earthquakes
- Measuring the explosiveness of a volcanic eruption
- Experiments on earthquakes and volcanoes

Share

It is time to communicate your citizen's alert programme with the community! To achieve this, you will need go out in your town and inform the citizens. You can do that by creating your own **science trail** in your home town/city. A science trail is a set of different physical stations where community members, tourists and other visitors will be able to learn about your work and gain awareness, promoting development, awareness and sustainability in the heart of the community.

A station of a science trail is a physical stop where the visitor goes through an interactive activity/game that will serve the following purposes:

- Introduce the topic (usually through a game, quiz, fun experiment, etc.)

- Raise awareness to the problem (a video, another game, etc.)

- Present the solutions and how they can be applied

Considering this, it is important to establish from the beginning what type of stations the science trail will contain:

Different types of stations can be planned:

- Self-sustainable station where the accesses a link or a QR code that leads to an online platform where the whole activity can be performed.
- Self-sustainable station created in the form of an exhibition with physical materials that are kept in place
- Stations that require the presence of at least one student to lead the visitors through the activity (this is the recommended for at least the release of the science trail to the public)

Having decided on what types of stations the science trail will have, the target community should be defined and the place where the science trail will be built should be chosen. This can either be inside the school, in a public garden, on a shopping mall, etc. There is no limit to the possibilities, and this should be defined among the school and if necessary the city hall. After being defined, you should actually map the trail where the stations will be exposed in a Map, marking the trail, the stations and with a proper scale.

E.g. - If the target community is the elderly population, then it makes no sense to create a trail in a forest that could be hard for this public to walk in. Maybe in this case the best place would be the city garden or even the school. If the target public is the parent community, then the school could be a good place. If the target is the tourist community that visits the town, then maybe it could make sense to prepare a science trail in an already existing forest trail. etc.

See an example of a science trail created and maintained by students in Principe Island:

Click here to find more information about how to build your science trail.

Tips to make an effective project and science tail

Your science trail is all about making your voice heard. Think about ways to maximize your impact on your local community. Here are some ideas for you:

- Identify the local stakeholders and authorities that are directly related to your topic. Make sure they are aware of your work and try to get them involved as much as possible.

- Talk to local experts. Discuss and take interviews to add in your project.

- When working on your project keep record of everything you do and make as much footage as possible. Images and videos sometimes speak much louder than words.

- Pay attention to your presentation and know your audience. Make sure your stations are interesting so that people will want to come and check them out.

- Apart from selecting the ideal spot for your stations, also think about local events you can participate in.