LESSON 2

LANDFILLS
SPACE FOR WASTE?

OUTCOME

The learner will be able to

(1) Build a landfill and use it to analyze how hazardous chemicals in landfills may affect ground water.

(2) Investigate the shortage of landfill space.

(3) Examine methods of reducing waste.

TIME

3-4 fifty minute class periods

SETTING

Classroom

MATERIALS NEEDED

- 2 Litre Plastic Bottles (One for each group)
- Pourable Water
- Paper Toweling
- Mixture of Sand and Water-Based Paint
- Plastic Buckets
- Straws
- Paper Cups
- Sculpting Clay
- Plastic Baggies
- One piece of fine mesh Screen (Wide enough to cover container below)
- One Clear Container (Baking Dish, Beaker, etc.)

KEY WORDS

- Landfill
- Decomposition
- Municipal
- Dump
- Reuse
- Recycle
- Reduce
- Urbanization
- County
- Location Site
- Toxic Chemicals
- Hazardous Waste
- Ground water
- Water Table

BACKGROUND INFORMATION

See Appendices A and B.

PROCEDURES

(1) Before class, mix two parts water with one part water-based paint or dye. (Food coloring may also be used if final liquid is very dark.) Stir in enough sand for the mixture to cling to itself—it should be fairly liquid, though.

(2) Discuss common (Household) hazardous wastes with students.

(3) Discuss toxicity. (See glossary for definition.)

(4) Discuss the difference between dumps and landfills.

(5) Conduct the demonstration, and lead a discussion about the features of a dump.

Place one inch of water in the bottom of the clear container to simulate a water table. Place the screen on top of the container, push down forcing the screen slightly into the container. Then, pile dirt on top of the screen. Dig a small hole in the center, leaving some dirt on the screen, to serve as an old fashioned dump. Fill the dump with a small amount of your sand and paint mixture. Pour water over the mixture to simulate rain. Allow time for the mixture to leak through to the water table demonstrating the flow of toxic chemicals. Display the contaminated water table, discussing how toxins contaminate our water supply, and how this, in turn, affects plant life, wildlife, agriculture and drinking water.

(6) Show diagram of modern day landfill. Discuss the improvements over dumps and tell students about the next activity: making landfills in cooperative groups.

NOTE: Teachers may want to make their own landfill to serve as a guide to students.

EXTENSION IDEAS

(1) Visit your county landfill.

(2) Create a large scale landfill using the same principles. Use it and monitor it for a four to six week period.

(3) Write letters to county officials asking them what is being done about the waste problem in your community. Tell them what you are doing as a school.

HOME LEARNING SUGGESTIONS

(1) Find and identify hazardous chemicals at home.

(2) Learn how to dispose of these properly by researching and writing a class newsletter to parents on proper disposal.

RESOURCES

Lewis, T.A. (1993). *Waste Not, Want Not.* National Wildlife v31, n4 June-July 1993 p. 20-23

Recycling Study Guide (January 1989). Wisconsin Department of Natural Resources -- Bureau of Information and Education, P.O. Box 7291, Madison, WI 53707

PROCEDURES FOR MAKING LANDFILLS

(1) Cut the top 1/3 off of the 2 Litre bottles. You may want to do this before students arrive.

(2) Cut two small holes, opposite each other, on the top 1/3 of the bottle. These holes should be the size of a drinking straw to accommodate the pipes built in step 8. Do not seal the mouth of the bottle as this will provide access for the toxins (paint) to the water table, should the liner (baggie) fail.

(3) Flatten a ball of clay around the inside, top 1/3 of the bottle. This is the dirt on which your landfill resides. The thickness should be no more than 1/2 inch, and it should cover the entire inside surface.

(4) Place the plastic baggie inside, over the dirt (clay) as a liner, folding the top of the baggie over the top of the landfill.

(5) Place the top third of the bottle upside down, and inside of the bottom 2/3's of the bottle. Mark the location of the two holes cut in step one, on the outside of the bottle's bottom 2/3's. Set aside the top section, then cut these newly marked holes, again, making them about the diameter of a drinking straw.

(6) Pour water into the bottom 2/3's of the bottle; this will become the water table.

(7) Re-place the top section, upside down, and inside of the bottom section, lining up the holes in the process.

(8) Using a pencil, push through the two holes and through the clay and plastic liner of the landfill.

(9) Cut a drinking straw in half. At one end in each half of the drinking straw, cut two to four small holes, then push these ends through the pencil holes made in the previous step. These are the leachate collection pipes. Make sure that the clay is pressed firmly against the straw so no leakage can occur.

(10) Place a paper cup at the end of each collection pipe. These are leachate collection centers.

(11) Fill the landfill with the sand and paint mixture.

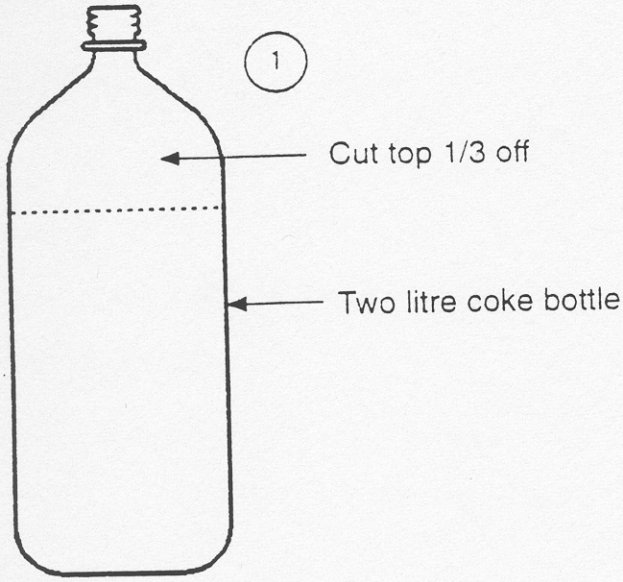
(12) Begin pouring water slowly onto the top of the mixture to simulate rain. Observe what happens.

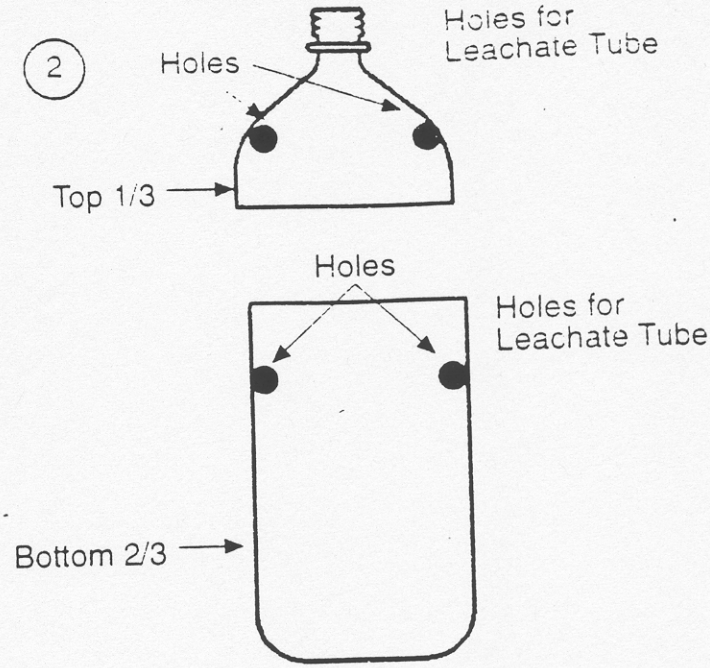
- Are there toxic chemicals going into the water table?
- Is it collecting in the collection centers?
- Are all landfills in the room getting the same results?

(13) Discuss the results of the dump demonstration and this experiment.

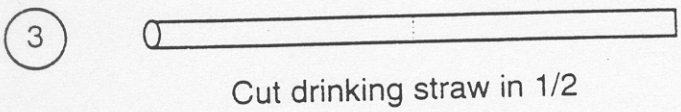
(14) Discuss the advantages landfills have over dumps.

(15) Discuss the current problems with landfills (lack of space, costliness, imperfections).

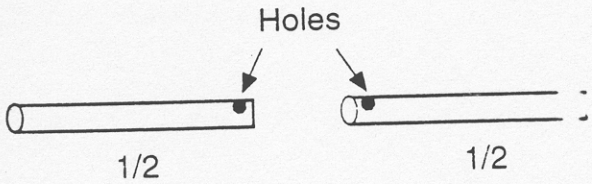


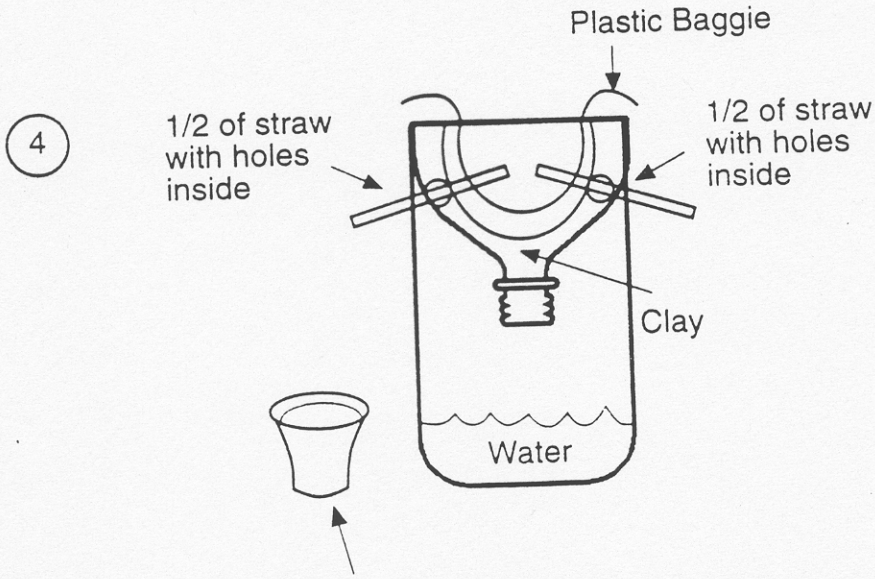


Note: Holes in Top 1/3 must line up with those in Bottom 2/3



Cut drinking straw in 1/2





Paper cups to be placed under the outside end of the straw to serve as a leachate collection center.

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