

Zero Waste Education Toolkit

A Resource for B.C. First Nations Elementary School Teachers



Reduce, Reuse, Recycle
these are things
that you
can do
to
help the
world.



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About the Zero Waste Education Toolkit

Teachers in First Nations communities in British Columbia have asked for curriculum/education materials to help teach students about waste, recycling and composting. The Zero Waste Education Toolkit (for Kindergarten to Grade 7) is intended to provide teachers with distilled information (less text and more graphics), and a set of Activities so students can learn concepts or practical applications through doing.

The toolkit approach (rather than lesson plans) recognizes that teachers have the skills and experience to best design and integrate information into each particular classroom setting, and can adapt assembled materials in the topic area. The toolkit literally includes supplies and items needed to carry out suggested Activities, to increase the ease of use for teachers.

Several First Nations School teachers have contributed thoughts, suggestions and ideas to the toolkit. Their input is greatly appreciated and has helped to shape the final form of the toolkit.

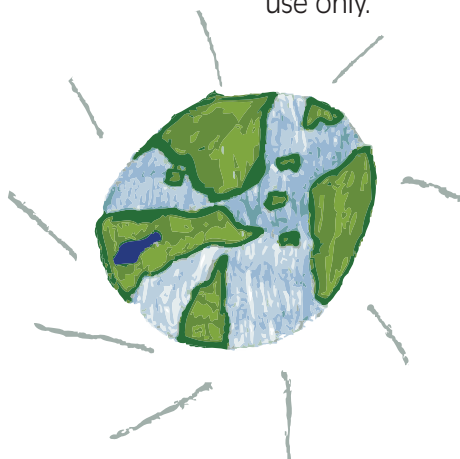
The first part is Understanding Waste (What is Waste? Where does waste come from? What are some common problems with waste?)

The second part is Getting to Zero Waste and includes the 4Rs, Composting, How to Reduce Garbage and its Impacts on Mother Earth.

Teachers are free to weave back and forth between the two parts to suit the classroom needs and for the best learning outcomes.

Examples (including photos and video) from BC First Nation communities help to increase the relevance of the material. Special artwork by Henry V. Robertson Jr., a Haisla artist, highlights this First Nations content throughout the toolkit. Mr. Robertson is from Kemano, B.C. and has been given the name of Un-gu-lth ("First Breath of the Killer Whale"). His mother's clan is the raven, his father's clan is the eagle, and he was also adopted into the killer whale clan.

Thanks are also due to the many sources and contributors listed in Acknowledgements. Finally, this toolkit is intended for non-profit use only.



Children's Art from Bella Bella Children's Poster Contest, 2015

About the Zero Waste Toolkit

Artwork to indicate Indigenous content in the toolkit

Artwork by Henry V. Robertson Jr., a Haisla artist



Killer Whale "Orca"
and Seven Salmon



Eagle with Two Ravens on Wings
and Seven Salmon



Sea Lion

Zero Waste Curriculum Connections

In the new B.C. Curriculum, “teachers are encouraged to create... learning experiences that go beyond learning area borders to focus on students’ needs and interests or local contexts.” While waste education is not specified in the curriculum, it is pertinent to the daily reality of First Nation communities.

Fortunately, there are many avenues for zero waste education to be introduced while following curricular competencies and key concepts. This toolkit, with activities based on solid waste education, offers opportunities to apply curriculum-based skills, strategies and processes, and to transfer the students’ learning to a new topic or situation. In addition, many of the activities build on literacy and numeracy foundations.

Local First Nations context and community involvement are stressed in the new curriculum. Your community’s perspectives and knowledge on local solid waste issues, history and current waste reduction initiatives will greatly enhance the topics that are discussed in this toolkit. Some ideas include:

- Contact the transfer station operator, public works supervisor, garbage/recycling collector, local compost expert and elders to arrange a tour, interview or classroom presentation.
- Contact the regional district or recycling/gardening society.
- Involve other members of the community in your activities such as a community litter pick-up or upcycle project.



Gwa’sala -’Nakwaxda’xw Grade 6 students collect recycling bins from each classroom every Thursday.

Zero Waste Curriculum Connections

The following competencies are a suggested starting point to bring waste education into the classroom:

Science

Grade K – Make exploratory observations using their senses

(e.g. recyclable materials such as plastic, wood, glass, metal; compostable materials such as food and garden waste).

Grade 1 & 2 – Consider some environmental consequences of their actions
(e.g. litter/marine debris).

Grade 3 & 4 – Collect simple data; use tables, simple bar graphs, or other formats to represent data and show simple patterns and trends
(e.g. conduct a waste tally activity).

Social Studies

Grade 1 – Relationships between a community and its environment.

Grade 3 – Relationships between humans and their environment
(e.g. pollution of local environment from waste and litter).



Zero Waste Curriculum Connections

Math

All Grades (at an appropriate level) – Understand and apply mathematical concepts, processes, and skills to solve problems in a variety of contexts (such as a waste tally activity).

Applied Design, Skills and Technologies

All Grades (at an appropriate level) – Plan and carry out an “upcycle” project where an unwanted item is transformed into a new useful item using available tools and technologies in a safe manner.

Arts Education

All Grades – Create artwork with “waste” materials. Exploration of various design elements and materials for visual arts, symbolism, Aboriginal arts, processes, technologies, tools and expressing ideas are all part of this subject’s content for all grades.

Career Education

Grades K - 3 – Learn about local solid waste management jobs in the community. Identify and appreciate the roles and responsibilities of people in this field. Recognize the basic skills required for these jobs.



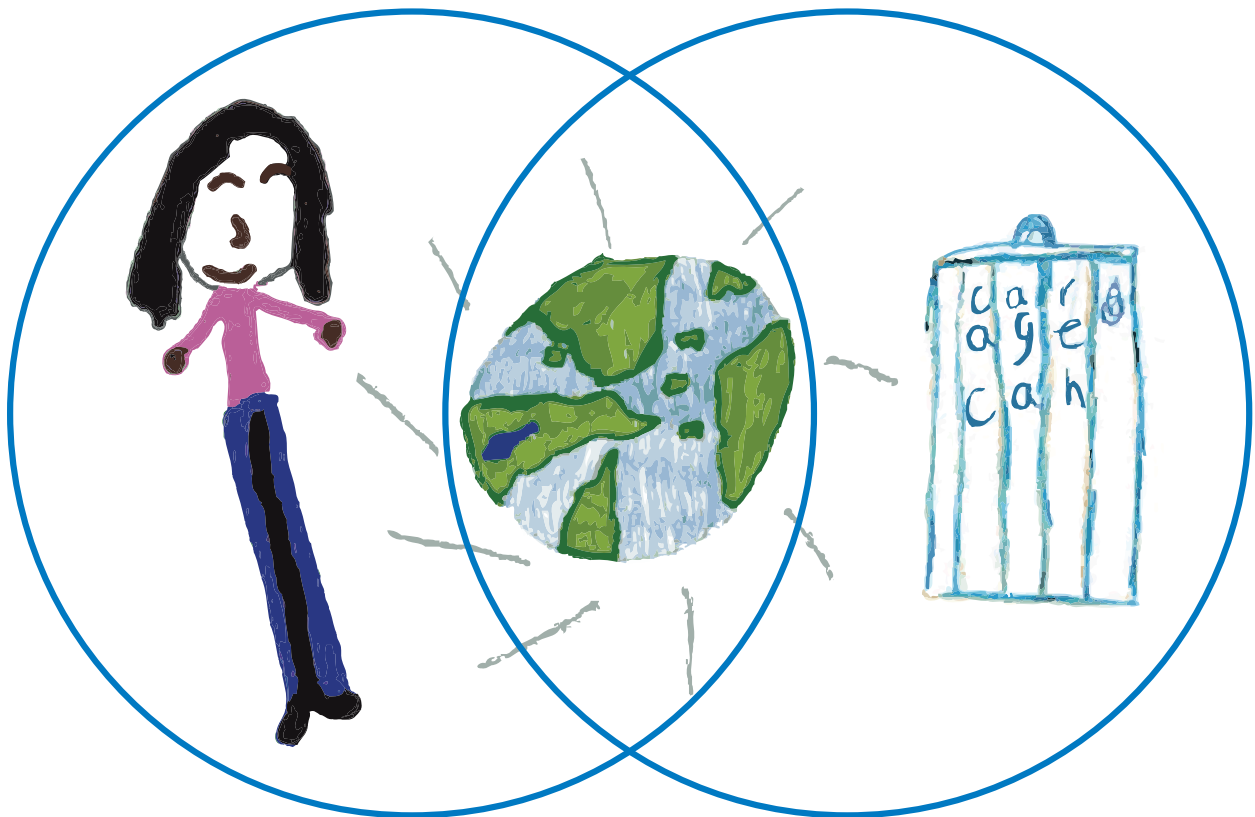
Upcycle project



Pieces of scrap fabric were upcycled into this beautiful quilt (photo provided by Sharon Wilson, Heiltsuk First Nation).



Understanding Waste



What Is waste?

Definition of Waste

Waste is something that someone doesn't need or want anymore, or is surplus to what we can use.

Other Terms for Waste

- Rubbish
- Junk
- Garbage
- Trash
- Refuse

Cultural Perspective on Waste

by Josh Carpenter, Heiltsuk Nation

- Pre-European contact, materials our ancestors used were biodegradable and reintegrated naturally back into the environment.
- Post-contact saw a rapid adoption of environmentally incompatible packaging and consumer waste.
- The health and environmental consequences were immediate and persistent.
- Our community members and leadership quickly understood they needed a new strategy to address this growing concern.



Historical Timeline of Waste



Where does waste come from?

Household Waste

Packaging, food, paper, old toys, old clothes, garden cuttings, old furniture, batteries, electronic waste (computers, televisions, cell phones), old appliances (refrigerators).

Other Sources of Waste

- Shops, stores, and community buildings
- Street waste bins and litter
- Construction, renovation, and demolition of buildings
- Farms
- Factories, mines, and other industrial activities
- Sewage (i.e. flushing the toilet)

Some waste from households may be dangerous to the environment or public health, such as cleaning materials, paints, weed killers and medicines.



?Esdilagh First Nation collects waste once a week from each of the community's 15 houses, the Band Office, and the church.

What's in Household Waste?



What makes up waste?

Organics

Waste from the kitchen and garden can be composted. It is collected in a household bin or a community facility; over time the organic waste decomposes into soil to be used in gardens.

Recyclables

Material that is reprocessed into new items:

- “Blue Box” recyclables
(i.e. cardboard, paper, glass, metal cans, plastic packaging, beverage containers)
- appliances and electronics
- paint, pesticides, solvents
- large metals and automotive special waste
(e.g. tires, used oil, antifreeze)

Scrap Wood

Clean wood can be burned or reused.

Sources of scrap wood:

- pruning or tree removal
- construction, renovation and demolition projects
- wood shipping pallets
- sawdust

Residual Waste

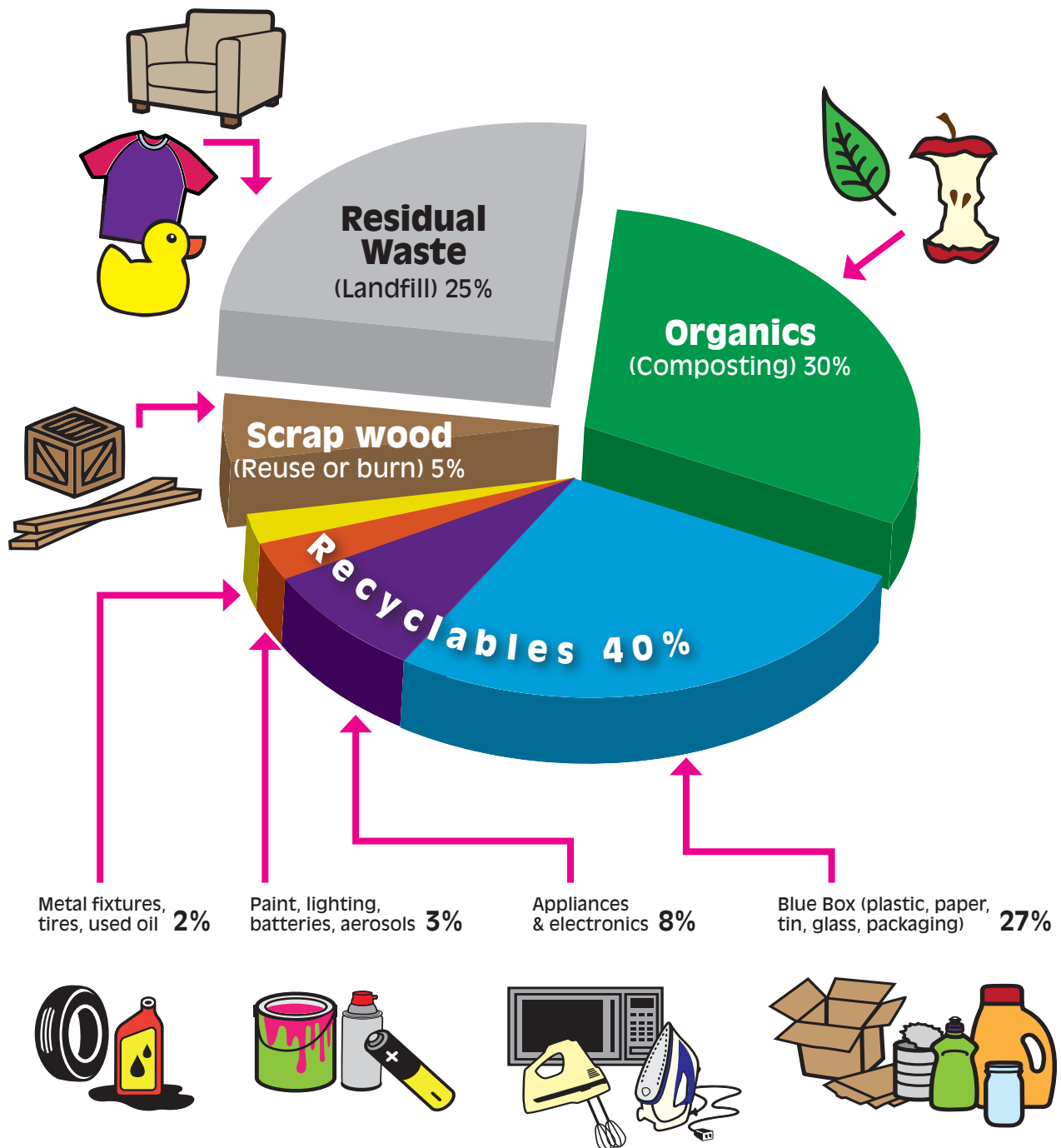
Items that cannot be composted, recycled, repurposed or cleanly burned go to the landfill. In 2015, each person in British Columbia sent an average of 497 kg of solid waste to landfill.²



Recyclables, scrap wood and some residual waste can be **REPURPOSED** through the community free store, thrift shops, and **upcycle projects!**



How can waste be sorted?



What are some common problems with waste?

Garbage Bears

In 2015, 174 bears were destroyed in B.C. because they were continually seeking food from unsecured trashcans and dumpsters.³

Litter

445,915 cigarette butts and 79,339 food wrappers topped the list of the most collected items from Canadian shorelines in 2016.⁴

Planned Obsolescence

Most video game systems are designed so you have to buy new versions of the same old games to make them work. This is called “planned obsolescence,” and it costs consumers and the environment.⁵

Water Pollution

It only takes a single gram of mercury to contaminate an 8-hectare lake to the point where the fish are inedible for a whole year.⁶

Animal Impacts

The nets that citrus fruits are sold in are non-recyclable, and they can harm birds and water animals that get caught in them or try to eat them.⁷

Health Impacts

“(Open burning caused) a lot of medical issues we had to deal with – respiratory issues, asthma – and we couldn’t burn anymore.”

Pam Frank, Ahousaht⁸

Garbage Disposal

Burning Garbage – reduces garbage volume, but causes air pollution.

Incineration – hi-tech incinerators reduce garbage volume and produce heat. However, they are expensive, leave behind fly ash with toxic heavy metals and emit fine particles and carbon dioxide.

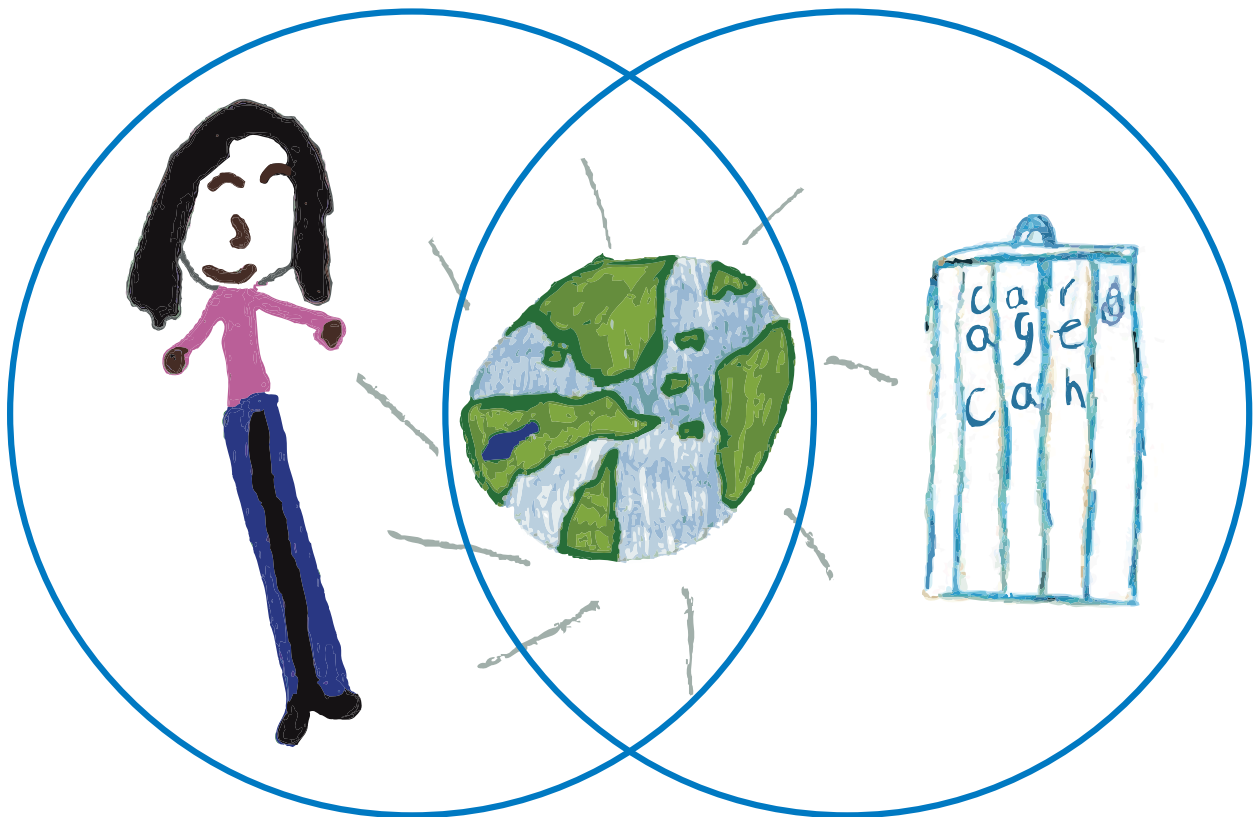
Landfilling – burying garbage takes up land and properly controlling the gas and liquid emissions from landfills is costly.

Marine Debris

is litter that ends up in the ocean. It’s a huge problem! Watch this video of a remote beach cleanup near Kyuquot Sound: www.youtube.com/watch?v=Ws1dbS91KeI



Understanding Waste Activities



About the Activities

The following activities are meant to be a hands-on, practical approach to understanding waste. Teachers can adapt them as needed to suit any grade level.

To the greatest extent possible, materials needed for each activity have been provided. Common classroom items (e.g. pencils, paper clips) are assumed to be available at the schools. Emphasis has been placed on reusable resources (e.g. laminated tally sheets with wet-erase markers), although some consumables, such as gloves and garbage bags, will eventually need to be replaced by the school.

Please return all materials to the kit when done. The materials for each activity are grouped together and labeled. Checklists are provided to help you keep track of the supplies.

Online Resources/Further Activities:

- Capital Regional District – The 3R Hierarchy (2014 Edition)
www.crd.bc.ca/education/school-programs/for-k12-teachers/educator-guides-resources/recycling-garbage
- City of Ottawa RETHINK GARBAGE Resource (2009/2010)
<https://ottawa.ca/en/residents/garbage-and-recycling/waste-reduction-and-education>
- Marlborough District Council (New Zealand) – The Waste Kit
www.marlborough.govt.nz/environment/environmental-education/school-education-programmes/waste-minimisation
- The Pod Waste Information Pack (Wastebuster, UK)
<https://jointhepod.org/teachers/other/waste-information-pack>

1. Litter Pick-Up

Learning Objective:

This activity will help students to look at the relationships between individuals, their community and their environment and consider the environmental consequences of their actions.

You will need:

- ☐ Shoreline litter article
- ☐ Tally sheet
- ☐ Gloves
- ☐ Grabbers/Tongs
- ☐ Garbage and recycling bags
- ☐ Wet erase markers

Activity:

1. Read the Shoreline Litter article provided in the toolkit with the class. Discuss the kinds of litter the students see in the community and where they have seen it.
2. Discuss litter pick-up safety with the students (e.g. wear gloves, use grabbers/tongs, things that are unsafe to pick up (broken glass, needles)).
3. Collect litter from the school grounds or community spaces and decide how much of what has been collected is trash and how much could be used again.

Extension:

1. Find ways to make use of the reusable items where possible.
2. Lead a community clean-up on Earth Day.



Community clean-up by Wei Wai Kum First Nation school children.



2. Classroom Waste Tally

Learning Objective:

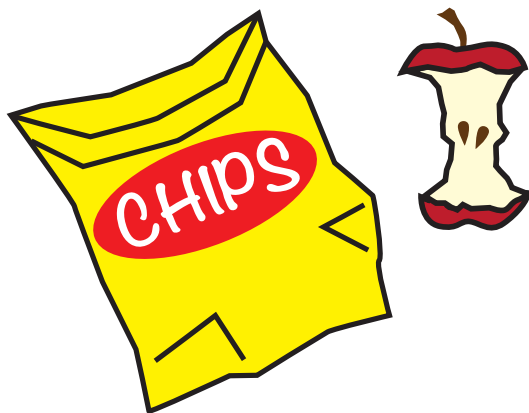
This activity will get students to measure weights, record and analyse data, and present the results.

You will need:

- ☐ Gloves
- ☐ Tally sheet
- ☐ Category signs
- ☐ Large piece of plastic or tarp
- ☐ Containers or buckets to hold separated waste (optional)
- ☐ Scale
- ☐ Recycling Guide
- ☐ Wet erase markers

Safety Tip

Teacher should pre-check the garbage, removing any sharp or harmful objects.



Activity:

1. Collect all garbage discarded by the class for 1 or 2 days. Separately collect contents of recycling and compost bins as well, if there are any.
2. Lay the plastic on the floor, dump the garbage on it, and have students sort it (wearing gloves) according to category (i.e. paper, plastic, metal). Either section off the plastic sheet with masking tape or use buckets.
3. Check the recycling and compost bins (if you have any). Record anything in those bins that shouldn't be there (e.g. a chip bag). Add contents to appropriate categories.
4. Working in groups, weigh each category and graph the results.
5. Create a bar chart bulletin board display that compares the various components of the classroom waste stream by type and weight.

Extension:

1. Activity can be repeated for seasonal/daily/weekly changes or to measure improvement over time when implementing a waste reduction program.

3. Survey Says

Learning Objective:

This activity will get students to conduct an investigation into the current waste reduction practices in the community, collect data through personal interviews, and organize and present the information.

You will need:

- ☐ Survey forms
- ☐ Wet erase markers



Activity:

1. Create 2 columns on the board or a flip chart. Label one side "What I know now about garbage and recycling" and the other side "What I want to know about garbage and recycling." Have the students brainstorm and discuss.
2. Talk about the need to reduce garbage. Have students share the ways they presently reduce garbage at home and at school.
3. Give each student a survey and emphasize the importance of completing the survey at home and returning it to school.
4. After all surveys are complete, compile the data. Have the students create bar graphs or calculate percentages to demonstrate the ways in which members of the class recycle at home, the number of families recycling different materials, the number of families who compost, and so on.
5. Discuss each question, drawing on students' answers and ideas about what they do now or could do in the future to reduce garbage.

Extension

Invite a member of Council or the waste management staff to the classroom. Students can share the survey results and learn about current or potential community-wide efforts to recycle or reduce waste.

4. All Wrapped Up

Focus for this activity is not the 3R's (although it can be discussed), but rather identifying what makes up packaging as part of the waste stream.

Learning Objective:

This activity will help students think about the functions of packaging and will encourage them to give equal consideration to quality, value, convenience, and environmental impact when making purchasing decisions.

You will need:

- ☐ An assortment of clean, empty food packaging or other product packaging



Activity:

1. Have students each choose a package that interests them. Ask students, "Why do you think the manufacturer chose that particular package to contain that product?" (Reasons may include health, containment, safety, amount of garbage produced, cost, eye-catching design). Note reasons on blackboard.
2. Ask, "What attracted you to that product?" Discuss the influence of marketing on why students chose different packages.
3. Ask, "Who has a package that could be recycled? Reused? Reduced?" Talk about what "reducing" means (not making garbage in the first place). Have students brainstorm

different types of packaging material (glass, paper, etc.), then place their packaging under the appropriate title. Discuss the purpose and advantages of different materials. Determine which packages are made from renewable and non-renewable natural resources.

4. Show the students various types of packaging used for the same item. For example: cookies, drinks, and popcorn can be packaged in a variety of ways. Varieties include bulk, concentrate, box, glass, aluminum, tin, plastic and mixed materials.
 - Does the food need packaging? Why? How much packaging does it need? Do any of the examples demonstrate excessive or overpackaging? Why might companies use overpackaging?
 - Which type of packaging produces the most garbage? Which type of packaging minimizes waste? Which type of packaging enables consumers to reuse it?
 - What is the price difference of the various types of packaging? Do you pay more for convenience? Why?

Extension:

1. Ask students to define "overpackaging". Break class into groups and hand out flyers from a grocery or department store. Have students find examples of overpackaged goods. Discuss what they have found and what alternatives may be available.

5. Litterless Lunch

Learning Objective:

This activity will help students think about the functions of packaging and consider the environmental consequences of their choices. They will gather information from personal knowledge and help to create a visual representation of the collected material.

You will need:

- ☐ Activity sheet
- ☐ Wet erase markers

Activity:

1. This activity will need to take place before lunchtime. Have students get their lunches and split the class into groups. Provide each group with an activity sheet and wet erase marker.
2. Look at the various types of packaging and containers used for the items in their lunches. Mark down on the activity sheet what category each item belongs in. Discuss what happens to the packaging once they finish their lunch.
3. As a class, have the students comment on where most of the lunchtime packaging will end up. Why do some students bring water bottles, juice boxes, plastic boxes, etc.? Brainstorm the advantages and disadvantages of each.



6. Waste Detective – Polluting Waste Investigation

Learning Objective:

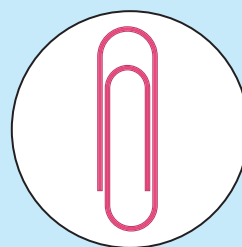
This activity will help students understand that improper disposal of waste has damaging effects on animals and their habitats.

You will need:

- ☐ A jug
- ☐ Some water
- ☐ A set of dice
- ☐ A paperclip
- ☐ A pencil
- ☐ Permanent markers
- ☐ A bit of string
- ☐ Numbered plastic cups containing:
 - some dirt
 - small stones
 - a used opened tea bag
 - bits of waste paper
 - polystyrene pieces
 - cooking oil
 - vegetable peelings
 - other optional items of your choice (up to 12)

Activity:

1. Tie one end of the piece of string around the pencil. Tie the other end to the paper clip. Lower the paper clip into a jug full of water. Wind the string on the pencil so that the paper clip is hanging in the water. The paper clip is now your tadpole! The jug of water is the 'habitat' it lives in.
2. You're going to see what happens when a week's worth of waste is dumped into the tadpole's habitat. Roll the dice. Tip the waste from the plastic cup with the same number into the jug. What happens to the water? What happens to the sides of the jug? Keep rolling the dice and adding the waste until its all in the jug. Can you still see the tadpole?
3. If waste is not disposed of properly, it can damage the places that wildlife live. When you add waste to the water:
 - oil droplets form on the surface of the water
 - dirt and stones line the bottom of the jug
 - pieces of waste paper and polystyrene float in the water. This makes it harder for the tadpole to breathe and find food.



7. Make Your Own Landfill

Learning Objective:

This activity will help students think about where their garbage goes and to help them understand the decomposition of different materials.

You will need (for each group):

- ☐ Cardboard box
- ☐ Garbage bag
- ☐ Dirt
- ☐ Water
- ☐ Popsicle sticks
- ☐ Permanent markers
- ☐ Activity sheet
- ☐ Wet erase markers
- ☐ Two samples each of typical household waste such as:
 - Food scraps
 - Newspaper
 - Glass
 - Cloth
 - Chip bag

Activity:

1. Line the cardboard box with the garbage bag and fill it half full of dirt (do not use potting soil).
2. Bury two identical rows of waste (such as food scraps, newspaper, glass, cloth, chip bag, etc.), marking the location of each item with a labeled popsicle stick.
3. Use the activity sheet for each landfill project to monitor the experiment. Note the items placed in each landfill, with the date.

Add water to moisten the soil and place the mini-landfill in a sunny spot. The landfills should be watered regularly (to simulate rain).

4. After 2 weeks, carefully remove the waste items from one row of the landfill and examine them. Record the results on the worksheet.
5. After 4 weeks, carefully remove the waste items from the second row of the landfill and examine them. Record the results on the worksheet.
6. Graph the results of the study on a bar graph.
7. Questions for discussion:
 - Were the decomposed items natural or human-made?
 - Why do you think some items decomposed more rapidly than others? What characteristics do these items share?
 - Some items will show no signs of decomposition. Will they remain unchanged for a long time and why?
 - If the landfill had been made of sterilized soil, would the waste have decomposed as quickly?
 - What does this study tell you about the types of items we put in landfills? Are there items that should never go into a landfill?



Acknowledgements

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This toolkit would not have been possible without the abundance of waste education information already available on the Internet. In particular we would like to acknowledge the following agencies for their ideas and inspiration:

Capital Regional District – The 3R Hierarchy (2014 Edition)

City of Ottawa RETHINK GARBAGE Resource (2009/2010)

Marlborough District Council (New Zealand) – The Waste Kit

The Pod Waste Information Pack (Wastebuster, UK)

We also appreciate edf Energy and the Pod (jointthepod.org) for providing access to their online resources.

Footnotes

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