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 the atmosphere. **Smog** is a dramatic example o
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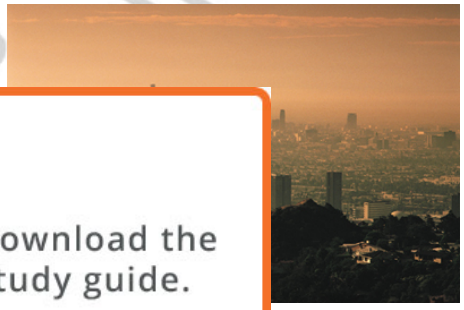

sunny
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Acid precipitation is another secondary pollutant. Sulfur and nitrogen compounds are put into the atmosphere when coal and other fossil fuels are burned. They react with water in the atmosphere to form acids. These acids react with certain rocks, primarily marble, and rapidly deteriorate the marble (this is very evident in cemeteries where marble headstones are turning black and are literally 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 of 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

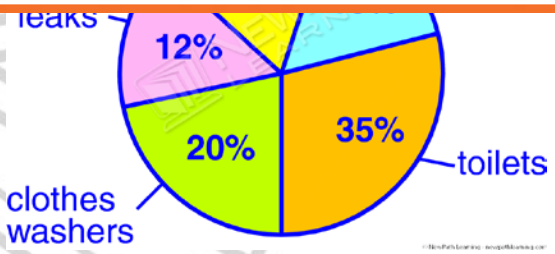
The burning of fossil fuels for various forms of energy creates millions of tons of primary pollution that is poured into the atmosphere. Gases in the Earth's atmosphere, like water vapor and carbon dioxide, hold heat energy near the Earth's surface. This process, called the **greenhouse effect**, occurs 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 carbon dioxide created by burning fossil fuels are enhancing this process and leading to dramatically harmful environmental changes. The gases, ffect are **greenhou** interior environme l its windows c (heat) to increase in ape, so the interio

Studies are ongoing (and will have to be for many decades) but the evidence suggests that there is a measurable rise in average global temperatures. The results of **global warming** are measured in environmental changes. The Polar ice cap at the North Pole is shrinking. Regional weather patterns are changing. Some desert regions are growing. Should a global warming trend continue, some scientists predict that melting glacial ice and polar ice caps will cause 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. Low-volume toilets can immediately and dramatically reduce water consumption. Though this pie chart is specific to a specific community on in general.



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 to **secondary treatment** where the water is aerated and bacteria is introduced to consume biological material that is dissolved in and floating ntually allowed
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Raw sewa wn drains or flushed raw sewage is aste. The sludge collected in the primary stages of water purification is simply solid material that has been physically separated from the water. This sludge is not chemically treated in any way. Despite national and international laws, sludge (and in many places, raw sewage) is dumped directly into the oceans and other waterways.

Sewage and sludge dumping in the oceans creates a situation called **nutrient loading**. The biological waste material is a rich source of nutrition 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 products, have too often washed up on beaches around the world. Also, other materials are dissolved in the ocean water. Fish consume these pois

In 1972 th e first laws passe sh, garbage, a it under the contro is important It prepared t fficial recognition that polluting the oceans is a significant issue that demands drastic changes in the ways we handle waste.

The list of substances polluting our waters is, unfortunately, lengthy. One that has received significant attention in recent years is mercury pollution. Mercury is an element. It is the only metallic element that is liquid at room temperature. Some mercury is naturally released into 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.