Teacher Notes to support WDCS / Captain John Boats Recycling Initiative

Key Messages:

1 Recycling saves natural resources by re-using materials as an alternative to using new raw materials.
2 Recycling keeps waste out of our landfills.
3 Recycling can reduce energy consumption by re-using materials rather than processing new materials from scratch.
4 Recycling keeps potentially harmful waste products out of the environment.
5 Learn where the recycling facilities are and why some products are recycled and others are not.

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1. Recycling saves natural resources by re-using materials as an alternative to using new raw materials. Some materials are non-renewable; they cannot be replaced or can be replaced only at such slow rates and under such rare conditions that they are for all practical purposes not renewable. Non-renewable resources can be conserved through careful use, and recycling. In order to re-use materials efficiently, containers need to be separated, cleaned, and taken to a recycling centre where they can be processed.

a) Concepts of waste/recycling. When is an object considered to be 'waste'? (A whole banana would not be considered waste but once the banana has been eaten, the peel is considered waste. Why is that? Why is it OK to discard a banana peel in a compost pile but not a soda can? What is 'recycle'? What types of materials can be recycled? Why should we recycle or not recycle? What types of materials shouldn't be recycled and why? (ex: pressure treated wood contains arsenic and should requires special handling.)

b) How to recycle: separate and classify – a lesson in graphing.
Classroom Activity K-3:
Use classroom/school recycling or bring in a recycling can from home with at least one piece of recycling for each child; there should be examples of aluminum, glass and plastic objects. (Make sure that there are no sharp edges on the cans, plastic or bottles.) Ask the students to classify the objects. Which ones are similar? Why? What materials are used? (Optional: on a large piece of paper, brainstorm a list of all of the different things they might buy in each type of container. Are there any alternatives?)

1. Ask each student to select a recycled object.
2. Mark a large right angle in masking tape on the floor of the classroom to represent a graph. Remind the students of how they have classified the recycled objects as you place an example of each type of recycled material along the bottom of the graph (the x-axis). Ask them to line up behind the representative example.
3. Have children in each line count off. Write those numbers on the chalkboard beside the name of the recyclable material. Ask the children to place the object at their feet and go back to their chairs. Ask the group to compare the numbers. Which is the most recycled material? Which one has the shortest line? What does this mean?

4. Explain that there is a simpler way of showing this information. On a newsprint graph, mark the equivalent number of spaces for each material. Tell children that this is what their lines would look like if someone were looking down on them. Explain that each line you draw stands for one of the lines they have formed. Demonstrate how you used the numbers along the side to know where to end each line.
5. After children are seated, have them again compare the lines, pointing out how easy it is this way to see the relative length of each line.

Classroom Activity 3-6:
Use classroom/school recycling or bring in a recycling can from home; there should be examples of aluminum, glass and plastic objects. (Make sure that there are no sharp edges on the cans, plastic or bottles.)

1 Ask the students to classify the objects. Which ones are similar? Why? What materials are used? Why do they have to be separated for recycling? What might the objects be recycled into?
2 Have the students count the number of each type of object and create a bar graph representing this data. Which materials are used the most? The least? Why do they think this is?
3 Recycling at home: Ask the students to keep a tally of how many items their family recycles in 1 week. They can keep note of each time that an item is placed into a recycling bin. The students can then create a bar graph as above to see which type of materials each family recycles the most and why.
4 Compare the students' bar graphs from home. Review concepts from the previous lesson. Are there any trends that you can identify? Which materials are recycled the most often?
5 Research: what are the basic raw materials that go into each type of container? How are these materials processed? What type of products come in each type of container and is there a choice in having the same product in a different container, one of which can be recycled and the other one can't?

Think Bigger!
Many drinks in recyclable containers are consumed away from home, in areas where recycling is not an easy option and so the containers get thrown away. Captain John Boats and WDCS (The Whale and Dolphin Conservation Society) tackled this problem on CJB whale watching boats in summer 2007. Staff and volunteers collected the recyclable items, sorted them, cleaned them, and delivered them to a local recycling centre.

As a class, brainstorm other places that might benefit from a similar recycling program (your school, a local park, a bus station). Can you do something about it? Raise money to purchase recycling bins and set up a schedule to pick up the bins, sort the containers, and take them to a recycling centre. Convert your recycling into energy savings. Think of ways to let your classmates, parents, and others know your results. *Make sure to wear gloves when sorting through recycled containers!*

2. Recycling keeps waste out of our landfills

It is not just a case of out of sight = out of mind; containers take a long time to degrade. Further, modern landfills are designed to inhibit degradation so that toxic wastes do not seep into the surrounding soil and groundwater. Therefore, even those materials that would normally degrade fairly swiftly do not do so once they have been put into a landfill site.

a) How long do different types of containers take to degrade?

- Aluminum cans: 100-500 years
- Glass bottles: 1 million years or more
- Plastic bottles: dependant on type of plastic

Classroom activity:

How many beverages do you drink from aluminum cans in a day/week/year? If you put one aluminum can into a landfill today, it would take a minimum of 100 years to degrade. How many more aluminum cans will YOU put into a landfill before the single can you put in today has degraded?

Think bigger!

Captain John Boats and WDCS collected 2,694 aluminum cans for recycling from whale watch tour boats in the summer of 2007, and 2,154 cans in 2008. Without the recycling program, these cans would have been put into the trash and then into a landfill. If tourists on the whale watch tour boat continue to drink the same number of beverages each summer, how many cans would the boats produce before cans put into the landfill this year completely degraded?

b) How much space would the beverage containers use in the landfills?

Classroom activity:

Measure and weigh different beverage containers to find out how much space each item would take up in a landfill site. Ask the students to consider how many of each type of container they have recycled at home in a week.

1 How much landfill space has each student saved by recycling drinks containers at home for a week?

2 How much landfill space has the class combined saved by recycling drinks containers at home for a week?

Think bigger!

How much landfill space has WDCS / CJB saved by recycling drinks containers in summer 2007? In summer 2008?

3. Recycling saves energy by re-using materials rather than processing new raw materials from scratch.

Recycling containers can use less energy than creating new containers from raw materials. For example: it takes less energy to melt a glass peanut butter jar than to

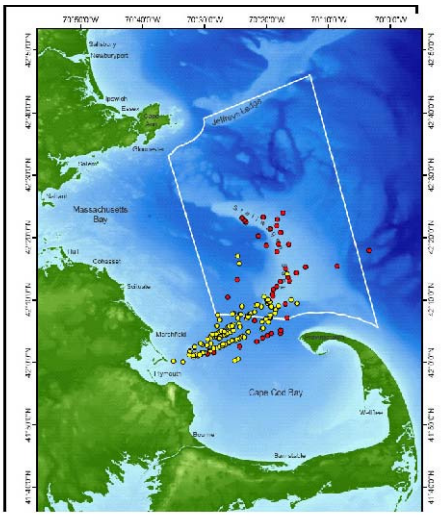
make the same quantity and quality glass by melting the jar's starting material --sand. Recycling used aluminum cans requires only about five percent of the energy needed to produce aluminum from bauxite! Reducing the amount of energy that is used is important because it reduces the amount of scarce fossil fuels that we are using. If the energy applied in recycling and conserving comes from another non-renewable source, then the effect is to trade one non-renewable resource for another

a) Energy comparisons. The energy saved is the same type of energy used to power appliances in our homes. We can compare the amount of energy saved through recycling to an amount of energy typically used to power a television set.

	Aluminum can	Plastic bottle	Glass bottle
Energy saved by recycling one container could run a TV for:	3 hours	1.5 hours	20 minutes

Classroom Activity:
Ask the students to consider how many of each type of container they have recycled at home in a week.
1 How many TV hours could be powered by the amount of energy saved by recycling drinks containers at home for a week?
2 How many TV hours could be powered by the amount of energy saved by recycling drinks containers at home for a week?
3 How many hours of TV has the family watched this week? Calculate how much of each item would they need to recycle to offset their TV watching? Compare that to what they have actually recycled and ask them to think about the gap – how does the class think this gap could be reduced or closed?

Think bigger?
1 How many TV hours could be powered by the amount of energy WDCS / CJB saved by recycling drinks containers in summer 2007? In summer 2008?
2 Recycling a six-pack of aluminum cans could save enough energy to power a car for 5 miles. How many miles could WDCS / CJB drive on the amount of energy saved through recycling on the whale watch boats during the summer of 2007? In summer 2008?
3 Locate your local recycling centers. How many aluminum cans would you need to recycle to balance the energy costs of a round trip in the car to drop off your recycling?
(Extensions into mapping)



WDCS trash survey of SBNMS- 2008.
Yellow = documented / Red = retrieved

4. Recycling keeps potentially harmful waste products out of the environment.

In some cases, containers that are not recycled end up entering the environment as litter. Litter is a very visible problem on land but some people seem to think that litter in the sea will be carried away and sink out of sight and therefore out of mind. Further, even trash disposed of on land will often find its way into the marine environment. WDCS conducts trash surveys each year to document the amount of rubbish in our local waters and retrieve as much as possible. Recycling not only reuses materials to make new objects, it also ensures that those materials do not find their way into the environment as litter! The Cape Cod Stranding Network reports that marine mammals are impacted by litter largely through entanglement or ingestion. (*discuss these terms with your class and reach a common understanding)*

- Some marine animals like to eat squid. Imagine a plastic bag floating around in the water – what do you think that looks like to a hungry dolphin or turtle?
- The Cape Cod Stranding Network reported strandings where the animals involved were found with plastic and / or glass in their stomachs – that's not a very healthy meal, ouch! What issues do you think this can cause for animals?

Think Bigger!
Participate in a local beach, river, lake, or stream clean up to help make sure that litter stays out of the environment. Separate the materials you find and see how much can be sent to the local recycling centre. Perhaps the class can use some of the other objects to create litter art to raise awareness of the problem.

Food for thought… would a waterway be a good place to help organize a recycling scheme? Just think about all those summer picnics… How does an inland stream end up taking trash into the ocean?

OR

How about organizing your own sponsored shoreside clean – perhaps some of your friends and family would be willing to donate $0.01 per item that you pick up. The proceeds could pay for trash bags, gloves, and trash pickers for the whole class!

Fun links:
Jack Johnson's take on the song "Three Is a Magic Number," reinterpreted as a call to protect the environment and Reduce, Reuse, and Recycle
http://www.recyclingsupermarket.com/recycling/jack-johnson-reduce-reuse-recycle-song/

'Don't Mess with Texas' Litter Force games.
http://www.dontmesswithtexas.org/litterforce/

Raw Data – 2007				
Date	**Aluminum**	**Glass**	**Plastic**	**Total # Items**
4/23/2007	112	66	5	183
5/14/2007	10	6	22	11
5/17/2007	15	14	132	161
6/9/2007	0	4	26	30
6/10/2007	281	62	307	650
6/13/2007	161	2	106	299
7/24/2007	568	0	432	1000
8/2/2007	64	1	64	1278
9/18/2007	229	217	420	866
10/1/2007	237	17	142	396
10/26/2007	345	61	128	534
Total so far	2694	480	2354	5528

Raw Data – 2008				
Date	**Aluminum**	**Glass**	**Plastic**	**Total # Items**
5/28/2008	22	160	52	234
5/29/2008	314	49	167	530
5/30/2008	300	200	200	700
06/10/2008	6	53	27	86
06/10/2008	240	0	140	380
06/28/2008	182	0	0	182
7/6/2008	270	17	403	690
10/05/2008	820		297	1117
10/10/2008	0	192	156	348
Total so far	2154	671	1442	4267