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Landfills: What a Load of Garbage!

Written by Torran Anderson

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Trash in the Past

Thousands of years ago, people living in the ancient city of Troy (in modern-day Turkey) threw their garbage on their floors. When the floors grew filthy enough, the people would put another layer of earth on top to bury the garbage. The Trojans piled so many layers of trash on their floors, they had to raise the roofs of their houses!

You may laugh, but what we do today isn't so different. Ancient or modern, people still have to figure out what to do with their trash.

Health and Garbage

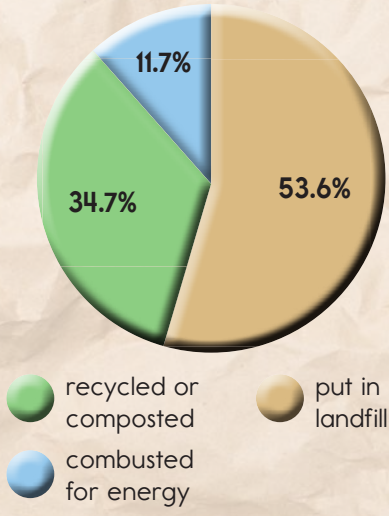
One thousand years ago, during the Middle Ages, people in Europe would throw their waste right in the middle of the street. At the time, people didn't understand the connection between public health and garbage. This filth attracted rats and fleas, which spread a deadly disease. The plague, also called the *Black Death*, killed 75 million people worldwide.

Trash Today

Today, most people do not throw garbage on the floors or in the middle of the street. Instead, we put it in trash cans, the garbage truck hauls it away, and we forget about it. But where exactly is "away?"

When you put something in the garbage, it enters what is called the *waste stream*. The waste stream is the flow of garbage to its final location. Most of the garbage in the waste stream goes to **landfills**—areas of land set aside for burying trash.

What Happens to U.S. Trash



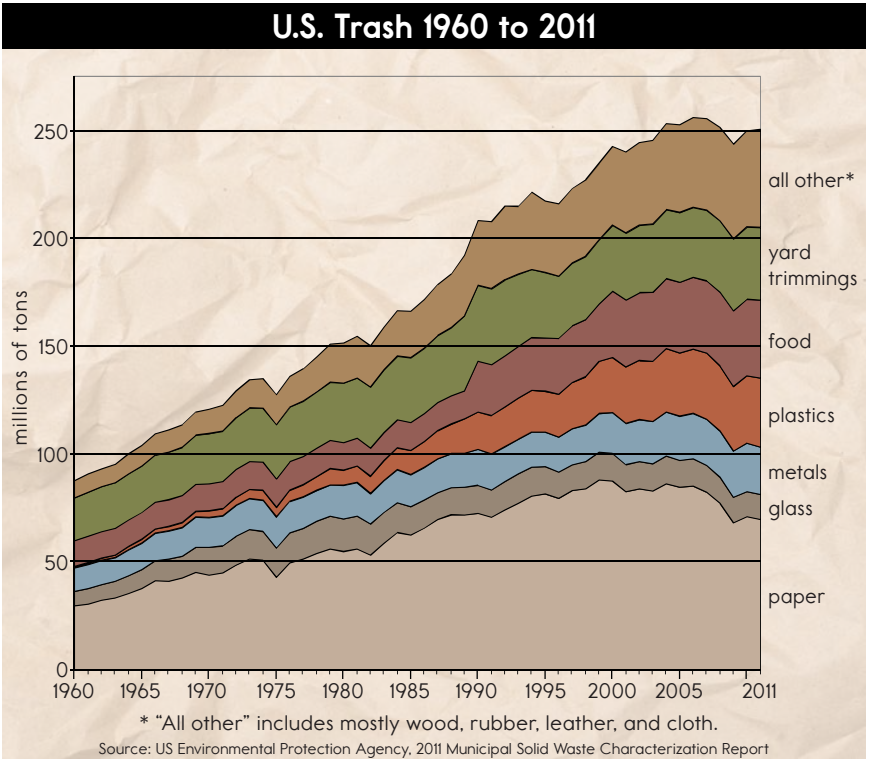
Source: US Environmental Protection Agency, 2011 Municipal Solid Waste Characterization Report

Composted garbage—such as food scraps and yard waste—breaks down into rich organic matter. That compost can then be added to the soil to help plants grow.

When trash is combusted for energy, waste that can't be recycled is turned into heat, electricity, or fuel. Combustion is a controlled burning process that also reduces the volume of trash. Most of the ash that results goes to landfills.

How Much Trash Do We Create?

The world creates more than 2.6 trillion pounds (1.2 trillion kg) of trash each year. That's about what 182 Great Pyramids of Egypt would weigh. Americans make up only 5 percent of the world's population but create 25 percent of the world's waste. The average American creates 4.5 pounds (2 kg) of trash every day. Paper and paper products, such as cardboard packaging, make up a lot of what Americans toss.



A compactor truck flattens trash at a landfill.

Follow the Trash

A garbage truck carries our trash to a landfill. The truck unloads the trash into a *cell*—a storage space for garbage. Then a heavy truck drives over the garbage with large, spiky wheels and smashes it down. At the end of the day, a bulldozer covers the trash with dirt so that it's less exposed to the **elements**. Burying the garbage also helps keep out wildlife and reduces the odor.

Building a Landfill

Landfills vary in size. Usually, a gigantic hole is dug about 200 feet (61 m) wide and up to half a mile (805 m) deep. The garbage can't be dumped straight into the ground, though, because some of the garbage is **toxic**. As trash breaks down, its toxic parts mix with rainwater to produce *leachate*. Leachate is the often-toxic liquid that has drained, or leached, through the landfill. If you picture the landfill like a giant swimming pool, leachate is the liquid inside. If not collected and **treated**, the leachate will either drain through the bottom or overflow.

Machines roll out a liner for a new landfill.

A heavy plastic liner keeps the leachate from escaping, while pipes running through the landfill remove the leachate. Sometimes the leachate is treated at the landfill site. Often, though, it's sent through the sewer system to the closest water treatment plant.

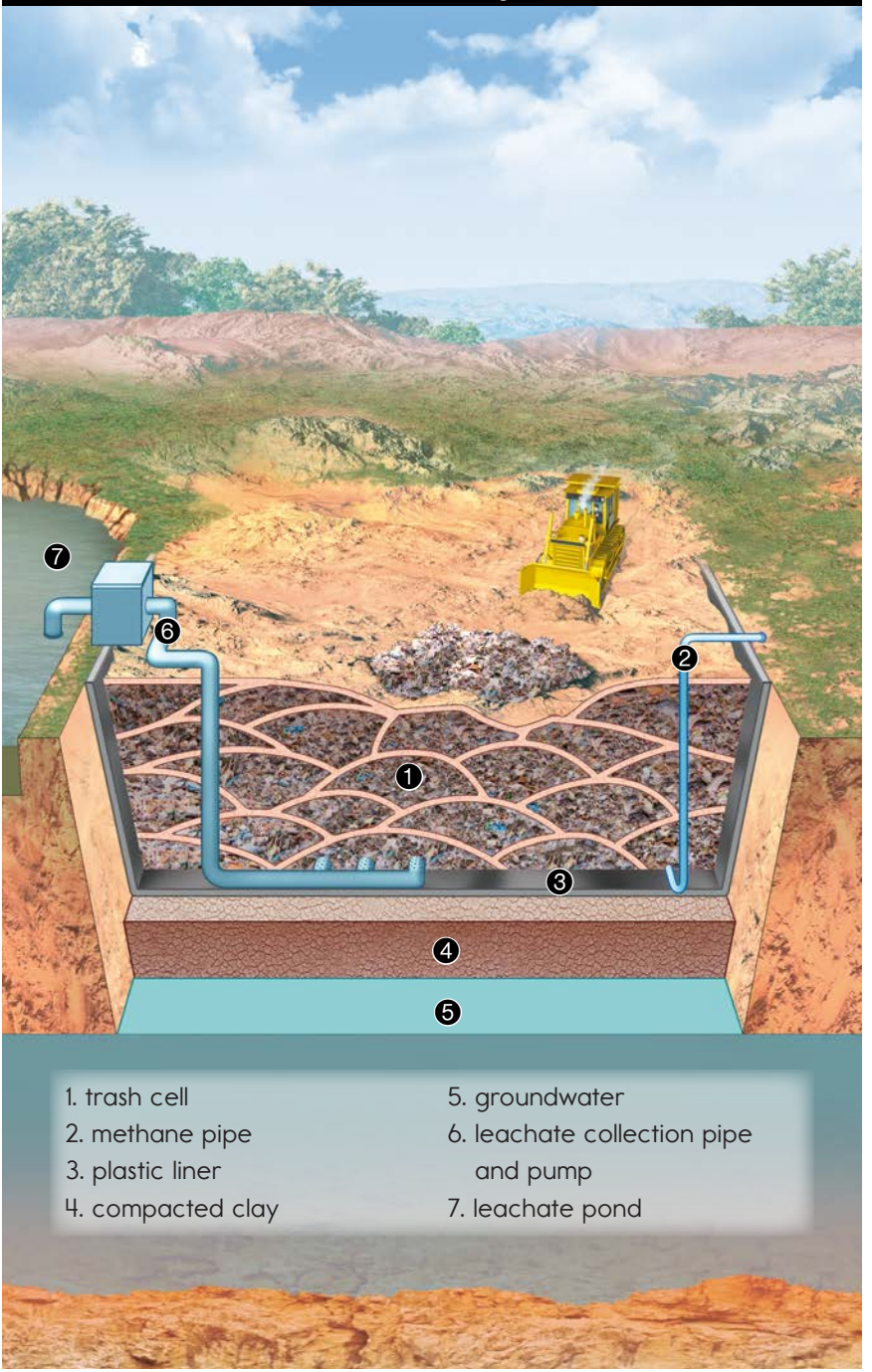
Landfills must also be designed to deal with landfill gas. When garbage rots, it creates a gas called **methane**, which must be released or burned. Otherwise, it can cause explosions.

Using Methane

Methane from landfills can be used to generate electricity and fuel vehicles. The current landfill-gas-to-energy projects in the United States can power more than 800,000 homes. These projects also keep methane from escaping into the atmosphere. That's good, because methane is a powerful greenhouse gas. It traps heat in the atmosphere, which adds to the global problem of climate change.

A well collects methane from decaying garbage at a landfill in Smith's Creek, Michigan (left). Engines generate electricity from the methane (right).

Landfill in Progress



A Tomb for Trash

Garbage dumped inside a landfill sits for a long time. Sealing the trash from air and water is like mummifying our garbage. **Organic** materials such as vegetables are **biodegradable**, and bacteria and other organisms could break them down in a short time. These organisms can't do their job, though, because they need air and water to survive. The plastic we throw away isn't biodegradable and can take thousands of years to break down. Worse still, the Styrofoam cup you toss today could take more than a million years to turn to dust.

Styrofoam litters a beach.

Landfills of the Future

New bioreactor landfills help garbage decompose. In these landfills, air and liquid are pumped through the trash so the decomposers can break it down. Speeding up the decomposition time in a landfill leaves more space for new trash to be buried. Bioreactor landfills can extend the life span of a landfill by as much as twenty years.

New York City used to dump all of its trash into the largest landfill in the world, Fresh Kills on Staten Island. The landfill was closed in 2001. Now the area is being developed into a 2,200-acre park three times the size of Central Park.

It can take thirty to fifty years to fill a landfill. Full landfills are often capped with clay, plastic material, and then a layer of soil to allow plants to grow. Closed landfills can be turned into parks, playgrounds, or open areas. Even after they're capped, though, landfills cannot be forgotten. A 2008 study found that 82 percent of the landfills studied were leaking. "No liner can keep all liquids out of the ground for all time. Eventually liners will either degrade, tear, or crack," reports the Environmental Protection Agency. When that happens, toxic liquids will escape and **pollute** the soil and **groundwater**.

Not in My Backyard

The United States may have a lot of land, but that doesn't mean it's easy to find space to build new landfills. People often don't want one in their neighborhood because they worry about the noise, pests, and pollution. Some states actually ship their trash across state lines to get rid of it.

The number of U.S. landfills is dropping. The country had 6,300 open landfills in 1990. By 2011, it had only 2,300 open landfills. The new landfills are bigger and better, but the trash has to travel farther to reach them. The United States burns more fossil fuels each year in order to lay the trash to rest.

Signs in New Hampshire protest a landfill.

Coming to a Landfill Near You

Shipping trash across state lines solves one problem, but it causes another. The farther we have to move the trash, the more expensive it becomes.

Take New York City. For years, that city's garbage only traveled a few miles to Staten Island. Today, New York City sends its trash to states such as Ohio, Pennsylvania, and West Virginia. It spends more than $300 million a year to move its garbage to faraway landfills.

Moving that amount of trash that far also costs the planet. That's because it creates hundreds of thousands of tons of carbon dioxide each year. Like methane, carbon dioxide is a greenhouse gas that causes climate change.

A Legacy of Trash

We don't know how long it will take our trash to break down or how long the landfill liners will last. What we do know is that each of us has a choice about what we do with our garbage. About half the things we throw away could be recycled and kept out of landfills. We can also reduce the amount of garbage we're creating each day by buying less in the first place.

We may not throw trash on our floors anymore, but that doesn't mean the things we throw away go away. What will people in the future say about the trash we leave behind?

A boy studies kitchen scraps in a garden compost bin. Composting is a great way to break down garbage that would otherwise sit in a landfill.

Glossary

biodegradable *(adj.)* capable of being decomposed or broken down by microorganisms, such as bacteria (p. 11)

elements *(n.)* weather conditions, such as wind, rain, sun, or extreme temperatures (p. 7)

groundwater *(n.)* water held underground in soil or rock, often feeding springs and wells (p. 12)

landfills *(n.)* places where garbage is stored and covered with dirt (p. 5)

methane *(n.)* an invisible, odorless, flammable gas; also called "natural gas" (p. 9)

organic *(adj.)* having to do with or coming from living organisms (p. 11)

pollute *(v.)* to make something, such as the environment, unclean or unsafe for use (p. 12)

toxic *(adj.)* poisonous; dangerous to life (p. 8)

treated *(v.)* added a substance, such as a chemical, to improve, protect, or clean something (p. 8)

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We would like to thank Wilson Hughes and Chris Leverenz for sharing their expertise about landfills.

Page 3: Children in a Rhode Island garbage dump, 1912

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A Reading A–Z Level Q Leveled Book
Word Count: 877

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