

Environmental Change

Types of Environmental Change

Natural changes can take place in any habitat. These changes affect the organisms that live there. Some examples of natural environmental change include fire, flood, drought, erosion, climate change, and volcanic eruptions.

Fire

Fires can decrease the number of plants and animals that live in the area. Some plants and animals are killed in the fire. Others can be hurt later because they don't have enough food or because they have lost their home. The effect of a fire on a forest can be very large because many different kinds of plants and animals live there.

In time, life will return to an area damaged by fire. At first, the types of organisms that can live well there may be different from the ones that lived there before the fire. This is partly because more sunlight can reach the shorter plants since the tall trees are no longer blocking it out. After many years, the area will once again have the same kinds of plants and animals as it did before the fire.



This forest is beginning to show signs of life after it was destroyed by fire.

Drought

A drought takes place when there is no rain or snow for a long period of time. Drought can hurt or kill plants because they do not have the water they need for their life processes.

Drought can also hurt animals because they need water to live and because they can't find enough food after the plants start to die.

Animals living in bodies of water, like lakes or ponds, are also affected by droughts. During droughts, the amount of water that falls as rain is less than the amount that evaporates. This causes the body of water to get smaller. As it gets smaller, fish and other animals will not have enough water to live.



Stream beds like the one above can become dry because of a drought.

Flood

Floods are usually caused by heavy rain, large amounts of rain, or the fast melting of snow or ice. Floods can harm plants. They can also harm any animals that live in burrows, that cannot swim, or that are not able to get away from the flood waters by running or flying away.



This habitat has been affected by a flood.

Flash floods are floods that happen very quickly. They can sometimes happen during any heavy rain, but they are most likely to happen in low areas after a drought or a wildfire. This is because when a fire or drought destroys the trees and other plants that were slowing the

flow of fallen rainwater, the water will flow much faster down hills and into valleys or low plains.

While flooding sometimes causes damage, it can also have some good effects on the environment. The flood water brings topsoil and other kinds of sediment that it picked up from other places. This sediment usually has lots of nutrients, so it makes the soil better for plants to grow in.

Erosion

Erosion takes place when soil, mud, dirt, or rocks are washed or blown away by wind, water, or ice. Loss of soil can decrease the number of plants living in an area. This is because the plants then do not have the nutrients they need or a place for their roots to grow. As the number of plants decreases, the number of animals also decreases because animals have fewer plants to eat.



As this sea arch weathers and erodes away, the trees have less space and soil in which to grow.

When the soil in an area of land is no longer held in place by plants and their roots, it can become very dry and dusty. Strong winds sweep the dry soil away and create dust storms that are harmful to plants.

Loose soil can also find its way into streams, ponds, and lakes. The soil can cloud the water. This decreases the amount of sunlight that gets through the water. Algae and water plants that live in the water may not get enough sunlight to survive. If the plants die, there may not be enough for fish living in the water to eat.

Volcanoes

A volcano is an opening in the Earth's surface. Lava (melted rock), steam, or ash can come out of the opening and flow down the side of the volcano. When a volcano erupts, the lava that comes out can harden to make new land. The hot lava can also burn plants and destroy habitats.

Big volcanic eruptions can make ash and dust go high into the air. The dust can block sunlight and cause climate changes around the world.



Volcanoes can release ash and dust into the air. This can block sunlight, even in areas that are far away from the volcano.

Image courtesy of NASA

Less sunlight reaching the Earth can make it harder for plants to make food. This can decrease the number of plants in certain areas, which can cause animal populations to get smaller also.

Effect of Environmental Change on Organisms

Plants and animals are affected by their environment. Any change in the environment of an organism can make it either easier or harder for the organism to survive.

Habitats Are Living Systems

Habitats are systems. They are made up of many parts, and each part has a function. When all the parts are functioning, the habitat works well, and it is in balance.

In any habitat, the organisms that live there must meet their basic needs. For example, animals need places where they can seek shelter. Plants need to be able to get sunlight, or to develop ways to use less sunlight if not much is available. Animals need to find plants or other animals that they can eat. Both plants and animals need to be able to get the water they need.



Giant pandas get food by eating bamboo plants.

Habitat Change

Natural changes in a habitat, such as a flood or a fire, can cause many different things to happen to the organisms that live there. Some organisms might do well, while others might either die or be forced to move to new areas.

Humans can also change environments by doing things such as cutting down forests, making pollution, or using pesticides. Pesticides are a type of poison that kills insects. Although they can help farmers by protecting their crops, pesticides can also harm people, pets, and insects that are good for crops.

If a change to a habitat is minor (small) or does not last long, the populations of organisms will often return to normal. If the change is major (big) or lasts a long time, the populations of organisms can be changed forever. In some cases, this can lead to plants and animals dying out, or becoming *extinct*.



Plant and animal populations often return to normal after a wildfire. This is a minor event.



When a whole forest is cut down at once, animals are forced to find new places to live. This is a major event.

Responses to Environmental Change

Animals can respond to environmental changes in different ways. Some animals may move out of the environment and find a new home. Others may change their behavior. For example, an animal might start begging for food from humans if humans move into its habitat.



Squirrels that live near parks or school campuses survive partly by getting food from people. After a while, the animals may begin begging people for food.

If an animal population does not respond to an environmental change, then all the animals may die.

Solutions to Environmental Change

Humans can use science knowledge and engineering design solutions to solve problems caused by environmental change. For instance, humans know that plants help hold soil in place and prevent erosion. If a bare slope is losing large amounts of soil to erosion, people could plant grass, flowers, or trees on the slope to decrease soil loss.



This slope might lose less soil to erosion if people planted grass on the slope.

Developing Solutions to Problems

Science can help people solve problems.

To solve a problem, first scientists have to learn about the problem. Then, they can do investigations to study the problem. Scientists also use investigations to test solutions to problems. Finally, they may design a new product or tool that solves the problem.

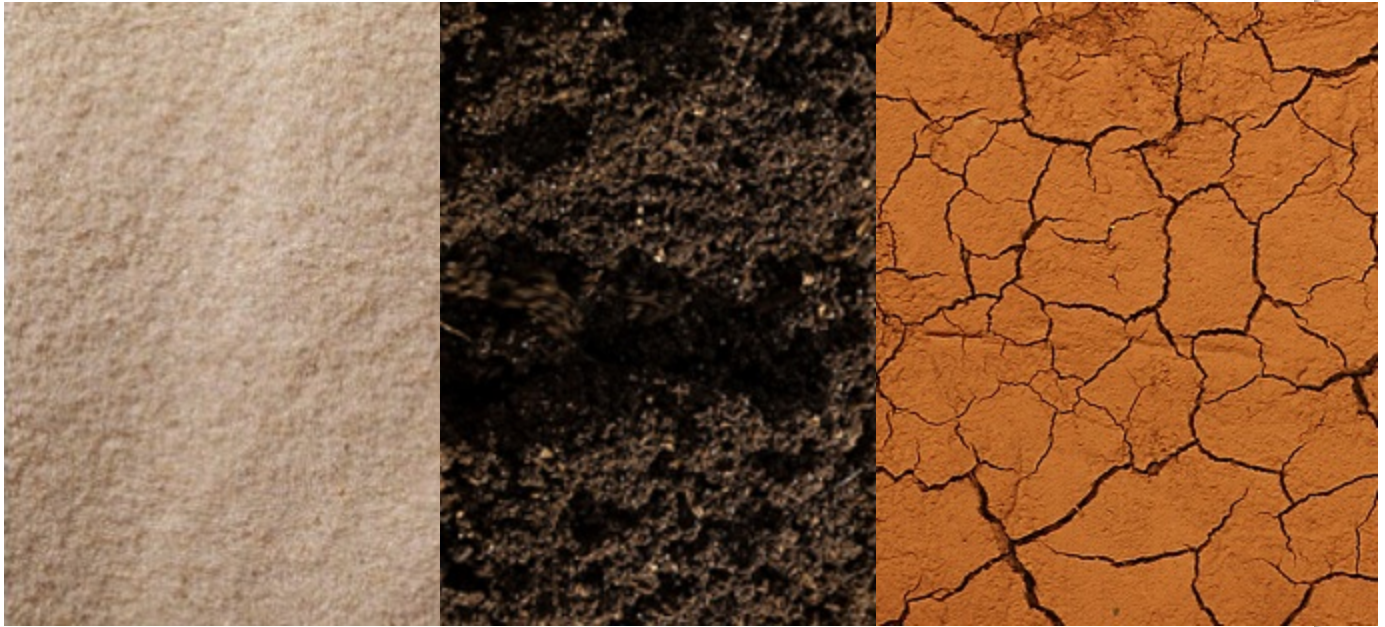
A Scientific Process

One problem a scientist might solve is how to care for a certain type of worm indoors. The scientist should first **ask a question**. He might ask "what type of soil is best for a worm to live in?" The answer to this question will help him build a home for a worm indoors.



What type of soil is best for a worm to live in?

The scientist could read books or use the Internet to **research** (learn about) what type of soil worms like to live in. He could also do an **investigation** by finding what type of soil outdoors—sandy soil, soil rich in humus, or clay soil—has the most worms living in it.



Sand

Humus

Clay

After the scientist chooses the best soil, he could **design** a terrarium to hold the soil and the worms. For example, the terrarium in the picture below was made from a soda bottle, soil, and plants.



To test the terrarium he could use another investigation. He could put some worms in the terrarium to test how well it works.

A Scientific Attitude

A solution to a problem might not be found on the first try. A scientist needs to be willing to try different ideas and to pay attention to unexpected results.

- Solving a problem may take many tries.
- Solving a problem may take creativity.

- Solving a problem may take patience.

Many important problems have taken a long time to solve. A scientist needs to be patient even if an investigation takes many tries.

Sometimes the first idea doesn't work. A scientist must be creative and willing to try different ideas, even if it is someone else's idea.

It is important for a scientist to pay attention to all the results of an investigation even if they are not the results that the scientist wants or expects. Many discoveries have been made by accident or because the results were different from those predicted.