Human Impact on Earth

Reflect

A long time ago, the human **population** was very small compared to what it is today. Eventually, humans figured out how to grow crops, which allowed more people to live in a smaller area. People discovered medicine and ways to keep their living spaces clean and free of harmful germs. All of these factors helped humans live longer. About 2,000 years ago, the human population began to grow very quickly. The increase in our population has had an effect on the **environment**. How do humans change the environment? Are all the changes bad?

Pollution is one negative impact humans have had on the environment.

How do organisms, such as humans, change their environment?
Humans use Earth's resources. We take up space, grow and eat food, breathe air, use energy, and produce waste. Humans have a greater effect on their environment than they ever have before. Scientists estimate that 80% of Earth's surface has been altered by human presence or by activities designed to meet the demand for natural resources. More and more people are moving from rural farmland to urban cities in pursuit of careers and active lifestyles. This process is called *urbanization.* As more people move to cities, more roads, houses, and other buildings are required to meet the needs of the people. This has a significant impact on the environment. What are some ways humans change the environment?

Urbanization has created a need for more buildings and structures, which has had a significant impact on the environment.

Changes to Land
Humans sometimes drain wetlands or cut down forests to build houses and other structures. They also sometimes turn fields into landfills for trash. When these environments are changed, they have a large impact on the animals that used to live in the environments. Draining wetlands removes a water source for animals and a habitat for fish, frogs, and other animals. Cutting down forests, also called *deforestation*, removes a habitat and source of shade and protection for animals and plants. The removal of trees also makes it easier for wind and rain to **erode** soil and nutrients from the land, making it harder for plants to grow. When humans turn fields into landfills, they replace a habitat with trash, which displaces animals and kills plants in the original habitat. These changes may help humans find shelter and get rid of waste, but they can harm other living things in the environment.

population – all the living things that belong to the same species and live in the same area

environment – the living and nonliving things that are around an organism

erode – to gradually wear away

Forests are home to many plants and animals.

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Changes to Water
Sometimes, humans take too much fresh water from their environment or reroute rivers and streams to make room for new structures. As a result, a river or stream might dry up, which kills the **organisms** that once lived there as well as those that may have depended on that water downstream. Humans also dump trash and harmful chemicals into freshwater and saltwater environments, often making the environment unfit for organisms to survive. Landfills also pollute the environment by leaking liquids into groundwater. This contaminated groundwater can affect plants and animals that depend on the water to survive.

Humans often dump harmful pollution into water.

organisms – living things

Changes to Air
Cars, buses, trains, and other types of transportation use fuels that pollute the air. Factories also pollute the air when they burn chemicals and release gases into the air. All of these chemicals put harmful contaminants into the air, which affects not only the air we breathe but also other organisms and our planet. These contaminants can create acid rain, which is the hyperacidic state of snow, fog, dew, rain, and dry particles. Acid rain has a damaging effect on plant and animal life, the soil, water, rocks and other building materials, and people.

Exhaust from cars pollute the air.

Deforestation has caused increased amounts of carbon dioxide in the atmosphere. Trees absorb carbon dioxide and then convert it into oxygen during photosynthesis. When trees are removed as part of deforestation, less carbon dioxide is absorbed, which leaves an excess. Landfills also release methane gas into the atmosphere, which, along with the excess carbon dioxide from deforestation, traps heat in the atmosphere, which contributes to global warming.

Changes to Living Things
Overhunting and overfishing can harm or destroy populations of organisms. On the East Coast, fish called cod used to be very common. Overfishing caused these populations to decline so much that they are now very rare in these areas. The larger, predatory fish that depended on these fish had to move or find other sources of food.

Humans can also accidentally introduce new, nonnative organisms into ecosystems. These organisms can use up food, space, and water that other organisms need. These animals or plants are called invasive species. They often outcompete the native species for resources (sunlight, food, water, space, shelter) they depend on. For example, the Asian tiger shrimp was introduced to waters here in the United States. It is causing native shrimp populations to decline. The tiger shrimp grows to be larger, eats more, and grows faster than the populations that grow naturally in those waters. How do you think this will affect the ecosystem over time?

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How might highways and bridges affect an environment and the organisms that live there?

Imagine that you are trying to walk home from school. All of a sudden, someone puts a wall that is 100 feet tall and 100 feet wide in front of you. It would be pretty hard for you to get to the other side of the wall, right? Highways may seem small to us, but they can seem like very large barriers to other organisms. Suppose a highway is built through a forest. A turtle needs to cross the highway to get to a pond on the other side. But a turtle crossing a highway might get hit by a car or spotted and eaten by a predator.

To a turtle, a new road can create a major obstacle.

Similar to a highway, a bridge can also have a negative effect on organisms. Chemicals from cars may fall into the water beneath the bridge. The sounds and vibrations from traffic might disturb the animals living there. Shade from the bridge could affect plants in the water that need sunlight. However, not all changes are harmful. Perhaps the bridge provides a new habitat for organisms that otherwise could not have lived there, such as barnacles. There are many changes that building structures can have on an ecosystem, both helpful and harmful.

What Do You Think?

Not all human activities are bad for the environment. What are some ways that humans help their environment? What can humans do to reduce their impact on other organisms?

What happens to organisms if their environment changes? Can you think of good and bad changes?

Deer are becoming increasingly overpopulated throughout the United States.

Life on Earth is a delicate balance. When something in an environment changes, it influences the organisms living in that environment. Sometimes, a change that is good for one organism might be bad for other organisms. An example is the deer population in the United States. Deer have become a problem animal. Humans used to hunt the animals that ate deer, such as wolves, coyotes, and mountain lions. A decrease in the number of **predators** was good for the deer. More deer survived each year, and their population grew. But other organisms suffered as a result. Deer like to eat grass, short bushes, and young trees. Sometimes they may eat all the plants in an area, leaving little food for other animals, which may starve. When the deer eat young trees, they prevent the trees from growing and replacing the old, dying trees, which can make the forest become bare. Higher populations of deer also increase the number of deer affected by diseases, which then spread among crowded populations. Scientists predict that, unless the deer population

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Look Out!

Humans can unintentionally cause change. Drought is commonly caused when the course of rivers and streams is altered by humans. Some farms with serious drought do not have enough water, and farmers have a hard time growing their crops. The process in which land that was previously fertile becomes dry and arid is called *desertification*. Desertification is often the result of human alterations that lead to drought, such as rerouting rivers or streams and deforestation. Desertification also leads to increased erosion of the soil, which inhibits plant growth.

A drought can make plant growth nearly impossible.

Scientists in the Spotlight: Rachel Carson

In the 1950s, people used a chemical called DDT to try to get rid of harmful insects such as mosquitoes. DDT was good at killing insects, but people did not know how dangerous it could be to other animals. When animals ate the dead insects, they also ate the DDT. The dangerous chemical traveled up the **food chain**. Rachel Carson was a scientist who noticed that songbirds were dying because they were eating earthworms and other organisms that were full of DDT. The chemical also caused the eggshells of birds to not harden, preventing the baby birds from forming properly in the egg and surviving. This reduced bird populations. Carson wrote a book about the danger of DDT called *Silent Spring*. Reading the book helped people understand how harmful DDT was to the environment. New laws were made that forced people to stop using DDT. Bird populations increased soon after DDT was banned.

DDT had a very harmful impact on the bird population.

What Do You Think?

Many things can happen as a result of environmental changes. Use what you have learned to consider how humans can change the environment. Read each environmental change described in the chart below and study the images. Predict how the change will affect the organisms in that environment. Write your answers on the right side of the chart. Be creative! There are many correct responses!

Change	Effect
 A company clears a large area of wetlands to build a new neighborhood.	

 A dam is built across a river to generate electricity and control flooding.	
 A highway is built in the middle of a forest.	
 A logging company promises to plant five trees for every one it cuts down.	

Try Now

How clean is the air around you? Complete this short activity to find out what is in the air you breathe every day.

For this activity you will need the following:

- 5 index cards
- A pen or pencil
- A hole punch
- 5 pieces of string (each about 1 foot long)
- Petroleum jelly
- Paper towels

1. Write the name of a different location around your school or home on each index card. Punch a hole at the top of each card. Tie a piece of string to each hole.
2. Use your finger to cover the cards with petroleum jelly on both sides. Wipe your hands with a paper towel when you are finished.
3. Hang the index cards in the five locations you listed. Leave them in place for two days. After two days, collect the cards. Do not let the cards touch each other.
4. Write down your observations of each card.

Here are some questions to guide you:

1. What kinds of materials did you see on the cards? Did you find both natural and manmade substances?
2. Which card had the most material on it? Why do you think that location had the most material in the air?
3. What are some ways in which you could improve the air quality around your school or home?