

Natural Environmental Impact

The Earth has continually changed since its formation. In addition to human activities, there are many natural processes that are involved in shaping the environment.

Volcanoes

Volcanic eruptions release many tons of greenhouse gases into the atmosphere. These can contribute to an increase in global temperature.

However, volcanoes can also release particles such as ash into the atmosphere. These particles reflect sunlight back into space, keeping it from reaching the Earth. Particles such as ash and dust can actually lower the temperature of the Earth. Depending on the amount of particulate matter ejected into the atmosphere during an eruption, these temperature drop can last from days to even months.



Image is courtesy of the USGS/Cascades Volcano Observatory.

Fire

Fires are a natural part of the life cycle of ecosystems such as forests and grasslands. Though they are sometimes attributed to human activity, wildfires are also caused by natural phenomena. Lightning and volcanic eruptions are often causes of wildfires as well.

The overall damage is dependent on factors. The build-up of underbrush can cause a fire to burn hotter and cause more damage. Drought conditions can also extend the amount of damage.



Image is courtesy of the US Fish and Wildlife Service.

- *Fires allow new plants to grow.*

Fires return the nutrients that were bound up in the plants to the soil, enriching it for new plant

growth. Fire also clears out old growth that blocked the light, giving new plants a chance to gain a foothold.

- *Fires destroy vegetation.*

Fires can destroy the food sources of herbivores. By destroying ground cover such as grass, they increase the erosion of top soil.

- *Fires destroy animal habitats.*

Many animals become displaced while fleeing fires or are killed by the smoke, fire, or destruction of their food sources.

- *Fires release ash into the air*, which can increase cloud formation and block sunlight from reaching the Earth.

Plants

Plant life has a tremendous effect on the environment.

- *Plants prevent erosion.*

Plants' roots anchor soil in place. They also absorb water, reducing the amount of runoff that can carry away soil.

- *Plants improve air quality.*

Photosynthesis removes carbon dioxide, a greenhouse gas, from the air, and releases the oxygen that animals need to live. Plants can also remove some pollutants from the air.

- *Plants improve soil quality.*

Many plants release chemicals from their roots that improve the quality of the soil. Some plants can even remove toxic metals from the soil.

Human Environmental Impact

Humans have the ability to affect the environment in many different ways. Construction, pollution, resource use, and preservation are just a few of the human actions that affect the environment.

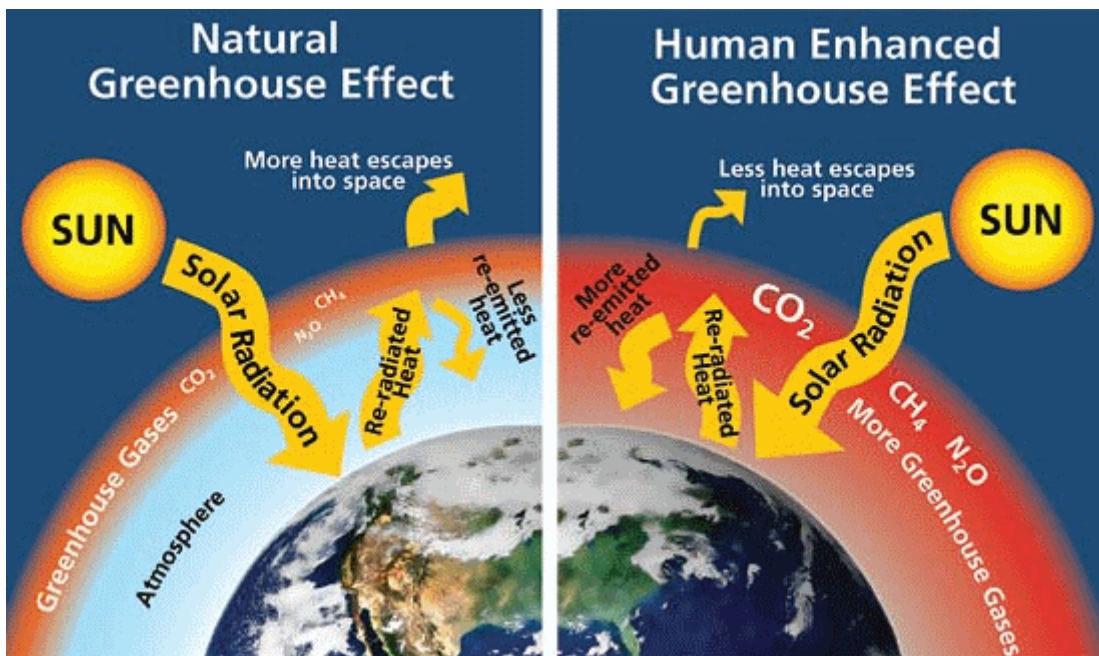
Human Activity and the Earth's Processes

Human activities can change the balance in Earth's processes, such as the carbon cycle and the water cycle. Careless human activity can also alter or destroy habitats and damage ecosystems.

The Carbon Cycle and Climate Change

The use of fossil fuels has impacted the carbon cycle. When fossil fuels are burned, carbon is transferred from the geosphere to the atmosphere. Greenhouse gases, such as carbon dioxide, methane, and water vapor, are released into the atmosphere in large quantities when fossil fuels are combusted.

The Earth's atmosphere naturally contains greenhouse gases, which trap sunlight energy. The increasing amount of greenhouse gases released by the growing population of humans is causing average global temperatures to rise, according to climate scientists.



The image of the left represents the natural greenhouse effect. The image on the right shows the effect of extra greenhouse gases on heat retention within Earth's atmosphere.

Image courtesy of NPS.

Earth's Atmosphere

Human activities release substances into the air, some of which cause problems for humans, plants, and animals. Some air pollutants return to Earth in the form of acid rain and snow, which corrode

statues and buildings, damage crops and forests, and make lakes and streams unsuitable for fish and other plant and animal life.

One type of air pollution, known as particulate matter, consists of the small particles released into the air from burning fuel. These particles are very small pieces of matter, which are easily inhaled deeply into the lungs where they can be absorbed into the bloodstream or remain embedded in the lungs for long periods of time.

Burning fossil fuels also releases other pollutants, such as sulfur dioxide and mercury from burning coal and natural gas. Sulfur dioxide and nitrous oxide compounds that are released into the atmosphere contribute to acid rain.

Some substances that are considered air pollution by the U.S. Environmental Protection Agency include:

- Ozone
- Carbon Monoxide
- Carbon Dioxide
- Nitrogen Oxides
- Sulfur Dioxide
- Lead
- Mercury
- Particulate Matter

Ozone is a type of gas in the atmosphere that shields the Earth from the Sun's radiation. Near ground level ozone is considered a pollutant—it is a major component of smog—but in the upper atmosphere it works a bit like sunblock on a global scale.

Chemicals called chlorofluorocarbons, or CFCs used in air conditioners and aerosol sprays destroy ozone. Scientists believe that these chemicals have caused two holes to develop in the ozone. These gaps in the ozone change both the amount and the type of solar energy that reaches Earth's surface. People worldwide are currently reducing the amount of ozone-destroying chemicals that are used.

The Nitrogen Cycle

Human-made fertilizers are produced using nitrogen from the atmosphere. This nitrogen is converted into nitrates, just as would happen in the nitrogen cycle in nature. The creation and use of fertilizers both bypasses the natural nitrogen cycle, and cycles nitrogen more rapidly between the atmosphere and plants.

The Water Cycle

Human activity alters the water cycle also. Surface runoff increases where more ground is covered with buildings and concrete. Pollution from these surfaces ends up in the water and changes the chemical balance of water bodies. Pollutants also leach from soils that have been polluted through spills or garbage, increasing the number of pollutants in waterways.



Landfills, which are humankind's most common way of disposing of solid waste, also impact the water cycle. Landfills often contaminate surface and groundwater.

Landfills are collection sites for solid waste materials. Water that is contaminated from the various organic and inorganic substances with which it comes into contact as it migrates through the waste is known as leachate. Water moving through a landfill inevitably becomes contaminated as leachate, which is undrinkable and often toxic. Most modern landfills in the U.S. have leachate collection and monitoring systems. These systems generally involve a layer of durable plastic that is placed beneath the waste to prevent water from seeping into the surrounding soil. But all such systems eventually fail, allowing nearby water sources to become contaminated over time.

The Cycling of Energy: Food Webs

There is a natural energy flow between plants and animals, in which plants use sunlight energy to produce the food that animals use as an energy source. Human activity has impacted the cycling of energy too.

When insecticides are used heavily, they can disrupt the food web in an ecosystem. When too many members near the bottom of a food pyramid, larger animals do not have enough food and their populations decline.

The flow of energy is also disrupted by the removal of plants. Deforestation removes the link between solar energy and food for other organisms. Deforestation can greatly limit the energy entering into a food web.

In other cases, human action increases the cycling of energy. Humans can build tools like greenhouses that allow plants to grow all year. Greenhouses increase the energy available to the plants, resulting in more plant growth and more food energy.

Human Activity and Earth's Ecosystems

Changes caused by humans can upset the balance in an ecosystem. It is a simple fact that humans and animals need space to live. As more land is developed for human use, there is less land available for animals.

Human Population Growth

Starting in the 1800s, humans have produced ever increasing amounts of chemical waste from technological activities. This began in connection with the Industrial Revolution, which started in the 1700s, and allowed for greater food production, helping to increase human health and lifespan.

Medical advancements have also allowed humans to live longer lives. Because of this, the human population has increased dramatically in the last 200 years. The current human population is estimated to be about 6.6 billion.

Animal Habitats

Human population growth has also resulted in changes to animal and plant population. Humans cultivate certain plants and animals for food, but pollution, deforestation, and land clearing have resulted in the loss of or changes to native animal habitats. This has caused some species to become threatened or endangered.

Erosion

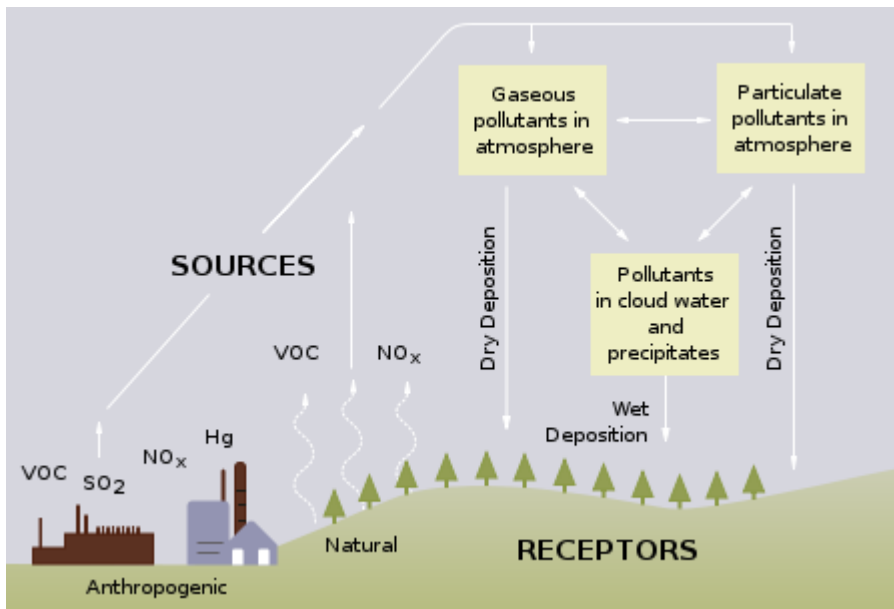
Erosion is a process that occurs naturally. However, the clearing of land through deforestation rapidly increases the amount of erosion. Without forest plants to trap and absorb water, erosion increases. Often very fertile, healthy soil is lost after deforestation.

Acid Rain

Acid rain occurs naturally, but pollution from human activities can increase the acidity of rain significantly. Acid rain occurs when atmospheric pollutants become part of clouds and then fall as

rain. The pollutants can come from volcanic eruptions, or they can come from human pollution of the atmosphere. Acid rain can harm plants and alter water ecosystems. The death of plants due to acid rain can also increase erosion.

The main way in which human activities generate acid rain is through the combustion of coal with high sulfur contents. When this coal is burned, SO₂ and nitrous oxides are emitted as byproducts. These compounds then react with other substances in the atmosphere, and can then fall as acid rain.



This image is courtesy of the U.S. Environmental Protection Agency

Acid rain can cause lakes to become too acidic to support life, leach essential minerals out of the soil, and damage or kill trees. Although acid rain is very harmful to the environment, its chemical components do not generally become concentrated in animals.

Some ecosystems are more resistant to acid rain than others. Lakes that are high in limestone and calcium carbonate can feel the effects of acid rain less than other environments. This is because limestone and calcium carbonate can neutralize the acid rain.

Human Activity and Conservation

Conservation is the careful use and preservation of Earth's natural resources. Conservation is based on the idea that people should plan ahead to minimize negative impacts. If people consider what impact their choices have on ecosystems first, they can look for ways to minimize that impact.

Although there are no easy solutions to the many negative environmental impacts that human activities can have, there are, in fact, many human activities that can have a positive impact on the environment. Some of these activities can be summarized simply as reducing, reusing, and recycling.

Reducing is the act of consuming fewer natural resources and decreasing the amount of waste a person creates. Reducing can come in many forms. Automobile manufacturers, for example, can reduce the amount of materials they consume by simply manufacturing smaller cars. Consumers can reduce the amount of fossil fuel energy they consume by operating smaller cars. Energy-efficient appliances and home heating systems also reduce the amount of resources needed to operate them.

Reusing can be giving something a different purpose, such as using an old glass jar to store extra nails and screws. It can also be the act of passing something along once you are done with it. For instance, giving clothes you've outgrown to charity or to your younger brother or sister is reusing. It keeps the clothes out of the landfill, and it also cuts down on the amount of new waste created in the production and purchase of new clothes.

Recycling is the process of making new products from products that have been used before. Since fewer new resources are needed to make the recycled products, resources are conserved. For instance, recycling paper helps conserve trees. Recycling aluminum cans helps to conserve aluminum.



There are some materials that are easier to recycle than others. Things like glass bottles, plastic milk jugs, and newspaper are easy to recycle because each is made of mostly one kind of material.

Other materials cannot be recycled by modern processes. As a result, these materials simply accumulate in the environment after their use. Light bulbs and some kinds of plastics are not recycled. Some of these items have recycling processes that are expensive. Others have processes that use a lot of energy or produce large amounts of waste.

Invasive Species

Invasive, or non-native, species may lead to extinction of native organisms by taking food, water, and space resources that the native organisms need in order to survive.

In the past few hundred years, humans have started to travel all over the world in boats, cars, and airplanes. Travelers may not know it, but they are often carrying plants, animals, and microorganisms with them when they travel.

In many cases, non-native organisms do not survive well in the new environment. However, there are cases in which the invading species is able to survive and reproduce in the new habitat. And in some instances, they even do well enough to outcompete *native species* for food and other resources. This can lead to the decline or even destruction of native populations.

One example of a successful invasive species is the kudzu plant. It is a vine with broad, heart-shaped leaves. Kudzu was brought to the U.S. from Japan. In the 1930s, the U.S. government began to promote its use to prevent soil erosion in areas without much vegetation.



Kudzu vine has covered these trees and bushes so thickly that it is difficult to see the trees underneath the vine growth.

Image is courtesy of Wikipedia

The kudzu plant has been incredibly successful in the climate of the southeastern United States. In many places there, kudzu has grown so well that it has crowded out native species. The kudzu completely covers native trees, grasses, and shrubs. Eventually, the native plants and trees die because they do not receive enough sunlight.

The video below talks about another non-native species called Japanese knotweed. To start the video, click the play button



Clip provided by Education Clip Library with permission

from ITN Source

Copyright © 2012 STUDY ISLAND. ALL RIGHTS RESERVED - All rights reserved.