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Environmental Health Hazards and Children

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The first sentence of Rachel Carsons book *Silent Spring* reads, “There was once a town in the middle of America where all life seemed to live in harmony with its surroundings.” Are you asking yourself where was this town? Does this town still exist? Unfortunately, this town does not exist any longer. Fortunately, people are becoming more aware of the lack of harmony that man has with nature and are beginning to do something about it.

This resource-based curriculum unit, Environmental Health Hazards and Children, will provide teachers with the information to inform their students of the effects of environmental hazards both globally and locally. The end result will provide students with helpful information to assist them in keeping their communities, homes, and schools as environmentally safe as possible and will make them aware of potential environmental health hazards. The curriculum unit is geared for fourth and fifth grade students and could be used as an impetus for students to continue with further research on a variety of subjects. The unit will provide teachers with successful activities and science experiments. Life science is a major part of this curriculum. According to the National Science Education Standards, students at this level should be able to understand characteristics of organisms, life cycles of organisms, and organisms and their environments. This curriculum unit will concentrate on the latter of the three.

Day 1 & 2

Background On Environmentalism

Ecology is the interrelationship of organisms and their environment. Everything that we do in our daily lives affects this interrelationship. The earth is always changing. Many changes occur naturally like hurricanes, floods, earthquakes and droughts. Today people are changing the earth faster than any forces of nature. We have created many problems like landfills, oil spills, and nuclear disasters. All of these changes have caused many environmental hazards to all that inhabit the earth.

Thirty-four years ago marine biologist and writer Rachel Carson changed the course of the environmental movement with her book Silent *Spring.* At the time the book was published people believed that pesticides were the best solution to controlling insect pest. Rachel Carson warned that if DDT and other chemicals found

in pesticides continued to be used, they would spread throughout the environment. The pesticides would make ill and kill not only pests but other organisms, including humans. After reading Carson's book, people who previously had little concern for the environment began to ask questions about the use of pesticides and their effects on humans and environment and related health risks. This began the biggest social movement in United States history, environmentalism. Gaylord Nelson was a U.S senator from Wisconsin who was very concerned about conservation. He proposed a nationwide environmental teach-in on college campuses. People joined in with the students and in 1970 the first Earth Day was celebrated. In 1972 the United States created the Environmental Protection Agency. The Environmental Protection Agency sets limits on the uses of toxic substances, hazardous wastes, and carcinogens.

Science Activity # 1

Develop a glossary.

Toxic substance-
hazard-
hazardous waste-
carcinogen-
environmentalism-
EPA-
Rachel Carson-
pesticide-
Gaylord Nelson-

Schedule a time for the students to visit the school library or public library to locate books and other resources for information on the topics listed above. Have students work in pairs and research the list. Discuss the various sources from which they were able to get information and discuss the results. While at the library, students should get addresses of places to write to obtain the most current information.

Science Activity # 2

Record a weeks worth of visible pollution.

Step 1—Spread a thin layer of Vaseline on one side of several 3 by 5 index cards.
Step 2—Place the cards in a variety of places were they will be undisturbed for one week.

(windows, outside hung from a branch, in the garage, kitchen, classroom or other area)
Step 3—At the end of the week collect all the cards and record what you have observed. The result is one weeks worth of visible air pollution of that place. Do this experiment as a class project. Have the students contrast and compare data. What are the most polluted areas, what are the least? Have class discussions on what students think caused the visible pollution. Record the classes' data in the form of a graph. Share your findings with others.

Day 3 & 4

Ecosystems and the Food Chain

The harmony that Rachel Carson wrote about of in *Silent Spring* is an ecosystem. An ecosystem is the way in which plants and animals and the environment live together. In every ecosystem there are food chains . To stay alive all living things need food. Plants get their food from the sun. By using sunlight, green plants make food from carbon dioxide, water and nutrients. Photosynthesis converts energy from the sun into chemical energy that is stored in the cells of plants. Plants and animals use this food. All animals need the oxygen given off by plants in order to breath. Animals called herbivores (plant-eating animals) eat plants for food. Herbivores are known as primary consumers. Carnivores (meat-eating animals) eat herbivores and are secondary consumers. Some carnivores can eat other carnivores and these are known as tertiary consumers. This process is known as the food chain. As the plants and animals die, the decomposers like mushrooms, insects, and worms feed on the decay and break it down into nitrogen and other chemicals. These nutrients enter the soil and provide the plants with food. Plants absorb these nutrients as well as the stored chemical energy from the sun and give them to the herbivores who give them to the carnivores and the chain continues. This food chain is the beginning of harmony in nature. As man evolved the natural balance of the food chain began to change. With our lack of awareness and respect of our environment we are gradually killing ecosystems.

Activity # 3

Design a Food Chain

Show the students several samples of drawings of a food chain. Have the students work in pairs to create an 18 by 24 inch poster of a food chain. The poster should include decomposers, green plants, primary, secondary, and tertiary animals and the sun. Research should be done on what animals are herbivores and carnivores. Display the results.

Materials needed 18 by 24 pieces of poster board,
pencil, markers and rulers.

Students should be given access to the library to find out information about the different animals.

Activity # 4

Have students role play the several parts of a food chain. Let students demonstrate how the food chain can be broken by the use , for example, of insecticides or herbicides. Be sure all major components of the food chain are represented.

Day 5 & 6

Human Changes to the Environment

Humans can change the environment in many ways. Some of these changes can be helpful and some can be harmful to humans and other organisms. The following section will show how harmful humans can be to trier environment.

Oil Spills

People today are extremely dependent on oil. Refined petroleum becomes gasoline for cars and trucks. Oil can be converted into heating fuel. Oil can also be used to produce plastics and asphalt for roads and roofs. Some oil seeps through the earth naturally. In 1859 prospectors drilled the first modern oil wells. Today large amounts of oil enter the environment because of accidents. On March 24,1989, in the upper part of Prince William Sound, the tanker Exxon Valdez grounded on Bligh Reef. There were approximately 53 million gallons of crude oil on the tanker. Almost 11 million gallons of them spilled into Prince William Sound within a few days. This was the largest tanker spill in United States history. It is estimated that at least 33,000 sea birds, 980 otters, and 136 bald eagles may have died from the accident. Six years after the Exxon Valdez oil spill, restoration efforts are still underway.

Science Activity # 5

Clean up an oil spill.

Objective To have a better understanding of why oil spilled in water is so difficult to remove.

Materials needed

1. Shallow rectangular baking pan.
2. Cooking oil.
3. Cold water.
4. Baking soda, cotton balls, dish washing liquid, towels, and sponges.

Procedure

1. Pour water into the pan so that it is half full.
2. Pour a small amount of oil into the water and notice the slick that form on the surface.
3.Try to clean the spill with the different cleaning materials.
4. Rate the effectiveness of the different materials.

Form your conclusions.

Day 7

Nuclear Power

Nuclear power stations are located throughout the world. There are 428 nuclear power plants operating in 26 countries to meet our heavy energy demands. There are 110 nuclear power plants in the United States.

Nuclear power plants provide electricity to heat, cool and light our environment. Nuclear power can generate electricity without emitting soot or other polluting by-products. Nuclear power sounds like a great idea! So what is the big deal about nuclear power? Nuclear power stations produce a very deadly poison called radioactive waste which is extremely toxic and is so poisonous that it can affect people 1,000 years into the future. No one is sure how to safely store radioactive waste.

In 1979 an accident occurred at the Three Mile Island nuclear plant near Harrisburg, Pennsylvania. The accident was caused by a combination of equipment failure and plant operators not having enough knowledge about what to do when equipment fails. The accident caused the release of a small amount of radioactive material. During the accident 700,000 gallons of radioactive cooling water spilled onto the floor of the reactor building, contaminating it. Radioactive material was also released through a stack into the atmosphere. It was luck that the Three Mile Island accident caused no injuries or deaths Studies have shown that there was no increase of cancer as a result of the accident. They did, however, find evidence of psychological stress. Immediately following the accident authorities ordered the evacuation of all pregnant women and preschool children within 5 miles of the plant site. All other residents were advised to stay indoors. The federal government and the nuclear industry took swift action after the TMI accident . The Institute of Nuclear Power Operations (INPO) has changed the way nuclear power plants are managed and operated. An increased improvement of plant performance over the past fourteen years has been reported.

Nine years after the Three Mile Island accident, on April 26, 1986 the meltdown of a nuclear reactor occurred at Chernobyl in the Soviet Union. The release of radioactive waste at the Chernobyl plant in the Northern Ukraine caused more than 300,000 deaths. Chernobyl released 200 times more radiation than the combined radiation from the atomic bombs dropped on Hiroshima and Nagasaki, Japan, in 1945.

Activity # 6

Discuss with students alternative sources of energy such as the wind and sun. Use the library to research wind

and solar energy use in the United States.

Activity # 7

Provide students with a blank map of the United States. Have them use resources in the library to plot the location of nuclear power plants. Discuss findings and graph them.

Day 8

Hazardous Waste Hazardous waste are products that could pose short or long term threats to your health or the environment if they are not disposed of properly. The disposal of hazardous waste can be very dangerous. Hazardous disposal sites have become a serious environmental problem. For many decades , hazardous industrial wastes were improperly disposed of on land, and eventually the toxic wastes seeped into ground water and drinking water. In 1980 the Superfund Act was installed to provide more than ten billion dollars for the detection and cleanup of problem hazardous waste sites.

Love Canal has become a symbol of the hazardous waste problem in our country, In a period of ten years the Hooker Chemical and Plastic Corporation dumped 22,000 tons of toxic waste in steel drums into an old canal. The covered the canal with topsoil and the property was then turned over to the Niagara Falls Public School District. Many homes, recreational fields, and a school were built on the site. In 1976 residents became concerned.They began to notice odd smells. The steel drums were leaking toxic waste into sewers, lawns and even the basements of some homes . Due to the actions of concerned citizen, Lois Gibbs,0 the state performed many health studies on the area and by 1978 the federal government declared Love Canal a disaster area. It cost the taxpayers 275 million dollars to clean up the site.

Today the EPA has identified more than 30,000 contaminated waste sites.

Science Activity # 8

Have students create alternatives to the toxins we use in our homes.

Have the students make and try the following alternative cleaning products. * Borax or hydrogen peroxide for bleach. * One cup white wine vinegar to each quart of warm water for floor cleaners

* Baking soda for scouring powder.
* Baking soda and a heavy brush for general cleaner.
* Worcestershire sauce for brass cleaner.
* Lemon juice and salt for copper cleaner.
* Olive oil and lemon for indoor wood cleaner.

Rate the effectiveness of the alternative cleaners and take note of the harmful ingredients on the labels of cleaners being replaced.

Day 9

Environmental Health Hazards and Children

The following section is designed to encourage children to take a closer look at their environments and how it affects them directly. We have discussed the food chain and how everything relates to one another. People are an important part of the chain and what we do to our environment can affect our health. By protecting our environment we are going to be healthier. This portion of the unit will be a guide for students to see what they can do in their homes , schools and communities to ensure better health and safer environments.

Toxic Chemicals

Toxic chemicals are found in all our homes. The most dangerous toxic chemicals found in your home are cleaners, pesticides, and solvents. The best alternative is to use non-toxic substitutes that will be safer to our environment and cause fewer health problems.

1) Read the labels of these product in your home with your parents. Discuss with them the best way to store and dispose these products. Try to use as many alternative non-toxic substances. (See alternatives mentioned earlier) If you have younger brothers or sisters, it is extremely important to keep these products out of their reach.
2) Post telephone numbers of your local poison control center near you phone in case of an emergency.
3) Always were long sleeved latex gloves when using toxic chemicals and before removing them wash them with soap and water.

Pesticides Pesticides are poisons used to kill pests. Many farmers use pesticides on their crops. Most pesticides disappear but the traces of pesticides that remain on crops are called pesticide residue. (Remember Rachel Carson). What can you do about pesticides?

1) Always wash your fruits and vegetables before eating.
2) If purchasing pesticides at home, buy only EPA registered products.
3) Before using pesticides outside, remove children’s toys.
4) When using pesticides outside, children and pets should stay inside, with windows shut.
5) Remove all clothing after applying pesticides and wash separately.

Pesticides are graded according to their toxicity .

Caution Least harmful, but can be lethal to small children.

Warning Use extreme caution.

Danger Should be use only by professionals.
Finally, if an accident should happen, call your poison control number.

Smoke detectors

Most smoke detectors contain the radioactive element americium. When purchasing a new smoke detector get an ionization detector. It contains no hazardous radioactive material.

Batteries

Reduce your use of batteries whenever possible. Batteries contain mercury, a chemical that is toxic. Use rechargeable batteries.

Unbleached paper products

Recycled paper is made pure white by a bleaching process.This process produces hazardous waste. Dioxin is a toxic chemical created during the bleaching process. When possible use unbleached paper products because they are less harmful to the environment.

Lead

Lead is a highly toxic trace mineral and can be very hazardous to your health. When lead enters the body it can cause permanent damage. Lead is more damaging to children than it is to adults. Lead can be found in drinking water, lead-based paints, pottery, motor vehicle exhaust, dust and in the soil around your home. The only way to know if you have lead in your drinking water is to have it tested.

You can avoid lead in your drinking water by never using the hot water to prepare food , instant soup, hot cocoa or other beverages. Always use cold water for drinking and cooking. Be sure to let the water run for several seconds before using.

If your home was built before 1950 there is a good chance that lead from the exterior paint has seeped into the soil. Keep your yard well vegetated to minimize exposure to the dust. Clean floors , window sills and other surfaces regularly. Make sure that there are no old toys or pieces of furniture that may contain lead paint. Always practice good hygiene, especially frequent hand washing.

Activity # 9

Have students write a letter to their local health department to find out what is being done to address the issue of health risks which may be caused by lead in their environment. Provide students with appropriate addresses.

East Shore Waste Water Treatment Plant

345 East Shore Parkway

New Haven, Ct.

New Haven Regional Water Authority

90 Sargent Drive

New Haven, Ct. 06511

Scientific Method

Scientists are performing experiments everyday on the effects environmental hazards have on humans and their environments. All experiments, no matter how simple or complex, follow basic steps. These steps are known as the scientific method. Teach your students to follow this method when they do science experiments.

Scientific Method

1. Identify the problem. What do you want to find out?
2. Form a hypothesis. Make an educated guess as to what you think the answer to step one might be.
3. Perform the experiment. Do the experiment, make observations, and record and collect data.
4. Form a conclusion. Study the data collected, form a conclusion and compare it to your hypothesis.

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