



Lesson Plan: Our Impact on Earth

Grade Level: 6

Subject: Physical Science

Duration: 45–60 min

NGSS MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.

Learning Objectives

By the end of this lesson, students will be able to:

- **Identify** the main causes of human impact on Earth, including industrialization, deforestation, resource depletion, pollution, and climate change.
- **Describe** the effects of human activities on Earth's systems, including loss of biodiversity,



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- **Greenhouse effect:** The natural process by which gases in Earth's atmosphere, like water vapor and carbon dioxide, hold heat energy near Earth's surface, making the planet habitable.
- **Global warming:** The measurable rise in average global temperatures resulting from increased levels of greenhouse gases in the atmosphere.
- **Renewable resource:** A natural resource that can be replenished in a reasonable period of time, such as water in most situations.
- **Raw sewage:** The liquid and solid waste that is washed down drains or flushed away by toilets.



- **Nutrient loading:** The massive addition of nutrients to a body of water that results in uncontrolled algal growth, leading to oxygen depletion and harm to aquatic life.

Materials Needed: (all links are included in this PDF)

- Printed copies of the Study Guide (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)
- Vocabulary matching worksheet (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-our-impact-on-earth-1.pdf>)
- Worksheet 0 (assessment) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-0.pdf>)
- Worksheet 1 (practice) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-1.pdf>)



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human activities affect the planet and what we can do to minimize negative impacts.

Step 2: Direct Instruction (15 minutes)

- Use the Study Guide to explain the main causes of human impact on Earth: industrialization, deforestation, resource depletion, pollution, and climate change. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)
- Discuss the difference between primary pollutants (directly released, such as carbon dioxide from cars) and secondary pollutants (formed by chemical reactions, such as smog and acid



precipitation). (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)

- Explain the greenhouse effect: how gases like carbon dioxide and water vapor naturally trap heat near Earth's surface, and how increased levels from burning fossil fuels enhance this process, leading to global warming. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)
- Introduce key vocabulary terms using the Study Guide, ensuring students understand pollution, primary and secondary pollutants, greenhouse effect, global warming, renewable resource, raw sewage, and nutrient loading. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)

Step 3: Guided Practice (15 minutes)

- Distribute the vocabulary matching worksheet and work through it as a class, reinforcing the key terms and their definitions. (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-our-impact-on-earth.pdf>)



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support their work. (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)

- Circulate the room to provide individual support and answer questions as students work through the worksheet.

Step 5: Assessment (10 minutes)

- Conduct a quick assessment using Worksheet 0 to evaluate student understanding of pollution types, causes of human impact, and conservation strategies.



(<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-0.pdf>)

- Review completed worksheets for accuracy and understanding of key concepts.
- Have students classify everyday items (plastic bottle, aluminum can, food waste) as examples of materials that can be reduced, reused, or recycled.

Differentiation Strategies

For advanced learners:

- Challenge advanced learners to research and present on a specific environmental issue, such as ocean acidification, deforestation in the Amazon, or the impact of plastic pollution on marine life.
- Have students calculate the carbon footprint of their household and propose specific actions to reduce it, using online carbon calculators and data analysis.



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like low-flow toilets or fixing leaks.

- Debate: Organize a class debate on a current environmental policy issue, such as carbon taxes, renewable energy mandates, or plastic bag bans, requiring students to research and argue both sides of the issue.

 Complete List of Available Resources:



- NewPathWorksheets: Our Impact on Earth (<https://newpathworksheets.com/science/grade-6/our-impact-on-earth>)
- Study Guide PDF (<https://newpathworksheets.com/api/guide/study-guide-science-grade-6-our-impact-on-earth.pdf>)
- Worksheet 0 (Assessment) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-0.pdf>)
- Worksheet 1 (Practice) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-1.pdf>)
- Worksheet 2 (Practice) (<https://newpathworksheets.com/api/worksheet/worksheet-science-grade-6-our-impact-on-earth-2.pdf>)
- Vocabulary Matching Worksheet (<https://newpathworksheets.com/api/vocabulary/vocabulary-science-grade-6-our-impact-on-earth-1.pdf>)



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OUR IMPACT ON THE EARTH

Pollution

Any waste substance that is added to a natural system in amounts greater than that natural system can break it down or eliminate it is called **pollution**. The waste substance itself is the **pollutant**.

A **primary pollutant** is one that is put directly into the air, land or water. Ash from a volcano, even though it is naturally produced, is considered to be a primary pollutant. Primary pollutants created by humans include carbon dioxide and carbon monoxide from internal combustion engines and ash and soot from incinerators, to name just a few.

A **secondary pollutant** is one that forms by the chemical reaction of primary pollutants with other molecules in



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crumbling). These acids also accumulate over time in streams and ponds, making the waters increasingly acidic and killing plant and animal life.

Another way to classify pollution is by its source. **Point-source pollution** is pollution that begins at an identifiable place, such as a drainpipe from a factory or a leak in a gasoline storage tank.



Nonpoint-source pollution is pollution that comes from a large area. Pollution such as fertilizers, pesticides, drainage from mines and mine waste piles, and more are washed away by rain and ground water. Water that falls on the surface and runs downhill is called **runoff**. Runoff carries polluting chemicals and materials with it. Nonpoint-source pollution contaminates lakes, rivers, streams and, ultimately, the ocean.

Air Pollution and the Greenhouse Effect

The burning of fossil fuels for various forms of energy creates millions of tons of primary pollution that is poured into the atmosphere. Gases in the Earth's atmosphere, like water vapor and carbon dioxide, hold heat energy near the Earth's surface. This process, called the **greenhouse effect**, occurs naturally and is the mechanism by which heat is trapped near Earth's surface, contributing to Earth's habitable environment. However, there is evidence that growing levels of



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ocean levels to rise and literally flood the coastlines. Other possible outcomes could be increased hurricane activity, long-term droughts and the extinction of species as their habitats and food sources dwindle. Geologic evidence shows that the Earth has undergone cycles of cooling and warming throughout its history. It is possible there is a natural element involved in what appears to be a current trend of global warming. We are also increasingly aware that human activity is also potentially contributing to this trend.

Conservation

The three “R’s” of conservation are as important today as ever: **reduce, reuse and recycle**. The early 21st century has shown how vulnerable energy resources are to geopolitical events and pressures. Oil prices can skyrocket in very short periods of time. Oil production can drop as quickly. The result is that oil and petroleum products can become expensive very quickly. In addition, there is a growing understanding of global warming and the greenhouse gases produced from burning fossil fuels. All these factors are incentive for conservation and the benefits of reducing oil consumption.

Careful analysis of water use in the home has revealed that there are many areas in which water usage and waste can be reduced in every home. As this pie chart reveals, wasted water through leaks alone consumes almost 14% of the overall water consumption. The largest percentage of water consumption is literally flushed down the drain.



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A growing number of families and individuals are recycling materials whenever possible. Consciousness of recycling resources is increasingly common in American society today. Businesses built around recycling are also growing in size and number. Plastics from bottles, for instance, are being reused to make plastic “lumber” for park benches, toys and other products. There was a day, not too long ago, that Americans were essentially consumers (use the product, throw away the rest). Our cultural attitudes are changing and conservation is becoming more a part of our lifestyle and even our economy.

Water Pollution

In most situations, usable, safe water can be replenished in a reasonable period of time. A natural resource that can be replenished is called a **renewable resource**. In most cases, water is a renewable resource. But overuse and pollution is threatening the water resources of a growing number of communities. Wise water management and reuse of water resources is increasingly important.

Polluted wastewater from homes and businesses is gathered by many municipalities at a treatment facility. At the treatment facility, both particulate matter and dissolved matter are removed from the water and the water is treated to make it safe to be returned to the environment.

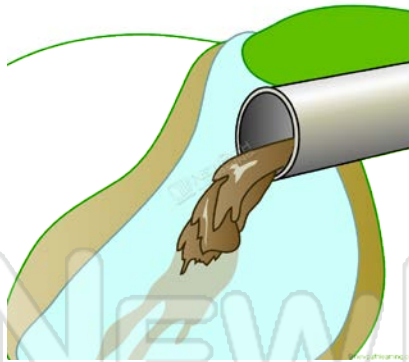
- The first step of the treatment process, **primary treatment**, is the removal of larger pieces of material like rocks and rags.
- Once the large particles are removed, the remaining water proceeds



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nation for algae. With a massive addition of food, the algae grows uncontrollably. Dissolved oxygen in the ocean water is then depleted which in turn suffocates fish and other marine organisms. In addition, sludge and sewage pollution raises bacteria levels in ocean water which can poison beaches, shellfish, and, ultimately, humans.



The dumping of tons of solid waste directly into the ocean has been practiced for many decades. It was assumed that solid waste would either sink to the bottom of the ocean or be broken up by waves to a size that would essentially eliminate them. This polluting practice, however, has proven to create considerable problems. Trash, including medical waste like hypodermic needles and used medical



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the environment. The majority, however, is pollution produced mostly from burning coal and trash incineration. The mercury that is released into the atmosphere returns to Earth with rain. Mercury concentrations in the oceans, consequently, have been increasing. Fish absorb mercury that is then consumed by humans. When consumed in high enough quantities, it can cause mercury poisoning. Neurological damage is a typical result of mercury poisoning. Mercury poisoning has also been associated with growth abnormalities in children and, when it occurs in high enough concentrations, even death.



Name _____ Class _____ Date _____

1

Any **waste substance** that is added to a natural system in amounts **greater than** that natural system can **break it down** or eliminate it is called a(n) _____.

- A element
- B pollutant
- C compost
- D additive

**2**

Which of the following is not a form of pollution created by the **burning of fossil fuels**?

- A acid precipitation
- B smog
- C oil slicks
- D acidification of ponds

**3**

Acid precipitation is created when water in the atmosphere combines with _____ produced when coal, oil, or gas is burned.

- A carbon dioxide
- B carbon monoxide
- C sulfur dioxide

**4**

Which of the following would be considered a **primary pollutant**?

- A ash from a volcanic eruption
- B acid precipitation
- C smog

**5**

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7

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D ozone, fog, acid rain

D the acid reacts with lime and creates high levels of carbon dioxide

9

A power plant was built in a particularly **windy location** to assure that the pollution created would be **blown away**, thereby reducing the acid precipitation in that **region**. What is the **problem** with this plan?

- A It will not be windy every day.
- B Acid precipitation always forms near the source of the pollution.
- C Winds blowing the pollution elsewhere will cause acid precipitation in the environment downwind.
- D It is a sound plan with proven positive results.

**10**

Who are **most vulnerable** to the effects of air pollution?

- A the elderly and young children
- B those with lung problems and allergies
- C those with heart problems
- D all of the above





Name _____ Class _____ Date _____

1

Any **waste substance** that is added to a natural system in amounts **greater than** that natural system can **break it down** or eliminate it is called a(n) _____.

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B

2

Which of the following is not a form of pollution created by the **burning of fossil fuels**?

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C

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Acid precipitation is created when water in the atmosphere combines with _____ produced when coal, oil, or gas is burned.

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C

4

Which of the following would be considered a **primary pollutant**?

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A

5



B

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B

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Who are **most vulnerable** to the effects of air pollution?

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D



Name _____ Class _____ Date _____

1

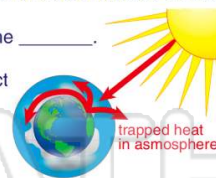
In addition to respiratory effects on humans, **air pollution** is **also** known to be responsible for _____.

- A** lead and arsenic poisoning
- B** arthritis
- C** tuberculosis
- D** diabetes

**2**

Gases in the earth's atmosphere, like water vapor and carbon dioxide, **hold heat energy** near the **earth's surface**. This process **naturally** occurs **without** the added levels of carbon dioxide created by burning fossil fuels. This process is called the _____.

- A** global warming effect
- B** greenhouse effect
- C** acid rain effect
- D** radiation balance

**3**

Global warming is to the **greenhouse effect** as _____.

- A** a house is to a car
- B** work is to salary
- C** the earth is to the moon
- D** sick is to a virus

**4**

The **greenhouse effect** is similar to what happens when _____.

- A** an ice cube is left on the table in the summer
- B** a car is parked in the sun on a hot day

**5**

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9

At a water treatment facility, after wastewater has been filtered, it is then **aerated with special bacteria** that literally **consume** and **digest** waste material in the water. This **step** of the water purification process is called the _____.

- A** primary treatment
- B** secondary treatment
- C** chlorination
- D** sludge

**10**

If the toilet in your home uses **2.5 gallons of water per single flush**, and you use the toilet **6 times** a day, how much water will you **save** each year if you **replace** the toilet with one that uses only **1.6 gallons per flush**?

- A** 54 gallons/year
- B** 540 gallons/year
- C** 1,971 gallons/year
- D** 19,710 gallons/year





Name _____ Class _____ Date _____

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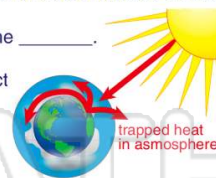


A

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B

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A

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C



Name _____ Class _____ Date _____

1

In most situations, usable, safe water can be replenished in a reasonable period of time. A **natural resource** that can be **replenished** is called a(n) _____.

- A renewable resource
- B nonrenewable resource
- C aquifer
- D point-source resource



2

For decades trash, garbage, and sludge has been **dumped** into the **ocean**. The ocean was **believed** to be a **good dumping place** for waste because it was **assumed** _____.

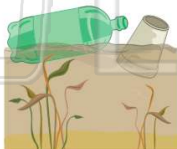
- A the ocean would break it up for animals to eat
- B ocean currents would send it to other countries
- C it would sink to the bottom and stay there
- D it would all dissolve never to be seen again



3

Raw sewage is the liquid and solid waste that is washed down drains or flushed away by toilets. **Sludge**, which is related to raw sewage, is _____.

- A another name for raw sewage
- B the solid waste that sticks to the inside of pipes



4

In 1989, an oil tanker named *Exxon Valdez* hit a reef and **split open**, spilling 260,000 gallons of oil. This **oil spill** killed thousands of animals, cost over \$2.5 billion to clean up, and devastated the local fishing industry. **What technological improvement** now used was designed to eliminate this kind of catastrophe?

- A flat-bottom boat design



5



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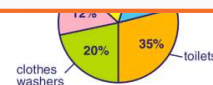
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Ocean water.
True or false?

- A true
- B false



- B clothes washers
- C leaks
- D toilets



9

Assume that John and Jane Smith drive **20,000 miles each year** in cars that average **25 miles per gallon**. They will use 800 gallons of gas. When they buy **new vehicles**, they purchase cars that get **30 miles per gallon**. How many gallons of gasoline will they **save** in the course of **10 years**?

- A this will actually use more gas
- B 800 gallons
- C 1,330 gallons
- D 4,000 gallons



10

What **alternative to gasoline** is being explored and implemented more **regularly** in the United States (and is already used regularly in other parts of the world, such as Brazil)?

- A solar powered vehicles
- B biofuels such as ethanol mixed with gasoline
- C electric cars
- D hybrid cars; the combination of gasoline engines and electric current





Name _____ Class _____ Date _____

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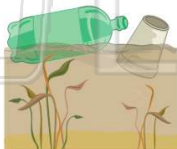


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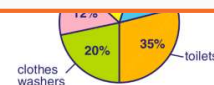
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Name _____ Class _____ Date _____

Match each of the following terms to its definition:

Nutrient loading

Sludge

Smog

Pollution

Raw sewage

1. - the massive addition of nutrients to a body of water that results in uncontrolled algal growth



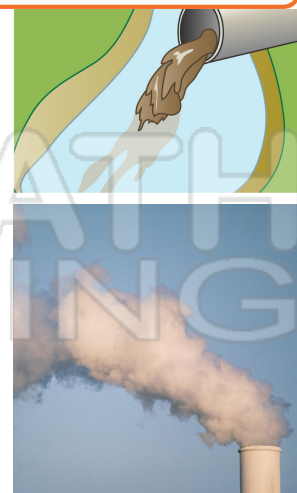
2. - any waste substance that is added to a natural system



3. waste

4. water;

5. - a cloudy accumulation of secondary pollution caused by primary pollution reacting with sunlight and more primary pollution



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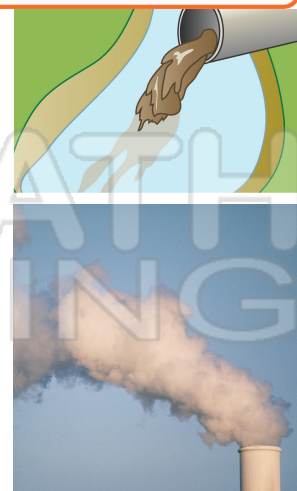


2. pollution - any waste substance that is added to a natural system break



3. raw drains

4. sludge
sludge



5. smog - a cloudy accumulation of secondary pollution caused by primary pollution reacting with sunlight and more primary pollution

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