



Smithsonian

Human Effects on Earth

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TCM

Teacher
Created
Materials



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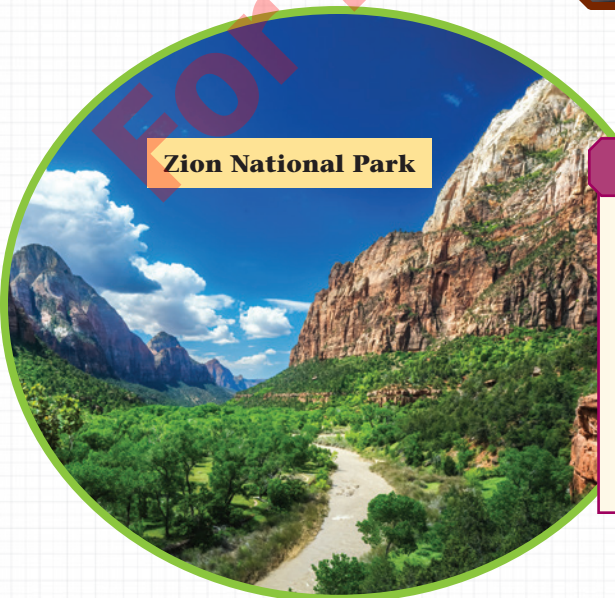
At Home on Earth

Picture a brand-new apartment building. It has just been constructed, and every room is freshly painted. The kitchen appliances are all sparkling clean. Every surface is spotless. Now, imagine what it looks like one year later, after people have moved in. They've made changes throughout the space, whether accidentally or on purpose. While setting up their furniture and belongings, they have scuffed and scratched the walls. The appliances have been used countless times, and they don't sparkle anymore.



It's impossible for people to live anywhere without affecting their surroundings. Just like humans can affect an apartment building, humans can affect the entire planet. Humans constantly change Earth in positive and negative ways.

As people use Earth's resources, they can cause problems such as air pollution and damage to rainforests. Litter can end up in our oceans, harming animals and ecosystems. But people also develop solutions to these issues. They want life on Earth to be **sustainable**. For many negative effects on Earth, humans have created positive solutions. Some of them include using different energy sources, recycling, and protecting the land.



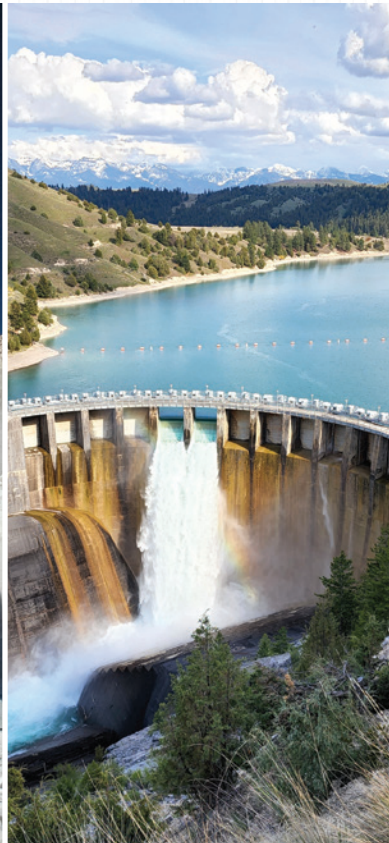
FUN FACT

In the United States, the National Park Service protects and **preserves** areas of land. The land is protected from human development. Plants and wildlife can flourish in the parks. And people can enjoy these areas now and into the future!

Using Earth's Resources

When it comes to survival, humans have a few basic needs they can't live without. Food and water are at the top of the list. Shelter and clothing are also basic human needs. Shelter protects people from **predators**. Both shelter and clothing protect against harsh weather. People take and use natural resources on Earth to get the things they need for survival.

Natural resources are items found in nature. Sunlight, air, and water are examples. Natural resources also include a variety of other items, such as plants, soil, stone, wood, and **minerals**. Humans use these raw materials to create the things they need for survival. For example, we can use soil to grow food to eat, and we can build homes using wood from trees.



Desalination

Some places on Earth do not have access to clean drinking water. One possible solution for this is desalination. This process removes the salt from seawater. It involves using special pipes and tanks to put seawater under intense pressure. Then, the water is forced against a membrane that filters out the salt.



desalination plant

Some of Earth's resources are renewable. Air, water, and soil are considered renewable because they naturally **replenish** themselves. This happens quickly enough that humans can keep using them.

Different locations on Earth have their own varieties of natural resources. For example, some areas have dense forests with lots of trees. Other areas, such as deserts, have lots of sand and rocks.

In the modern world, humans are using resources on Earth for reasons that go beyond basic needs. We use them for fun, comfort, and security. We can buy electronics, toys, cars, and many other things we want but don't necessarily need. Today, we have an **abundance** of choices.



Shopping malls have a variety of stores for people to visit and buy items.

Getting What We Need

People have designed large, complex systems to get the resources they need from Earth. In fact, much of modern life is made of systems designed to deliver **goods**. Large container ships carry goods across oceans. Airplanes transport goods around the world every day. These complex operations make quite the impact on Earth.

Purchasing a carton of strawberries at the grocery store seems like a simple task. But what happens when you consider the work—and the journey—it took to get them there? In the United States, 60 percent of the fresh fruit in grocery stores comes from other countries. Most of this fruit is grown in Mexico. So, the strawberries started out in another country. Farmers used special equipment to carefully grow and ripen the berries. Then, they had to harvest them. A truck collected the berries and took them to a factory for packaging. Another truck had to take them to the United States. And finally, a grocery store worker had to stock them in the produce section. Without these systems and workers in place, most grocery stores wouldn't have such things as tomatoes, raspberries, or strawberries.



Workers pick strawberries in Mexico.



Fruits and vegetables are loaded onto trucks for further transportation.

Another example of one of these complex systems can be seen in the delivery of clean water to homes, schools, and businesses. More than 16,000 water treatment plants in the United States use equipment to collect water from Earth's lakes and rivers. There, the water is cleaned and transported to buildings through mazes of underground pipes.

In the past, people would grow strawberries themselves. They would drink collected water out of wells or from streams. Thanks to modern technology, people have changed the way they use Earth's resources.

Aqueducts like this one in California carry fresh water across the land.



STEAM CHALLENGE

Define the Problem

Some communities do not have easily accessible fresh water. They have been looking into alternative drinking water sources: rain collection barrels, highway water runoff, and local ponds and lakes. However, contamination caused by human activity has trickled into many of these water sources. Your task is to create a cost-effective water filter that can effectively reduce the amount of contaminants in a drinking water sample.



Constraints: You may only use the materials provided to you.



Criteria: Your water filter must fit on a table, and it must be portable. Based on both qualitative and quantitative observations, there should be a reduction in the number of contaminants in your water sample.



CAREER ADVICE

from Smithsonian

Do you want to work to protect Earth?

Here are some tips to keep in mind for the future.

"Environmental careers can take many shapes, and not all of them are centered on conducting research. There are plenty of other skill sets that can be useful in the environmental field like engineering, computer science, communications—even art or design! If you've got a passion for the environment, there's a place for you in an environmental career."

– *Dr. Anna Davis, Ph.D., Post-Doctoral Scholar at the Smithsonian Environmental Research Center*

"Being a scientist is about being curious and asking questions. If you can do that, then you can be a scientist!"

– *Dr. Alison Cawood, Ph.D., Director of Public Engagement at the Smithsonian Environmental Research Center*



Read and Respond

1. What is the difference between renewable and nonrenewable resources? Give examples of each type.
2. In what ways have humans designed systems to deliver goods?
3. Why is plastic so damaging to the environment?
4. How do deforestation and desertification negatively affect land?
5. What is renewable energy, and why is it better for the planet than fossil fuels?
6. In what ways do you have a positive effect on Earth?

