Title: Creating a Mini Landfill, the 4th R
Grade: 3
Subjects: Science, Social Studies, Language Arts
Time: Initial lesson of 60 minutes (maybe divided into two 30 minute sessions), 20 minute follow-up lesson a week later

Objectives

- Explain the need to reduce the amount of trash they generate, and describe ways in which they can make changes in their actions to support waste reduction.
- Predict, observe, record, and draw logical conclusions during simple investigation.
- Communicate their ideas in writing and inform readers about their actions to reduce waste.

Standards

Geography Standard 16: Understand the changes that occur in the meaning, use, distribution and importance of resources.

- Benchmark # 5: Know advantages and disadvantages of recycling and reusing different types of materials.

Geography Standard 18: Understand global development and environmental issues.

- Benchmark # 2: Know ways in which resources can be managed and why it is important to do so (e.g., conservation practices, recycling non-renewable resources).

Science Standard 12: Understand the nature of scientific inquiry.

- Benchmark # 3: Plans and conducts simple investigations.

Language Arts Standard 8: Use listening and speaking strategies for different purposes.

- Benchmark # 3: Respond to questions and comments (e.g., gives reasons in support of opinions).

Materials

- Chart paper
- Signs: paper, metals, glass, plastic, biodegradable
- Some sorting items: aluminum can, aluminum foil, brown paper bag, cereal box, junk mail, white paper, pie tin, newspaper, telephone book, plastic milk jug, plastic soda bottle, plastic containers, tin can, drinking glass, glass bottle, glass jars, corrugated cardboard. Make sure to have some biodegradable food items available- orange peel, banana peel, apple core, cucumber peel, celery stalk.
- Waterproof, plastic container (such as child's pail, cut open milk carton, plastic storage container)
- Dirt
- Piece of lettuce
- Piece of plastic bag
- 1 cup of water
- Fork
- "Mini Landfill Predictions, Observations, Conclusions" worksheet provided below

Overview: The average US citizen generates approximately one ton of trash annually, but seldom gives it any thought once they throw it away. So what happens to it all? Well, it goes into the waste stream where it is collected and hopefully, disposed of in a manner that least impacts the environment. This process is known as solid waste management.

The Environmental Protection Agency has designed a plan for this process, which they refer to as "integrated solid waste management", and has identified five ways to properly handle waste materials: a) source reduction and reusing, b) recycling, c) composting, d) converting to energy, and e) burying it in a

sanitary, engineered site. The EPA emphasizes that there is no definitive approach to waste management and encourages communities to combine these five methods to effectively address the issue.

In most communities across the country waste materials end up in at least one of three locations: a) a materials recovery facility, b) a waste-to-energy facility, or c) a landfill. A materials recovery center is where recycled materials are sent. Once at an MRF glass, metal, plastic and paper are sorted, separated, and baled. Then they are transported to manufacturers, processed, transformed into useful items and placed back on the shelves for consumers to purchase once again. A waste-to-energy facility burns the waste material and converts it to energy. The trash is used as fuel to produce heat energy, turning water into steam. The steam is channeled to turbine generators, which in turn produce electrical power. A landfill is a long-term disposal solution that buries trash in as safe and sanitary manner as possible. In a landfill trash is deposited and compacted overtime, burying layer upon layer of waste material and leaving it to decompose. The EPA recommends land filling as a last resort, after all other methods have been exhausted; however many communities find the other options too costly or impractical, and use a landfill solution as one of their primary methods of disposal.

While the technologies driving these methods have greatly improved in recent years, they still present a number of environmental problems; so the most desirable methods for reducing waste are composting and source reduction/reuse. According to reports from the EPA almost 70% of solid waste consists of organic materials, such as paper, food and yard waste. These materials can be composted by individuals or on the community level, using municipal solid waste composters. Either way, the result is a product that can be added to enrich and improve the quality of soil. Compost is a valuable agricultural resource.

However, even with all these other options source reduction is, by far, the most preferred method of solid waste management. It uses fewer resources, less energy and is essentially free. Unfortunately, it is also the most difficult concept to communicate to consumers. For manufacturers, source reduction means looking at and reducing the waste they generate during production, and the materials they use in packaging products. For individuals, it means reevaluating current practices, learning to do more with less, using what already exists responsibly, and recognizing the difference between needs, wants and what is ultimately best for the environment and the future of mankind.

Kid's Speak: The 3 R's stand for reduce, reuse, and recycle. Recycling is the process of reprocessing materials into new items. Recycling prevents valuable resources from being wasted. Recycled items are sorted and separated into material types. Items made from glass, paper, metals, and plastics can be recycled. A plastic bottle can be recycled and emerge as a fleece jacket. If trash is not recycled, it is taken to landfills which are rapidly filling. Eventually more land will be needed for landfills so that land will be unavailable for environmentally friendly use by people, plants, or animals.

Composting is another way to handle waste. Some people call it the 4th "R" standing for rot or return. Compost is made by layering organic materials in a pile and letting it decompose. A balance of "browns" and "greens" ensure a healthy and odor-free compost. Browns include carbon materials such as dried leaves and broken twigs, and the greens constitute fruit and vegetable peelings, green plants, etc.

Eco-fact: Recycling creates 6 times as many jobs as land filling.

Before Creating Mini-Landfill:

- Teacher poses the question, "What are the 3 R's ?" teacher will accept answers from the class of reduce, reuse, and recycle. Teacher will record these words on board or chart paper.
- Teacher next asks class to help with a definition of each word. Teacher listens to class and then summarizes a good definition and records on board or chart paper beside respective 3 R word.
- Teacher asks for examples of objects in the classroom that could be disposed of in one of the 3R's ways and adds it to board or chart.

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- Teacher asks, “What types of items can we recycle?” The teacher answers her own question by saying “We need to know what materials our items are made of. We will do an activity to sort items that are alike. I have brought some items from my trash for us to sort.” (Note: Teacher may wish to save and reuse these trash items for future lessons.)
- Explain that the types of materials we will classify or sort fall into these categories: Paper, metals, glass, and plastic. Provide a brief explanation of each category. Make a sign for each category so children can place each item in the proper place.
- Spread out the some following items for class classify and sort: aluminum can, aluminum foil, brown paper bag, cereal box, junk mail, white paper, pie tin, newspaper, telephone book, plastic milk jug, plastic soda bottle, plastic containers, tin can, drinking glass, glass bottle, glass jars, corrugated cardboard. Make sure to have some biodegradable food items available- orange peel, banana peel, apple core, cucumber peel, celery stalk.
- Guide the class through the classification process giving explanations as needed. Each item will be placed by students or teacher near the appropriate category sign.
- Save all food products for last. Teacher will explain to students that there is actually another “R.” This “R” can stand for rot or return. Explain to students that biodegradable materials are recycled in a special way called composting. Ask if any students compost at home. Explain that compost is made by layering organic materials in a pile and letting it decompose. A balance of “browns" and "greens" ensure a healthy and odor-free compost. Browns include carbon materials such as dried leaves and broken twigs, and the greens constitute fruit and vegetable peelings, green plants, etc.
- Add a new sign biodegradable and place food item in that category.
- Add this new “R” to previously generated chart. Also record a definition and examples.

Creating a Mini Landfill:

- Teacher poses question: I wonder happens to items that are not recycled, go to landfill, and become buried garbage?
- Teacher answers own question: As we saw in our recycling lesson fruit and vegetable scraps are biodegradable and can be recycled in a special way called composting. Plastic can be recycled. Then recycled plastic can be made into many new items. Sometimes people forget to recycle plastic and it instead goes to the landfill and gets buried.
- Explain to students that we are going to start an experiment today to see what happens to buried garbage. In a week we are going to uncover the garbage we bury and see what happened to it.
- We are going to make a mini landfill. We are going to put some lettuce and plastic into our mini landfill. Which one is biodegradable?

Process for Creating Mini Landfill:

- Fill a waterproof, plastic container with several inches of dirt.
- Place the lettuce and plastic on top of the several inches apart.
- Cover your trash with more dirt.
- Water your mini land fill.
- If your land fill dries out add more water.

- Instruct children to record predictions on provided worksheet. Collect worksheet and save for observations and conclusions next week.

- Note: Teacher may wish to have students observe the mini landfill during the week to notice that above ground no changes can be seen.

A week later after digging trash out of mini landfill:

- Wait a week. Using a fork dig your trash out of your mini landfill.
- Observe if the lettuce and plastic have changed. Complete the follow-up activities below.

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- Return to the provided worksheet that has student's recorded predictions. Students will now record observations and conclusions.
- Conduct a wrap up discussion.
- Stress the importance of the 4 R's in reducing the waste stream.
- What happens to items that are not disposed of using one of the 4R's and why is it harmful to the environment?
- How can each of us help the environment on a daily basis?

Adaptation:

- To hasten sorting activity teacher can demonstrate using less items.

Extensions:

- For more details about composting visit this link on this Green Thumb Challenge section on this GEF site. To further explore this aspect of recycling click here:
- For lessons about composting, visit these links on this GEF site. To further explore this aspect of recycling:
- *Sort the Compost Bin Lesson*
- *Build an Indoor Compost Bin Lesson*
- *Build an Outdoor Compost Heap Lesson*

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