

# Volcano Daily



International Strategy  
**ISDR**  
for Disaster Reduction

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## Information note for parents and teachers

**On behalf of the United Nations Secretariat for the International Strategy for Disaster Reduction, I have the pleasure to present Volcano Daily.**

**Volcano Daily is intended to make young people around the world aware of the dangers that volcanoes represent and, in particular, all the measures that can be undertaken to prevent and protect against volcanic disaster. We have chosen this subject as part of our information campaign on disaster reduction for sustainable mountain development, to accompany the celebration by the United Nations of the International Year of Mountains, 2002.**

**I hope you find Volcano Daily enjoyable and informative, with interesting activities. More details of the United Nations International Strategy for Disaster Reduction can be found at the end of the text.**

**Happy reading, and do not forget, prevention is better than cure!**

**Sálvano Briceño, Director  
United Nations Secretariat for the  
International Strategy for Disaster Reduction**

*The technical text of the publication is by Henry Gaudru, a vulcanologist and author of a number of books and films on volcanoes; he is also the President of the European Vulcanological Society, a member of the International Association of Vulcanology and Chemistry of the Earth's Interior (IAVCEI) and an adviser on volcanic risks for ISDR.*

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Greetings!

My name is Vulca the volcano and I am here to explain to you how to read “Volcano Daily”, which is about me. In the following pages, you will read that a journalist came to talk to me to ask questions about my family and myself and how I behave. The journalist also talked about me with a vulcanologist who is a person who works on volcanoes and their way of life. You will learn many things about volcanoes like me. What is very important to remember now is that, even if I can be dangerous sometimes, as you will see in “Volcano Daily”, you, and all the young people living close to volcanoes, can actually do many things to avoid my eruptions and protect yourselves from them. Together, we can avoid what people call a “natural disaster”, i.e. that people lose their homes, that they are injured or killed because of one of my eruptions.



Hello there, my name is Henri the vulcanologist. I know a lot about volcanoes and my work is to explain how volcanoes behave. I also help people to live well with volcanoes and protect themselves from them when necessary.



After sleeping for more than 600 years, the volcano has awoken. There have been a number of earth tremors, and a plume of steam and ash has risen above the crater. The alert has been sounded, and the local inhabitants are on their guard because a violent volcanic eruption could occur any day. Our special envoy is on the spot.

## ***Question: Mr. Volcano, who are you?***

***When people talk about me they often say I am violent and nasty ... and it is true that when I am in a temper I can smash your houses, destroy your roads, ruin your crops and even, sometimes, kill some of you ...***

***But don't forget it is partly thanks to me that you are alive today. A very, very long time ago, long before the dinosaurs, when the planet was still young I spat out a lot of gas that allowed life on Earth to start ... and it was after that that water, air, plants, animals and, a lot later on, people, came on the scene.***

***How many volcanoes are there in your family?***



***There are lots of us and we live in most countries, above ground, under the sea and even on other planets. Some of us are as big as mountains, others are no bigger than hills, some smoke almost constantly and others like to sleep for long periods.***

## **A vulcanologist comments**

The Earth has many volcanoes ... Over 10,000 have been found on the Earth's surface and there are several million under the sea. More than 1500 volcanoes have erupted over the past 10,000 years, 400 of them during the 20th century. Thirty-odd erupt each year.



# Questions to the vulcanologist



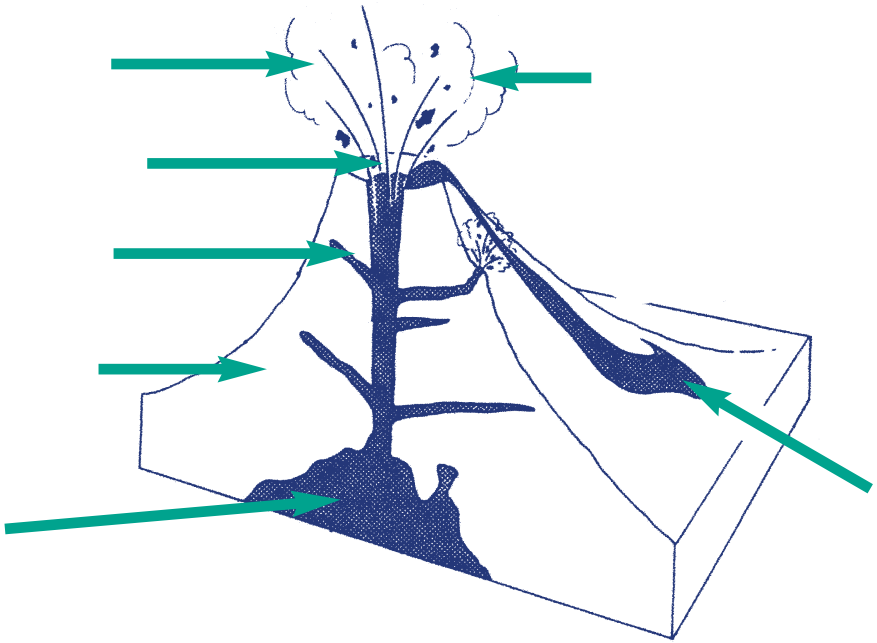
## Why are there volcanoes?

The Earth is a living planet. Several kilometers under our feet there is rock that is blazing hot. Sometimes this very hot rock manages to make its way to the surface, and that is when a volcano is born.

## What is a volcano?

A volcano is a sort of break in the Earth's surface through which the blazing rock, called **magma**, comes up. It is like a **chimney** which sometimes allows magma from the interior of the planet to escape. The hot rock is several kilometers beneath our feet. It is very hot (over  $1000^{\circ}\text{C}$ ). At that temperature rock melts, a bit like thick soup, and bubbles form in the magma, which can contain large quantities of **gas**. The solid surface of the Earth is like a lid put tightly on a saucepan of boiling water. It stops the gas escaping. But if the solid ground breaks open the gas can come out and it brings magma with it: that is what we call **lava**. As it comes up and spreads out the lava cools and solidifies. And as the lava comes out, quietly or violently, it builds up a sort of smoking mountain, **the volcanic cone**. From the top of the cone you get **smoke**, **ash** and lava.





Put the words underlined in the right places on the diagram

## Interview with the volcano

*What are your family like?*

*Very varied: there are old lazy-bones that let their lava run out smoothly, little agitated ones that are constantly exploding and great big angry ones that blow their heads off with a terrible*

*bang – there are all sort of funny types in my family.*



## A vulcanologist comments



Some volcanoes are not very dangerous – we call them “red” volcanoes – but others can get terribly worked up and present a danger to the people living nearby, and we call them “gray” volcanoes.

**Red volcanoes** have spectacular eruptions, which we sometimes call effusive, but are not terribly dangerous. Magnificent fountains of red-hot lava rise above boiling lava lakes in their craters, and rivers of lava spill down their sides – a real firework display! Because the lava flows are very liquid and contain very little gas they can flow out of the crater very fast. Unless the blazing rock encounters water on its way up there will not be a violent explosion.



**Gray volcanoes** are more violent and dangerous; they have what we call explosive eruptions. They explode when they erupt because there are gas bubbles that find it very difficult to escape from the thick, sticky magma. Ash, gas and blazing rocks can be flung high into the sky. The huge clouds of smoke often fall back towards the Earth and flow like a blazing flood down the sides of the volcano, destroying everything in their path. When it is all over, the fields and houses are covered in a layer of gray, which is where the term gray volcano comes from.

# The seven angry faces of a volcano



**1** The volcano covers houses and crops under coarse or finer ash: this is an ash fall. Examples: Galunggung, Indonesia, 1982; Rabaul, Papua-New Guinea, 1994.

**2** The volcano covers villages and fields under a river of fire that burns everything: this is a lava flow. Examples: Vesuvius, Italy, 1944; Heimaey, Iceland, 1973; Nyiragongo, Congo, 2002.

**3** The volcano emits a fiery avalanche that burns and destroys everything in its path: this is a pyroclastic flow. Examples: Mt. Pelée, Martinique, 1902 ; El Chichon, Mexico, 1982 ; Unzen, Japan, 1991.

**4** The volcano spews smoke that may make it hard to breathe or even kill you : this is volcanic gas. Examples: Dieng, Indonesia, 1979; Nyos, Cameroon, 1986.

**5** The volcano warms up snow or ice, or rain loosens previous layers of ash, sending mud cascading into inhabited valleys: this is a lahar or mud flow. Examples: Ruapehu, New Zealand, 1953; Nevado del Ruiz, Colombia, 1985; Mt. Pinatubo, Philippines, 1991.

**6** The volcano destroys homes and covers the ground and crops with boulders: this is a debris avalanche. Examples: Papandayan, Indonesia, 1772; Marapi, Indonesia, 1979; Mount St. Helens, USA, 1980.

**7** The volcano may flood towns and villages by the edge of the sea or a lake by sending large quantities of rocks into the water: this is a tsunami. Examples: Krakatoa, Indonesia, 1883; Colo, Indonesia, 1983.



## The champions of the Volcano family

- **Biggest:** Mauna Loa, which stands 9000m tall from the seabed to its summit and is 250 km across at its base.
- **Highest:** Nevado Ojos del Salado, in Chile, which rises to 6885 m above sea level.
- **Most often active:** Kilauea, in Hawaii (USA), with 74 eruptions since 1794.
- **Most violent: Tambora:** in Indonesia, which killed over 90,000 people when it erupted in 1815.
- **Biggest crater (caldera):** Toba, on the island of Sumatra in Indonesia. The volcanic caldera is 100 km long and 30 km across.
- **Highest smoke plume:** Taupo, in New Zealand, 186 A.D The column of smoke rose to an altitude of 50 km.
- **Biggest lava flow in history:** Laki, in Iceland, in 1783: the flow was 60 km long and covered an area of 580 km<sup>2</sup>.



### Interview with the volcano:

*What can happen if you live on or beside a volcano?*

*I may sleep for a very long time between eruptions, sometimes decades or centuries ..*

*I may remain quiet for your entire life, but sometimes I wake up, and not always in a good mood ... I begin by shifting and stretching then I smoke for some days, or months, or even years ... then one day I shake myself hard, roar and begin to spit ash and blazing rocks, which will start to fall on the fields and houses*



## Prevention is better than cure ...

There are many activities we can undertake together to protect ourselves from volcanic eruptions and live happily with volcanoes.

### Here is how it works:

With the help of a vulcanologist, at school, with your parents, with the firefighters, with your friends from the civil protection agency or many other people, you can determine if, where and how past volcanic eruptions have taken place. This can be seen by observing nature and the rocks around the volcano and by talking to the inhabitants who have been living around the volcano for a long time. Where there are many rocks and few plants, lava flows will have been. We can therefore determine where the dangerous locations are.

### Game:

If there are people living in dangerous locations, you can make a drawing of the location, called risk map, to determine where the most dangerous areas are.



Here is how to make a risk map.

- 1 With the help of your teacher, consult books or archives and ask around you what great eruptions have taken place in your area in the past. Determine which part of your village or city and its surrounding was affected. For example by mud flows, lava flows or ground trembling and landslides. Indicate these on your map using different symbols for different events.
- 2 On your risk map, indicate where the main buildings are: schools, hospitals, fire stations, houses, police stations, as well as buildings which could be dangerous like factories, fragile constructions, dams, electric power plants. Also draw the roads, rivers, tension lines and construction sites in your area using different colors.



- 3 Show how badly the buildings would be affected (a little, a lot, fully destroyed) using a different color according to the level of destruction.
- 4 Show where the most vulnerable people, those who would need most help in case of a disaster, would be located (old people's homes, hospitals, kindergartens, for example).
- 5 Discuss different solutions to reduce the risks and make your village/town safer.
- 6 On the risk map, try to add the following things if they do not exist where you live:
  - houses which are so strong that they resist earthquakes.
  - elters (in case the volcano spits fire or ashes)
  - dams to stop lava or mud flows
  - alarms like bells or sirens to evacuate people before a volcanic eruption.
  - escape routes
- 7 Share your work with local authorities, the firefighters, the police, emergency workers, medical doctors, social workers and journalists.





## What do you do in case of an emergency?

Next to many volcanoes in the world, there are observatories which can warn of an emergency. A surveillance observatory is the ideal way to follow the activity of a volcano in between eruptions in order to predict them. Inside the observatory, the vulcanologists watch volcanoes permanently by looking at them, but above and beyond, by using instruments which can detect a volcano waking up. The signs can be earth tremors, the air changing or the volcano's size changing for example. Here's an emergency table:

Emergency	Type of Alarm levels	Possible time before an eruption
Green	No alarm	Several years
Yellow	Vigilance	One or several years
Orange	Pre-Alarm	Several months or weeks
Red	Alarm	Immediate

When the emergency level is red, you must quickly go home and listen to the radio or watch TV to get information.

You must stay inside the house or go into a shelter foreseen for the emergency. If you are outside when a lot of ash is falling, you have to put a cloth over your eyes and nose to help you breathe better. You must never panic and wait for the instructions of the local authorities.



If the eruption becomes more violent, obey your parents and follow the advice of the police, the army and the vulcanologists. You may have to leave your house for several days while the volcano calms down.

### A vulcanologist comments



Thanks to their surveys and their measuring instruments, vulcanologists can now tell several weeks or days in advance if a volcano is waking up. They can often warn people before it explodes violently and advise them what to do. This way, people living in areas at risk, meaning living close to a volcano which can wake up, are assisted in what to do protect themselves.



## Interview with the volcano

*As I was saying, after I have been in a temper I calm down and often go to sleep for years and years. I am not as nasty as all that! Every time I erupt you benefit afterwards. The masses of ash I have spewed out help your plants to grow. When the rain washes the ash into lakes and rivers there will be lots more fish.*

*The gas that comes out of my crater brings up lots of different metals, and sometimes even precious stones and diamonds, with it. You can use my rock to build houses, roads and bridges. You can use pieces of me to make glue, toothpaste and lots of other things ...*

*You can use the heat I continue to give off to heat your homes, make electricity, and grow vegetables even when it is very cold.*

*So before you say I am nasty, think about that. You can manage the dangers I pose and act accordingly. Because even if I sleep for a very long time I can wake up very suddenly. Think about it, and don't settle too close to me. That way we can get along together on our beautiful planet Earth.*

## A vulcanologist sums up

People have always known that volcanoes can sometimes be deadly and destructive, but they also know what benefits volcanoes can bring. The people living at the foot of some volcanoes do very well out of the fertile soil.

Of course a volcano can be dangerous, but if we humans are reasonable and do not settle just anywhere, too close to craters or in the middle of areas that are directly threatened, we can minimize the risks. And by getting to know volcanoes better we can tell in advance what might happen and how to react in the event of an eruption.





## Information for parents and teachers

### What is a natural hazard?

Natural hazards comprise phenomena such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand and dust storms, and infestations.

### What is a natural disaster?

A natural disaster is a result of the impact of a natural hazard on a socio-economic system with a given level of vulnerability which prevents the society affected from coping adequately. Natural hazards themselves do not necessarily lead to disasters. It is only their interaction with people and their environment that generates impacts, which may reach disastrous proportions. The International Strategy for Disaster Reduction encompasses technical and environmental disasters only when caused by natural hazards. A disaster is usually defined as a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the society affected to cope using only its own resources (IDNDR/DHA 1992).

## **What is risk?**

The probability of harmful consequences or expected loss (of lives, people injured, property, livelihood, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions. Conventionally risk is expressed by the equation  $\text{Risk} = \text{Hazards} \times \text{Vulnerability} / \text{Capacity}$ "

## **What does disaster reduction entail?**

There are ways of mitigating the growing impact of natural hazards around the world. The knowledge and technology to put them into effect are widespread. Disaster reduction entails doing everything that can be done to make people less vulnerable to natural hazards. This spans a wide range of activities, from efforts to try to prevent disasters to action designed to limit their severity when they do occur. Success depends on good information and determined action by the public authorities.

Disaster reduction is an ongoing process, not limited to a single disaster. The aim is to persuade societies at risk to commit themselves to responsible disaster management that goes beyond traditional responses. By its nature, disaster reduction is a multisectoral and interdisciplinary exercise involving a variety of interdependent activities at all levels -- local, national, regional and international.

## The United Nations Secretariat for the International Strategy for Disaster Reduction



Within the United Nations system, the Secretariat for the International Strategy for Disaster Reduction is responsible for coordinating disaster reduction strategies and programmes. Its mission is to help people withstand disasters by making them aware of the importance of disaster reduction measures and providing support to help reduce human, economic and social losses. The Secretariat also provides backing for an Inter-Agency Task Force on Disaster Reduction headed by the Under-Secretary-General for Humanitarian Affairs and comprising representatives of several United Nations agencies, regional institutions and non-governmental organizations. Within the United Nations system, the Task Force is the chief body responsible for the design of disaster reduction policy.

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