



Environmental Character Education



Kindness

Middle School - December, 2006

Dear Teachers:

Kindness is a trait that should be promoted throughout the year, but is especially important during the holiday season. There are numerous ways in which we can express **kindness** to friends, neighbors, and the community. It is also important to remember that our roles include being **kind** to the environment in which we live.

The Carbon Cycle and Air Pollution

Carbon monoxide (or CO) is a common chemical pollutant that is found in our air. CO in the air primarily comes from the incomplete combustion of fossil fuels such as gasoline, diesel, coal, etc. In large cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust.* CO is poisonous even to healthy people at high levels of exposure; it can have adverse effects for people with heart disease and can affect the central nervous system.

To fully understand CO, let us take a look at the "Carbon Cycle." Carbon is an element found in all living things. Carbon moves through Earth's ecosystems in a cycle referred to as the Carbon Cycle. It is through carbon dioxide gas found in Earth's atmosphere that carbon enters the living parts of an ecosystem. Plants use carbon dioxide (CO₂) to produce sugar in a process known as photosynthesis. Sugars are carbon compounds that are important building blocks in food and all living matter. Food supplies the energy living things need to live and grow. To release the energy in food, organisms break down the carbon compounds—a process known as respiration. Carbon is released and cycled back into the atmosphere as carbon dioxide. When living things die, the rest of the carbon that makes up living matter is released during decomposition.

Earth's oceans contain far more carbon than the atmosphere. In water ecosystems—lakes, rivers, and oceans—carbon dioxide is dissolved in water. Algae and certain types of bacteria are the photosynthetic organisms that produce food in these ecosystems. Marine organisms release carbon dioxide during respiration and carbon is also deposited on the ocean floor when organisms decay.

Large amounts of carbon are stored underground. The remains of plants and animals buried underground from millions of years decay slowly and change into fossil fuels, such as coal and oil. The carbon in fossil fuels returns to the ecosystem in a process called combustion. As humans burn fossil fuels to release energy, harmful dust particles and gases containing carbon are also released into the environment. The CO pollution that is released typically gets trapped near the ground in the air that organisms breathe.**

There are many easy ways to demonstrate environmental kindness this month by doing things that help reduce the amount of CO released into our atmosphere. By walking, riding your bike, or riding the bus you can help contribute to reducing CO. Those activities emit far fewer emissions because less carbon-based fuels are burned. Since most of our electricity comes from the burning of carbon in fossil fuels, when you waste electricity you are also contributing to unnecessary CO pollution. So, remember to turn off lights and electronics when not in use.

Sources: *Environmental Protection Agency—Office of Air and Radiation (OAR) **Source: McDougal Litell, Science (2006)

Activity 1: Investigate Carbon

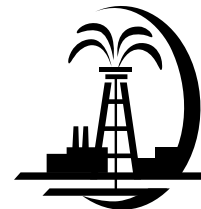
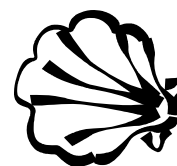
Sunshine State Standards: SC.B.2.3

Materials:

Mortar and pestle Whole seashell or fragments of seashells
Small beaker White Vinegar

Procedure:

1. Use the mortar and pestle to crush the seashell into a powder.
 2. Pour the powder into a small beaker.
 3. Add enough white vinegar to cover the powder.
- What happens when the white vinegar is added to the crushed shell?
 - What is the material produced in the reaction and where did it come from originally?
 - Calcium Carbonate is also found in the eggshells of birds and other creatures. A similar test with an eggshell should have good results.



Source: McDougal Litell, Science (2006)

Activity 2

Focus on Waste and Decomposers:

Sunshine State Standards: SC.G.2.3

Decomposers are important for the maintenance of ecosystems. Decomposers are organisms that break down dead plant and animal matter into simpler compounds. You can think of decomposers as the clean-up crew of an ecosystem. In a forest, consumers such as deer and insects eat a tiny fraction of the leaves on trees and shrubs. The leaves that are left on the forest floor, as well as dead roots and branches, are eventually digested by fungi and bacteria living in the soil. Decomposers also break down animal remains, including waste materials.

Just as decomposers help to break down plant and animal waste, they help us to break down human waste. As Earth's population grows, so does the amount of waste produced by humans. Much of the waste material produced by humans is the result of human activity. Some of this waste is garbage, or food waste. The rest of it is trash, or non-food waste. In the United States, huge amounts of trash are thrown out each year. Most garbage and trash ends up in landfills.

Landfills take up a lot of space. The Fresh Kills Landfill in Staten Island, New York, is 60 meters (197 ft.) high and covers an area as big as 2,200 football fields! Decomposing trash and garbage can release gases into the air as well as harmful chemicals into the ground. Another way to get rid of trash and garbage is to incinerate it— to burn. One problem with incineration is it releases harmful gases and chemicals into the air. To reduce the release of these chemicals, incinerator operators are required to install filters to prevent environmental contamination.



Broward County generates an enormous amount of solid waste. It is estimated that in one year, the amount of solid waste processed at the waste-to-energy incinerators could fill the area of a football field up to a height 3 1/2 miles high. Broward County's two waste-to-energy incinerators are capable of processing 4,500 tons of waste per day. Each year, the plants generate enough energy to service approximately 120,000 households in our community at an energy savings of 2.8 million barrels of oil.

There are many items that we throw away that decomposers can not break down efficiently. In particular, most plastics and metals remain in our landfills for long periods of time. Fortunately, many of the plastics and metals we use day-to-day can be recycled (plastic bottles, aluminum cans, paper, etc.). A great way to show environmental kindness is to become familiar with the types of things that can be recycled and make recycling a habit.

Another great way to display your environmental kindness is to compost food waste and other natural waste. You can compost at home or at school. Composting uses decomposers to break-down our waste and turn the waste into a product that can be used to fertilize plants. By recycling and composting, you can reduce the amount of chemicals released into our environment and you can reduce the amount of trash that finds its way to our County landfills and incinerators.

Source: McDougal Litell, Science (2006); <http://www.broward.org/solidwaste/wastetoenergy.htm>

There is still time to submit artwork!

EnvironmentTile Contest

Deadline for entries is December 5, 2006

Prizes to be awarded in January, 2007



The "Environmental Resources for Teachers" CD is now available at no charge!
Contact the Air Quality Division today for your copy!!! 954-519-1482 or airoutreach@broward.org

If you have any questions regarding these activities or have any comments, call 954-519-1220 or e-mail airoutreach@broward.org. You can also visit our web site at www.broward.org/kids and click on the Environmental Kids Club button.