

4-H Project Connections:

FORESTRY
ENVIRONMENTAL SCI.
VISUAL ARTS

Goals:

Help youth become aware of how we use our natural resources and the different options available for their conservation

Age Appropriate:

6th grade –8th grade, HS

4-H Science Abilities:

Build/Construct
Design Solutions

4-H Life Skills:

Wise use of resources
Critical Thinking

Colorado Science

Standards:

HS—Standard 2 (Life

Sciences), 5. There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources.

8th Grade—Standard 2 (Life Sciences), 1. Human activities can deliberately or inadvertently alter ecosystems and their resiliency.

7th Grade—Standard 2 (Life Sciences), 4. Photosynthesis and cellular respiration are important processes by which energy is acquired and utilized by organisms.

6th Grade— Standard 3 (Earth Systems Science), 3. Earth's natural resources provide the foundation for human society's physical needs. Many natural resources are nonrenewable on human timescales, while others can be renewed or recycled.

STEM Connections

Colorado
State
University

Extension



Connecting the Science, Technology, Engineering, and Math concepts to our everyday lives.

Sustainable Living:

TRASH TALK!

Start the lesson by asking students:

What is the Municipal Solid Waste Stream?

How can we use and reuse our natural resources to minimize the amount of material we send to landfills?



<http://www.paperonline.org/environment/paper-recycling/what-types-of-paper-can-be-recycled>

Introduction:

The pie chart at the right shows the percentages of materials we either send to the landfill, recycle or burn.

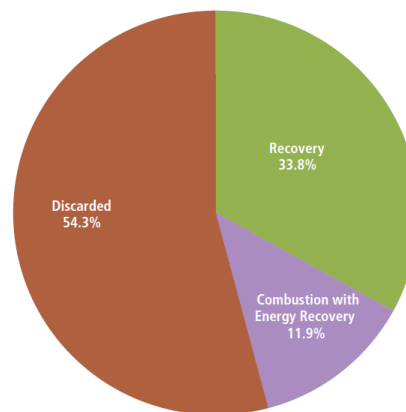
As a nation, we create 243 million tons of garbage per year, or about 4 $\frac{1}{3}$ pounds per person per day, and we recycle or compost 82 million tons of that, or about 1 $\frac{1}{2}$ pounds per person per day.

Let's look at the materials that end up in the waste stream: Notice that the biggest slice of the garbage pie is *paper*!

Wood pulp used to create paper accounts for about 25% of the timber cut annually or almost 4000 sq. miles of forest. That's a lot, considering all that forests do for us, including absorb carbon dioxide during photosynthesis. The Northern Institute of Applied Climate Science estimates that US forests absorb about 750 million metric tons of CO₂ each year; that is 10% of our country's CO₂ emissions! Reusing and recycling paper helps to save those forests.

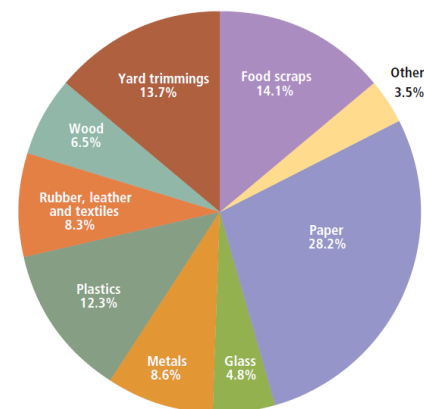
Here is an activity to get you thinking about ways you can make new items from discarded materials. Be creative and invent some recycled products of your own!

Figure 4. Management of MSW in the United States, 2009



www.epa.gov/osw/nonhaz/municipal/pubs/msw2009-fs.pdf

Figure 5. Total MSW Generation (by material), 2009
243 Million Tons (before recycling)



www.epa.gov/osw/nonhaz/municipal/pubs/msw2009-fs.pdf

Making Paper Beads

Time Required:

- One hour

Materials:

- Colorful used paper, such as old comic books, catalogs, newspapers, etc.
- Glue
- Scissors
- Wooden dowels: one set of 1/10 inch and one set of 3/8 inch (double pointed knitting needles work well, too)
- Embroidery Floss or other kinds of string

Power Words:

Municipal Solid Waste

—Our trash, or municipal solid waste (MSW), is made of the things we commonly use and then throw away. These materials include items such as packaging, food scraps, grass clippings, sofas, computers, tires, and refrigerators. MSW does not include industrial, hazardous, or construction waste. (from MSW Generation, Recycling, and Disposal in the US: Facts and Figures, 2009)

Recycle —to treat or process (used or waste materials) so as to make suitable for reuse.

Assessment:

http://www.colorado4h.org/research_impact/index.php

EXPLORE IT - DESIGN IT - DO IT

Colorado State University Extension 4-H programs are available to all without discrimination.



Experience / "What to Do"

How to Make a Paper Bead

1. Find a colorful piece of paper about 8" x 10" or so, such as pages from a catalog, magazine or old comic book. If the page has plain borders, cut them off. The edges of the paper



2. You are going to roll the paper up onto the thinner dowel, starting with the lower corner. The easiest way to begin is to lay the dowel down at a slight angle to the bottom (the longer side) of the paper, catch the corner under the dowel and begin rolling.

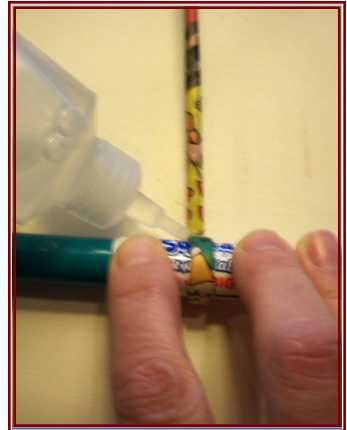


3. Before you roll up the top edge of the paper, apply a thin line of glue.

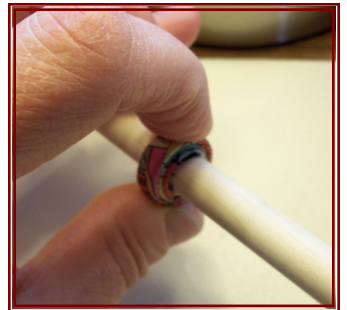


4. Finish rolling up the tube and hold to set glue.

5. Pull the tube off the dowel and lay it on the table in front of you. Now take the bigger dowel and flatten the first inch of tube by rolling the dowel over it. You will form the bead by rolling the tube tightly up onto the bigger dowel, applying glue as you roll.
*Be careful not to glue the paper to the dowel accidentally!



6. Carefully pull the bead off the dowel after the glue sets.



7. The beads can be used to create lots of different objects, like bracelets, mats, baskets—use your imagination! To make the bracelet at the right, tie 8 beads together with embroidery floss, using square knots, being sure to glue the thread down onto the sides of the beads. Wearing this bracelet will remind you to **RECYCLE** next time you are about to **THROW SOMETHING OUT!**



Share/Reflect/Generalize/Apply:

Use different diameter dowels to create different bead shapes.



Look at these amazing structures made from paper!



Shigeru Ban's Japan Pavillion



Frank Boelter's paper boat

Career Connections:

For information about careers in recycling, visit Waste Age Magazine (http://wastage.com/mag/waste_career_recycling) For local recycling information, visit Colorado Association for Recycling (www.cafrr.org). Maybe you even want to enter their Poster Contest! Or for careers in Forestry, visit The US Forest Service (<http://www.fs.fed.us/>)

References (Facts and Figures in Intro from www.epa.gov and fia.fs.fed.us/library/briefings-summaries-overviews/doc/ForestFactsMetric.pdf) *Cradle to Cradle* by William Donough and Michael Braungart is THE best book on sustainable design. *The Sustainability Revolution: Portrait of a Paradigm Shift* by Andres R. Edwards and David Orr is another good book about sustainability and society.

To find out more about 4-H STEM activities, contact your local county Extension office. <http://www.ext.colostate.edu/cedirectory/countylist.cfm> More activity sheets can be found at http://www.colorado4h.org/k12/activity_sheets/activity.php