



Drexel-SDP GK-12 ACTIVITY

Activity: Ewww! Landfills

Subject Area(s) Environments

Associated Unit Environments, module 4

Associated Lesson embedded

Activity Title Ewww! Landfills

Grade Level 6 (3-8)

Activity Dependency None

Time Required 50 minute lessons

Group Size Individual

Expendable Cost per Group None

Summary

Students learn about waste management, how landfills are created and problems associated with landfills. Biodegradable versus non-biodegradable plastics are tested by placing a piece of regular plastic in dirt next to a piece of “corn based” plastic. Samples are observed over time (5 weeks) for signs of degradation.

Engineering Connection

Engineers are deeply vested in the sustainability of our manufacturing processes. Sustainability calls for the responsible use, disposal and recycling of raw materials to ensure their availability for future generations. Engineers design ways to recycle previously used materials to extend their life span. For example, engineers are involved in the recycling of plastic soda bottles so that the petroleum-based plastic may be used multiple times, reducing waste and the amount of raw materials used in the manufacturing of new bottles.

Keywords

Environment, recycling, environmental engineers, petroleum, plastics, landfills

Educational Standards

- Environments and Ecology: Renewable and nonrenewable resources 4.2.A. Uses, 4.2.B. Availability, 4.2.C. Management, 4.2.D. Influential factors
Environmental Health 4.3.A. Environmental health issues, 4.3.B. Human actions, 4.3.C. Biological diversity
Humans and the Environment 4.8.A. Societal needs, 4.8.B. Sustainability, 4.8.C. Human impacts, 4.8.D. Supply and demand
- Science: Technology Education – Science, Technology and Human Endeavors – Meeting Human Needs 3.8.B, Science, Technology and Human Endeavors – Consequences and Impacts 3.8.C

Pre-Requisite Knowledge

None.

Learning Objectives

Explain the need and how a landfill works

Identify what can and cannot be recycled, and how plastics can be recycled.

Materials

Slides
Laptop
Projector

Introduction / Motivation

Students learn about waste management, how landfills are created and problems associated with landfills. Biodegradable versus non-biodegradable plastics are tested by placing a piece of regular plastic in dirt next to a piece of “corn based” plastic. Samples are observed over time (5 weeks) for signs of degradation.

Review the background material with the students, discuss the vocabulary, then begin the activity.

Vocabulary / Definitions

Word	Definition
Environmental engineering	The application of science and engineering principles to improve the environment (air, water, and/or land resources).
landfill	A method for final disposal of solid waste on land. Garbage is placed in

	holes in the ground and covered over.
Petroleum plastics	A material made from petroleum capable of being molded, extruded, or cast into various shapes. Non-renewable resource.
Renewable resource	A material made from petroleum capable of being molded, extruded, or cast into various shapes.
Nonrenewable resource	A finite resource that cannot be replaced once it is used (for example, petroleum, minerals).

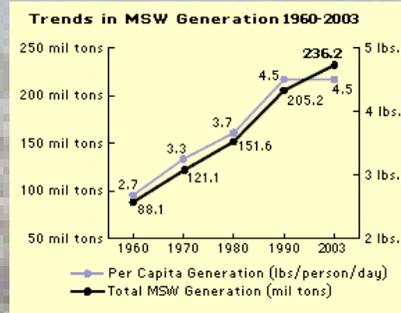
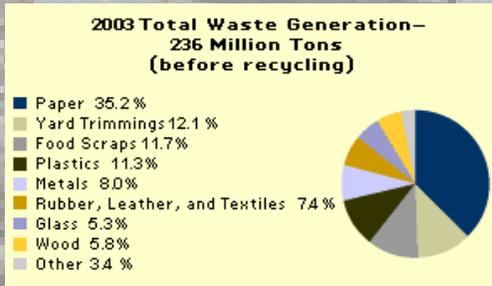
Procedure

Background



Why?

- Solid waste is a big challenge in the US today



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Why ?

Raw Materials are limited

- Renewable vs Nonrenewable



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Landfills

- A carefully designed site to keep trash from the environment
- Liner of either clay or plastic to prevent leakage into ground water



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Why are landfills a problem?

- It takes only 7 years to fill a landfill
- After its filled, it must be maintained for 30 years
 - Sealed with dirt and then left
 - Trash doesn't degrade- just stays there
- Take up space
 - Not enough space to use!
 - Not near my house!



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Alternatives to landfills...

- Reduce
 - Smaller packaging
- Reuse
 - Use ceramic or plastic plates instead of paper
 - Composting- turn natural products back into soil
- Recycle
 - Plastics, paper, cardboard, batteries, computers, etc



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Plastic Recycling

- **Inspection** - Workers inspect the plastic trash for contaminants like rock and glass, and for plastics that the plant cannot recycle.
- **Chopping and Washing** -? The plastic is washed and chopped into flakes.
- **Flotation Tank**-? If mixed plastics are being recycled, they are sorted in a flotation tank, where some types of plastic sink and others float.



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Plastic recycling

- **Drying-**? The plastic flakes are dried in a tumble dryer.?
- **Melting-** The dried flakes are fed into an extruder, where heat and pressure melt the plastic. Different types of plastics melt at different temperatures.
- **Filtering-**? The molten plastic is forced through a fine screen to remove any contaminants that slipped through the washing process. The molten plastic is then formed into strands.?
- **Pelletizing-** The strands are cooled in water, then chopped into uniform pellets. Manufacturing companies buy the plastic pellets from recyclers to make new products. Recycled plastics also can be made into flowerpots, lumber, and carpeting.



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Student Project



- Assume you are the owner of a McDonald's store here in Philadelphia
- Congress has passed a new law stating that no new landfills can be created
- How would you change your store policy to match this law?
- Would it cost you more money?
 - Show your savings/losses in a graph, table or chart



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Before the Activity

Load the PowerPoint presentation onto a computer connected to the projector.

With the Students

Methods:

Open discussion by asking some questions...

What happens when you throw something out?

Where does all that trash go?
What happens when the landfill gets full?
Would you want to live near a landfill?
Why not?
What problems do you think are associated with landfills?
Go through power point presentation on landfills.
Have students discuss what they think are problems with landfills

Safety Issues

- None

Troubleshooting Tips

Help students to navigate the EPA website to the pertinent information.

Investigating Questions

See Activity Embedded Assessment

Assessment

Pre-Activity Assessment

None

Activity Embedded Assessment

Engage the students in a discussion with the questions in the “With the Students” section.

Post-Activity Assessment

Evaluation based upon teacher assessment of student participation during activity as well as participation in the discussion.

Activity Extensions

<http://www.epa.gov/kids/>

Owner

Drexel University GK-12 Program

Contributors

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Version: Mar 2007