Reign in Garbage!

This activity center is part of the **Water Protection** theme.

What's the purpose of this activity?

To explain how proper waste management practices can avoid contamination of our water. Waste management includes proper landfill design and minimization of garbage. Students will become aware that their decisions on "garbage" before it enters the landfill are important and necessary.

Key messages:

- Minimize garbage going to landfills through responsible choices and decisions
- Leachate is formed when rain trickles through garbage in landfills
- Modern landfills capture & have backup systems in place to avoid contamination of groundwater

Materials:

- EnviroScape® Waste Management model
    - Bottom clear portion with 2 groundwater well containers
    - Upper enviroscaped portion
    - 2 Collection Trenches with small stoppers inserted
    - 2 fill trays (where sponges go into imitating garbage)
    - 2 spray bottle sprayers
    - 2 spray bottles with ecospouts (rain makers)
    - Sponge squares
    - Garbage Truck
    - Gas Plant
    - Wastewater Treatment Plant
    - Ranch House
    - Apartment building
    - 2 long green felt strips to lay in Stormwater Drainage Ditch
    - Green felt square to lay over Old Style Dump
    - Large stopper for lake
    - Water Tray
- Waste Management Card Description, laminated
- Where Does it Go? Cards, laminated
- Recycling Activity Boxes & cardboard props
    - 6 recycling boxes
    - 46 cardboard props
    - Aluminum (8 items)
        - Soup can
        - Tuna can
        - Soda can (2)
        - Corn can
        - Pet food can
        - Fruit can
        - Aluminum foil
    - Paper (8 items)
        - Envelopes
        - Paper bag
        - Notebook cover
        - Newspaper
        - Magazine
        - Books
        - Cards
        - Note paper
    - Cardboard (8 items)
        - Box
        - Pizza box
        - Cereal box (could be put into paper)
        - Gift box (could be put into paper)
        - Juice carton (could be put into paper)
        - Milk carton (could be put into paper)

        - Paper roll (could be put into paper)
        - Soda cup (could be put into paper)
    - Compost (8 items)
        - Worm
        - Dirt
        - Green leaf
        - Orange leaf
        - Carrot
        - Apple core
        - Egg shells
        - bread
    - Plastic (7 items)
        - Milk jug
        - Water bottle
        - Lotion bottle
        - Plastic bag
        - Strawberry tub
        - Cherrie tub
        - Soap bottle
        - Glue bottle (DO NOT USE!)
    - Glass (7 items)
        - Broken drinking glass
        - Broken measuring cup
        - Broken vase
        - Root beer bottle
        - Green bottle
        - Ketchup bottle
        - Jam jar
        - Light bulb (DO NOT USE!)

Activity Set Up:

1. See laminated photocopied set up pages.

What will I be doing?

You will be helping students understand how decisions on their "waste" before it gets to the landfill is very important … and not that difficult once the basics are understood!

Activity#1: Before you go to the dump!

1. When students arrive, ask them what they think trash or garbage is and where it comes from.

   Q: Do you produce a lot of garbage?

   A: We all produce garbage/trash, it is a by-product of our everyday activities at home, school and work.

   Q: How can we reduce our garbage?

   A: Reduce, Reuse & Recycle FIRST!

   - We all generate trash, and we all can help in different ways to manage our waste more efficiently and effective. One way to make less is to use less … which makes less to manage. However we will always have some waste that must be managed.
2. Indicate the Waste Management Centre on model, and explain what each area is and what goes there (use laminated Where Does It Go Centre Descriptions).
3. Now, bring out stack of laminated "Where Does It Go? Trash cards.
   - This stack of cards represents garbage that is going to the landfill.
   - Our job is to use the 3 R's … Reduce, Reuse & Recycle first to help keep as many things out of the landfill!
   - Hold up each card and ask students "Where should it go?"
   - Place on model in appropriate "centre:
     - Donation
     - Recycling
     - Compost
     - Hazardous Waste.

- Can further discussion from students by asking "Why they chose to put that item into that area/centre.

4. Now, take a look at any remaining garbage (cards).

   Q: **Where is this all going?**

   A: To the landfill.

5. Summary:
   - The overall goal in waste management is to divert as much material away from the landfill as possible!
   - So next time you are buying items, ask yourself …
     - Can this be used again?
     - Can this item be recycled?
     - Does this brand have excess packaging (because it will end up in the landfill!?
     - What could I use instead that will do less harm to our environment.

Activity#2: What happens when it rains on your garbage?

1. So all the garbage that is truly trash now sits in the landfill!
   - It sits there and is exposed to the natural elements … sun, rain, snow, etc.
   - What happens when it rains on garbage?
   - Let's find out!

2. ***When it Rains, it Leaches!***
   - Using the "modern landfill" area of the model, point out that the sponges represent trash.
   - Sprinkle a small scoop of coloured juice crystals over the sponges … explain that this represents dirt, chemicals, bacteria and other residues found in everyday household trash!
   - This "rain maker" (plastic bottle with rain spout) is the rain
   - Make it rain over the landfill by sprinkling about ½ of the bottle of water over the trash (sponges)
     - You can have a student do this!
   - Ask the students to watch as the trash soaks up the water until it is fully saturated
   - As a group, watch as the excess water "leaches" down further into the various layers of trash (demonstrated by the other Fill & Collector trays)
   - Notice the coloured water
     - This is "dirty" water that has leached through the various layers of garbage and collected contaminates along the way!
     - It's contaminated water … this is leachate!
   - Explain that when contaminated water, or leachate, reaches the bottom of the landfill, it stops! … at least in modern landfills.
     - **WHY?**
     - Because in modern landfills are developed with a main collection layer which collects the leachate that makes its way through the trash.

   Q: **This is very important … do you know why?**

   A: This is the "layer" that prevents the leachate, or contaminated water, from reaching the groundwater and aquifer!

   Q: What would happen if leachate got into the groundwater?

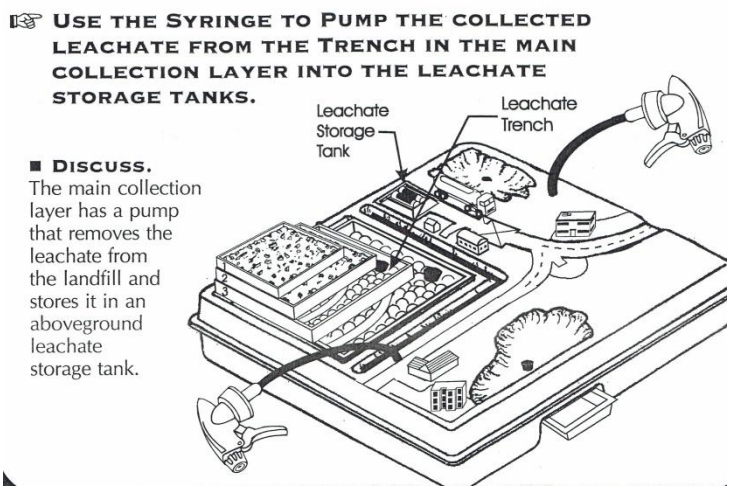
   A: It would pollute and contaminate our drinking water!

3. ***To Leachate or Not to Leachate!***

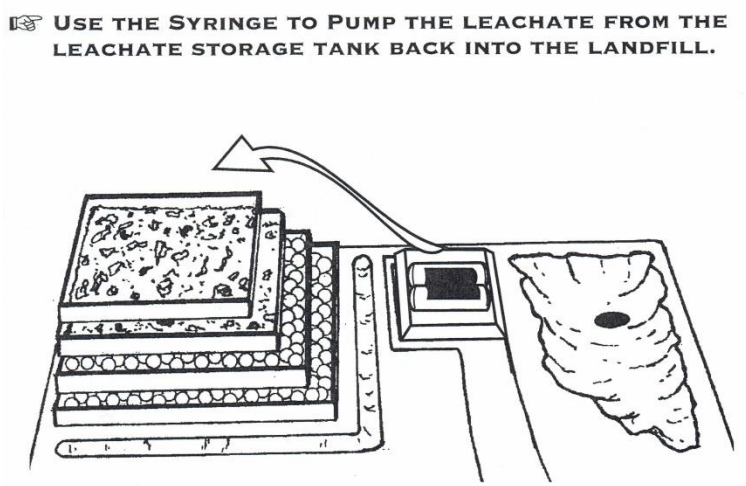
Leachate Storage Tanks:

- Have a student take the syringe and fill with leachate from the trench in the main collection layer

- Squeeze this into the leachate storage tanks
- As they are doing this, explain that the main collection layer has a liner (can demonstrate with piece in the kit)
  - This liner stops liquid from going any further down



- It also has a pump that removes the leachate from this layer of the landfill and stores it in an above ground leachate storage tank.
- Then we are able to pump some of the leachate from the storage tanks back



through the landfill.
  - Have another student fill the syringe with leachate from the storage tanks and squeeze over landfill again.
- This method helps the trash decompose more quickly while using some of the leachate that the landfill produces
  - The reuse of a leachate turns the landfill into a giant bioreactor!
  - A bioreactor is a device in which living organisms, especially bacteria, synthesize useful substances or break down harmful one.
- Not all landfills use this method.

Wastewater Treatment Plants:

- Point to the wastewater treatment plant
- Many landfills will collect the excess leachate and transport it to a wastewater treatment facility
- Here is it cleaned and released back into the environment
- Some landfills may even have this on site.

4. I've got your Back!

Back-Up Collection Layer at the bottom of the landfill (under Main Collection)

- Show students that nothing has happened in this bottom layer.

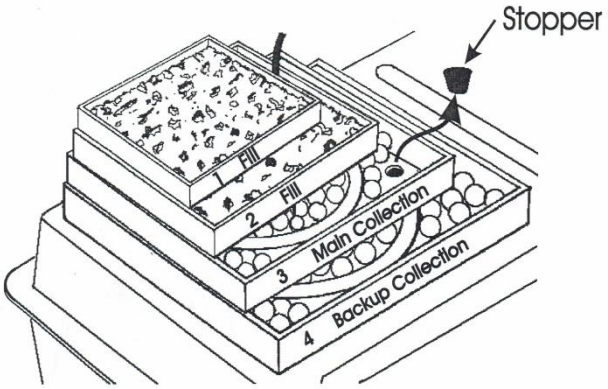
Q: Why do you think it is there?

A: Prevention!

- The bottom layer is the "back-up collection layer"
- If, for any reason, the liner in the main collection layer fails, the back-up collection layer will prevent any escaped leachate and prevent it from seeping into the groundwater!
  - To demonstrate, remove the stopper from the main collection layer

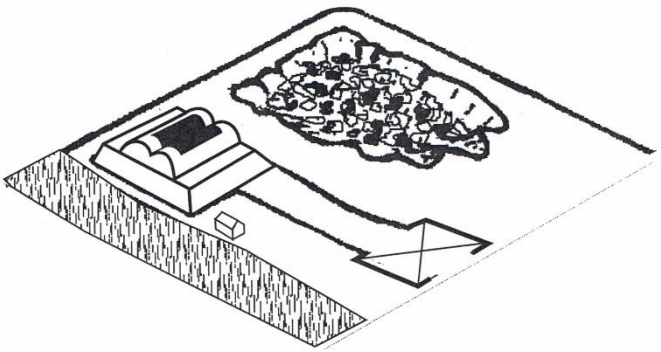
- This represents a tear or puncture in the liner and it can cause a leak.

☞ REMOVE THE PLUG (STOPPER) IN THE MAIN COLLECTION LAYER.



5. ***The Old and Dirty!***

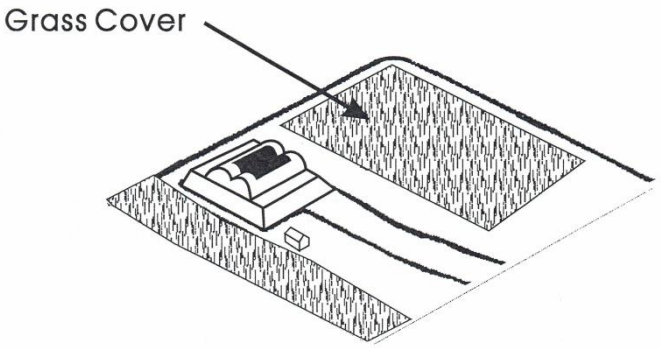
☞ LET'S TAKE A LOOK AT THE OLD STYLE DUMP.



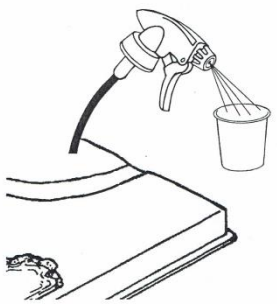
In older landfills … they did not use leachate liners and even if it was covered up (green felt representing grass, make sure you have sprinkled some coloured juice crystals over sponges), look what could happen:

- Here we have an old landfill that has been covered over by dirt and grass … it isn't being used any more
  - So, it should be okay, right?
- Use the "rain maker" (plastic bottle with rain spout) and make it rain over the old style dump (about ½ the bottle of water)
- This dump is an example of how landfills use to operate before strict regulations came in requiring leachate liners and collections systems!
- Now look beneath the model … see how the water seeps through to the groundwater, carrying the pollutants from the trash with it!
  - The groundwater is coloured.
- Imagine this occurring over many years … what would that do to our groundwater?
  - Contaminate it … and that can cause a lot of problems for us and wildlife!
- Have someone use spray pump and spray some water from the private well into the cup
  - Explain, when the contaminated leachate reaches the aquifer, it may travel beyond the immediate area
  - It can become a threat to drinking water!

☞ PLACE GRASS COVER (THE GREEN FELT) OVER THE LANDFILL.



☞ PUMP SOME WATER FROM THE PRIVATE WELL INTO THE CUP.



- Even with soil and grass over top, rain will percolate through these natural covers and eventually reach the old garbage!

Summary … don't just dump your garbage!

- Use regulated landfills for your garbage!
- Goal is to reduce your waste using the 3 R's

6. ***Recycling Relay … to bring it home!***
   - **What can you do to "reign in garbage"?**
   - Divide group into 3-6
     - Divide the cardboard props (items) equally among groups (this may mean that you don't use all props)
       - 3 groups – 15 items each
       - 4 groups – 11 items each
       - 5 groups – 9 items each
       - 6 groups -7 items each
   - Set up the Recycling boxes a couple of arm's length away from the groups
   - **We are going to "test" your recycling knowledge before you go!**
   - Have each group work together, and look at their items
     - Send one person on the team to the place the item in the recycling box the group thinks it belongs in
     - Continue until all items have been placed in a recycling box
   - Collect the recycling boxes and go through each one
   - The results should be as follows:
     - **Aluminum (8 items)**
       - Soup can
       - Tuna can
       - Soda can (2)
       - Corn can
       - Pet food can
       - Fruit can
       - Aluminum foil
     - **Paper (8 items)**
       - Envelopes
       - Paper bag
       - Notebook cover
       - Newspaper
       - Magazine
       - Books
       - Cards
       - Note paper
     - **Cardboard (8 items)**
       - Box
       - Pizza box
       - Cereal box (could be put into paper)
       - Gift box (could be put into paper)
       - Juice carton (could be put into paper)
       - Milk carton (could be put into paper)
       - Paper roll (could be put into paper)
       - Soda cup (could be put into paper)
     - **Compost (8 items)**
       - Worm
       - Dirt
       - Green leaf
       - Orange leaf
       - Carrot
       - Apple core
       - Egg shells
       - Bread
     - **Plastic (7 items)**
       - Milk jug
       - Water bottle
       - Lotion bottle
       - Plastic bag
       - Strawberry tub
       - Cherrie tub
       - Soap bottle
     - **Glass (7 items)**
       - Broken drinking glass
       - Broken measuring cup
       - Broken vase
       - Root beer bottle
       - Green bottle

- Ketchup bottle
- Jam jar

Additional Background Information:

Helpful Glossary for words related to waste management:

Landfill Where waste is buried in holes in the ground. Many of our current landfill sites are nearly full and we are rapidly running out of suitable land to create more.

Leachate is the liquid that drains or 'leaches' from a landfill. It varies widely in composition regarding the age of the landfill and the type of waste that it contains. It usually contains both dissolved and suspended material.

Waste, anything that we think we no longer have a use for and so throw away.

Waste minimization, referring to the whole process of sending less waste to landfill and incineration but instead finding ways to reduce, reuse or recycle it.

Waste hierarchy, reduction of waste is the best option followed by reuse. Only when neither of these is possible, should waste by recycled. Disposal through landfill or incineration should only be the last resort

3 R's , a short way of saying "Reduce, Reuse and Recycle. Perhaps the three most important words in waste management.

Reduce, avoiding creating waste in the first place and is an even better thing to do than reusing or recycling. Examples of waste reduction include buying items with less packaging and not replacing items until really necessary.

.***Reuse***, using something again, either for the same purpose or for something completely different. Examples include returning milk bottles for refilling and repairing electrical goods when they go wrong instead of throwing them away.

Recycling, using things that have already been used to make new things. This can involve turning the old material into a new version of the same thing. Alternatively, materials can be recycled into something completely different.

Refillable, Means that something (for example a bottle) can be refilled rather than having to be thrown away when it is empty.

Litter, waste (usually paper, plastics and glass) thrown around in the environment, rather than being placed in a proper bin or other waste facility. Not all waste is litter but all litter is waste.

Pollution, putting poisonous or other harmful substances into the environment.

Biodegradable waste, waste that can break down or rot naturally when attacked by bacteria. Examples include food and garden waste. Other kinds of waste are said to be non-biodegradable.

Organic waste, waste derived from plants and animals makes up about 20% of the weight of an average dustbin. A lot of the organic waste created by households consists of food but other sources are garden waste and the contents of babies' diapers. ***Compost***, is created by the controlled breakdown of biodegradable material such as garden and kitchen waste. It can be used to improve soil structure and nutrient levels without the need for artificial fertilizers and peat-based composts.

Domestic waste, waste which comes from homes. Also known as household waste.

Hazardous waste, Waste that is potentially harmful to humans, other living things and the environment and so needs to be carefully disposed of. Examples of hazardous waste include asbestos and poisons. Also called

Special Waste.

Toxic Waste, waste that is poisonous to humans or other living things.

Methane, a gas given off by landfill sites which is highly inflammable and a major contributor to global warming.

Incineration, getting rid of waste by burning it at high temperatures.

Resources, a general word for the things and materials that we obtain from the Earth. Resources can be classified in two ways.

- Renewable resources are those that can replace themselves over a fairly short time scale. Examples include the water in a reservoir or crops which grow from year to year.
- Non-renewable resources can either never be replaced or take a very long time to replace. Examples include coal and oil.

Clean Up Procedures:

- Store all cards in Ziploc bag and place in volunteer folder, return to volunteer sign in area
- Return all Recycle Relay props (items and boxes) to container
- Remove any felt and place in activity where is will be able to air and dry
- Remove buildings, vehicles and other loose components and wipe them with a sponge or rinse with water … dry before packing up
    - If festival is running another day, wipe down but leave set up on model
- Remove water from both groundwater containers, remove pumps, spraying any excess water from the tubing before storing
    - If festival is running another day, place spray pumps back into proper holes of model
- Remove wet sponges from modern landfill and old style dump
    - Rinse with clean water to get rid of excess colouring
    - Replace in landfill layers if there is another day of festival
    - If it is the last day of the festival, place wrung out sponges into a Ziploc but leave open so sponges can dry
- Remove and clean trays
    - Replace in proper position in model
- Drain the lake into the container beneath it
    - Empty and rinse
    - Dry before packaging
- Clean and dry the model thoroughly
- If last day of festival:
    - Pack the buildings and other smaller components in the water tray carefully and place in the green case.
- Return activity folder to volunteer sign in area