green kids

Six Degrees of Conservation

1999 spring tour study guide

#609 - 70 Arthur Street, Winnipeg, Manitoba, R3B 1C7 / Phone (204) 958-4745 / 1-800-447-6751

www.greenkid.org email: greenkid@mbnet.mb.ca

Contents

Air

· Many toxic gases and fine particles entering the air pose hazards to human health; these air pollutants can cause cancer, genetic defects, and respiratory disease, as well as exacerbate existing heart and lung disease.
· Nitrogen and sulfur oxides, ozone, and other air pollutants from fossil fuels are inflicting damage in more than thirty countries. Ozone and the acids of nitrogen and sulfur are damaging forests, crops, soils, lakes, streams, coastal waters, and buildings. Growing use of fossil fuels is spreading damage to industrial and developing countries throughout the world.
· Chlorofluorocarbons and other pollutants entering the atmosphere are depleting the Earth's protective ozone layer, and in some area this depletion is beginning to increase the amount of harmful ultraviolet radiation that reaches the Earth's surface. Ozone depletion could cause skin cancer and cataracts, damage the immune system, reduce crop yields, disrupt marine food chains, and cause significant climate change.
· Fossil fuel combustion is increasing the amount of carbon dioxide in the atmosphere. This increase, along with growing atmospheric concentrations of other heat-absorbing gases, is already raising global temperatures and could alter weather patterns, worsen storms, destroy natural systems, and disrupt agriculture. Global warming may eventually melt the polar ice caps and raise sea levels, forcing relocation of low-lying coastal populations.

Smog is a mixture of gases that forms a brownish-yellow haze primarily over urban areas. Components of smog include ground-level ozone, nitrogen oxides (NOx), volatile organic compounds (VOC), sulphur dioxide, acidic aerosols and gases, and particulate matter. These gases result from a reaction between certain airborne pollutants and strong sunlight. Smog is most prevalent in the summer months, when there is the most sunlight and temperatures are the highest. In large enough quantities, it posses threats to animal, plant, and human life. The airborne pollutant which makes up 90% of all smog in urban areas is ground level ozone.

Ground-level ozone forms as a result of chemical reaction between several distinct forms of pollutants and sunlight. Two groups of chemical pollutants are involved: nitrogen oxides (NOx), and volatile organic compounds (VOC). When stagnant air masses linger over urban area, the pollutants are held in place for long periods of time. Sunlight interacts with these pollutants, transforming them into ground level ozone. The ozone remains in the lower atmosphere until weather systems flush out a given area and dissipate them. An 'episode' of ground-level ozone can last from several hours to several days. Episodes are particularly severe in cities with high concentrations of NOx and VOC during periods of warm weather.

Discussion Questions:

What are the sources of air pollution in your area?
What actions can citizens and kids take to reduce levels of air pollution?

Activity:

The Effect of Smoke on Living Things

You will need:
2 small potted plants
2 large jars
2 lids
5 sticks of incense
5 matches

1. Place one potted plant in each jar.
2. Place a stick of incense in one jar. Light the incense. Put lids on both jars.
3. Place both jars where they will get the same amount of heat and light.
4. Make sure that each plant is watered.
5. Light a stick of incense in the same jar for four more days.
6. Observe the plants each day. Record your results.

Forests

Clearcutting is the most efficient, the most ecologically damaging, and (in the short term) the most cost-effective method of converting trees to logs and forests to non-forests human uses such as pasture land, cropland, town sites, and tree plantations. Simply put, clearcutting is deforestation. Clearcutting may be defined as any form of timber removal that does not leave a fully functioning forest after logging is completed.

Technically, clearcutting means cutting every tree on the site and removing those trees considered to be merchantable to a mill. Other logging systems, lumped together under the general category of partial cutting, cut and remove only selected trees and leave the rest standing. But in practical terms, many systems of partial cutting currently in use are simply variations on conventional clearcutting.

Seed tree cuts, for example, leave a scattered number of large trees on the site to provide a portion of the regeneration needs. Shelterwood cuts remove all the merchantable trees, leaving behind mostly poor-quality understory trees. This cutting system reduces not only the future economic value of the forest, but also the tree species and individual trees that would provide the most desirable seed for regenerating the site. Other terms that are variations of clearcutting include patch cuts and overstory removal.

Partial cutting systems do exist that protect the forest and ensure that a fully functioning forest remains after logging. Therefore, in the face of growing public and scientific criticism, the timber industry has developed some confusing and misleading jargon to describe its cutting systems that are essentially clearcutting in disguise. Before accepting any term that describes a timber cutting system, go out and have a look at the forest. As veteran forester Gordon Robinson said (1988):

"Anyone can identify destructive forest practices. You don't have to be a professional forester to recognize bad forestry any more than you need to be a doctor to recognize ill health. If logging looks bad, it is bad. If a forest appears to be mismanaged, it is mismanaged."

Understood mainly as a simple, efficient method of timber extraction, clearcutting has dominated human relationships with the forest in North America, beginning with the era of European settlement and accelerating with each new wave of technological development. This seemed to work fine as long as there were low levels of population, low levels of consumption, and low levels of pollution. If the timber industry fouled up one forest, there was always another forest somewhere else.

As a result of this approach, we are now facing serious and growing problems in the forest and human economies. The decisions that were made in the past regarding timber are now affecting all forest uses: air, water, carbon storage, climate modification, wilderness, public recreation, tourism, fish and the long term timber supply itself. The problem that transcends all of these is the exponential loss of biological diversity - the genes, the species, the communities, and the landscapes that form the basis for life - for sustaining Earth as we know it. As a result of clearcutting in the forest, this basis for life is now disappearing at a rate several thousand times the average rates of natural extinction. When we clearcut the forest, we are like a frog drinking up the pond in which he lives.

Discussion Questions:

What is clearcutting?

How can awareness of the damage caused by clearcutting begin to solve the problem?

Activity:

Plant A Tree

Choose your site carefully. Look up around and down. The tree you plant today could eventually reach 40 to 100 feet (12 to 30 meters) in height (depending on your tree type). Give your tree plenty of room - its roots will grow wide and deep. Plant it well away from powerlines so that it won't do any damage, or need disfiguring or harmful pruning later in its life. Plant the tree where its roots will not grow into the sewers and pipelines, or under driveways or sidewalks.

Look at the tree. Make sure it's suited to the environment you are planting it in, so that it has the best chance of surviving.

Take care before and during planting. Keep the tree cool and shaded, and keep its roots moist until planting. During planting try not to handle the tree's roots. Tamp the dirt firmly, but don't pack it too tightly or the roots won't be able to either reach out for water and nutrients, or anchor the tree. Soak the soil around the tree to encourage deep rooting.

If you're planting a sapling-
Dig a hole twice as wide and deep as the root ball. Build a mound of soil, and place the sapling on top of the mound of soil so that it is two inches (five cm) above the hole's bottom. If the roots are wrapped, remove the burlap. Fill the hole with dirt, tamping it down with your foot and wetting it as you fill the hole.

If you're planting a seedling-
Dig a hole a little deeper than the hole a little deeper that the root's length. Fill the hole around the seedling with dirt. Then gently pull the trunk of the seedling up slightly to straighten out the roots.

Give special care during the early, developmental years.

A tree is most vulnerable during the first years of it's life. Protect it from pests and animals. Water it frequently. Then sit back and enjoy! If cared for properly, each tree will grow and flourish, providing you and all of us with benefits and beauty for generations.

People

· World population, now 6 billion, grows by almost 90 million each year. It is projected to reach 10 billion by 2025.
· More than 90 percent of the projected increase in the world's population between now and 2025 will take place in Africa, Asia, and Latin America.
· Countries with rapid population growth rates rank low on measures of physical quality of life and high on measures of human suffering. Rapid growth is often accompanied by environmental degradation including deforestation, desertification, and soil erosion.
· The United States is one of the fastest-growing industrialized countries. The current U.S. population of ___ million grows by 2.2 million each year.
· Eight countries in East Asia and Latin America lowered their fertility rates by more than 50 percent between 1960 and 1987. Such reductions appear to involve broad-based economic and social development, and government commitment to population stabilization.

Rich and poor countries alike are affected by population growth, though the populations of industrial countries are growing more slowly than those of developing ones. At present growth rates, the population of economically developed countries will double in 120 years, whereas the Third World, with over three quarters of the world's people, would double in about 33 years. This doubling time is rapid because 37 percent of the world's developing population is under age 15 and in their most productive childbearing years. In Third World countries (excluding China), 40 percent of the people are under age 15; in some African countries, nearly half are in this age-group.

Of the more than 5 billion people alive, too many lack adequate food, water, shelter, education, and employment. Ironically, high fertility, traditionally associated with prosperity, prestige, and security for the future, now jeopardizes chances for many to achieve health and security.

The world's projected population growth will call for a commensurate increase in efforts to meet needs for food, water, shelter, jobs, and education. In the poorest countries, massive efforts are needed to keep social and economic conditions from deteriorating further; any real advances in well-being and the quality of life are likely to be negated by further population growth. In the industrialized world, many countries lack adequate domestic supplies of basic materials needed to support their current population.

In order for fertility to decline rapidly, progress must be made on four fronts. Incomes of poor households must rise, child mortality must decline, educational and employment opportunities for women must increase, and access to family planning services must expand. Of these, investments in female education have proven to be the most effective in reducing population growth and promoting development. Better educated women have fewer, healthier, and better educated children, and are more productive at home and at work.

Questions:

Why is it important to reduce population growth?

What can be done to slow population growth down?

Soil

· The use of unsustainable agricultural methods is causing serious degradation and erosion of croplands in most of the world's important agricultural regions, and erosion of fertile topsoil is increasing as more marginal land is farmed. In the United States, agricultural land may be losing more than 3 billion tons of topsoil each year.
· The loss of fertile land is frequently associated with the shortage of fuel wood. Many rural poor live in areas where forests, formerly a source of firewood, have been cleared for farmland. Important soil builders, such as animal dung and crop residues, are now used for cooking and heating fuel, thereby depriving the soil of essential organic matter and vegetable cover. Such soils lose both fertility and ability to hold water.
· Farmers in a number of countries are beginning to use low-input, regenerative agricultural methods that reduce expensive material inputs of pesticides and inorganic fertilizers, and increase the use of biological pest controls, organic fertilizers, crop management, and other sustainable farming methods.

Soil loss due to cultivation of steep marginal lands, reduced forest and vegetative cover, and improper irrigation are expected to accelerate, especially in North and Central Africa, the humid and high-altitude areas of Latin America, and much of South Asia. It will be difficult to improve erosion control without major changes in agricultural practices throughout the world.

Desertification involves the spread of desert-like conditions in arid and semi-arid regions. The United Nations Environment Program (UNEP) estimates that nearly a third of the Earth's land surface is affected by desertification to varying degrees. Desertification threatens the livelihood of at least 850 million people and has a severe impact on nearly 200 million people. Each year, desertification degrades some 21 million hectares, an area the size of Kansas, to a condition of near or complete uselessness. Of this total, some 6 million hectares are agricultural lands that become unsuitable for food production.

Erosion is occurring in most of the worlds important agricultural regions, and it is increasing as more and more marginal land is farmed. Soil erosion, especially in developing countries, is seriously damaging agricultural productivity, shortening the life of dams and irrigation projects, filling in canals and harbors, and harming productive wetlands and coral reefs.

In many regions, rates of soil loss exceeds rates of soil formation by at least tenfold. Much of the worlds cropland is believed to be losing topsoil at rates that are reducing productive capacity. In 1984, Worldwatch Institute estimated that about 25 billion tons of topsoil were being lost from the world's croplands each in excess of new soil formation.

Questions:

What can be done by young people to reduce desertification and soil loss?

Why is it important to maintain our fertile soil resources?

Activity:

Discuss with the students the meaning of biodegradable and the importance of diverting such materials from landfills. The average Canadian throws out about 1200 pounds of organic garbage each year and this material inevitably ends up in landfills. Once in a landfill biodegradable items will not decompose, as they do not have the water or air necessary to do so.

A Composting Quiz

Which of the items listed below is it okay to put in your compost bin or pile? I bet you know more than you think!

A	B	C
Fruit & Vegetables	Meat	Hair (human & pet)
Grass & Leaves	Cheese	Eggshells
Nuts & Nutshells	Peanut Butter	Tea leaves & bags
Floor Sweepings	Bones	Weeds

Answer:
You can put everything in columns A and C in your compost bin, jar, or pile. You shouldn't put things in column B in your compost because fatty foods can create odors and attract animals and flies.

Water

· In developing nations, only half the people have access to safe drinking water. Worldwide, some 10 million deaths each year result from waterborne intestinal diseases.
· In industrial nations, surface and underground water supplies are being polluted by industrial and municipal wastes, and by surface runoff from urban and agricultural areas.
· Heavy demands for water by agriculture, industry, and municipalities are rapidly depleting groundwater supplies in China, India, the United States, and many other countries.
· To ensure adequate water supplies, major priorities include protection and management of watershed areas; creation of incentives for conservation, such as water prices that reflect the real costs of supply; and legislation that encourages water recycling.
· To ensure acceptable water quality, the highest priority should go to programs to reduce the generation of solid, liquid, and airborne wastes-especially toxic wastes-from industrial plants, mining and smelting operations, electric power production, cities and towns, and agriculture. In addition, there must be adequate containment and treatment of remaining wastes that cannot be eliminated.

Unlike fossil fuels or soil, fresh water is a renewable resource. If properly used and carefully conserved, the global hydrological cycle can meet current and anticipated fresh water need on a sustainable basis.

As Canadians, we do not generally pay the true cost of the water we use in urban areas.. Several studies show that revenues from these fees are not sufficient to cover operational, repair, upgrading, or expansion costs of water distribution and treatment systems. Since the difference is covered by other tax money, we end up paying anyway, but the true price of water is hidden since water fees themselves are so low. This creates the illusion that water is cheaper than it really is. The price we pay for water often does not vary with the amount consumed. In many areas, users are charged a flat rate monthly, quarterly, or annual rate in exchange for access to unlimited amounts of treated water. This means there is no price incentive to use water efficiently.

Water quality is determined by kinds and amounts of substances in the water and what those substances do to inhabitants of the ecosystem. The water of even the healthiest rivers and lakes contains many naturally occurring substances - mainly bicarbonates, sulphates, sodium, chlorides, calcium, magnesium, and potassium. What's more, human activities can pollute rivers and lakes with excessive nutrient enrichment, persistent toxics, and bacteriological contamination.

Water pollution can be divided into two main categories: non-persistent and persistent. Non-persistent pollutants are degradable; they can be broken down by chemical reactions or by natural bacteria into simple, non-polluting substances such as carbon dioxide and nitrogen. Organic waste is an example of a non-persistent pollutant. Organic waste may contain microorganisms which are the waterborne agents of diseases such as cholera, typhoid and dysentery.

Persistent pollutants degrade very slowly or not at all, and so may remain in the aquatic environment for years or decades. Damage from persistent pollutants is wither irreversible or repairable over long periods of time. Examples of persistent pollutants include some pesticides, some leachate components from landfill sites, petroleum, PCBs and dioxins, radioactive material, and metals such as lead, mercury, and cadmium.

Questions:

What are some of the ways that water supplies are being polluted?

What can kids do to reduce the number of pollutants going into the water?

Activity:

Investigating the Water Cycle

Each group will need:

1 wide-mouth jar with lid
(500 - mL size)
1 small piece of sponge cut to fit the lid
hot water
1 ice cube

To see an example of a water cycle do the following:

1. Soak the sponge in hot tap water. Make sure that the sponge is full of water.
2. Put the sponge in the lid.
3. Set the lid on a flat surface where it can't fall.
4. Turn the jar upside down and screw it on to the lid.
5. Put an ice cube on top of the jar. Pour a teaspoon of water over the ice cube. Observe the results and record them on a chart like this one.

after 5 minutes	after 10 minutes	after 15 minutes	overnight

Wildlife

· By early in the next century, we could lose a million or more species of plants, animals, and other organisms-more than all the mass extinctions in geologic history, including loss of the dinosaurs.
· Wild plants and animals are vital to human survival. They produce foods, medicines, and essential raw materials, and are important for the future improvement of crops and livestock, and for development of new medicines and industrial products. Plants and animals also provide services such as pest and flood control, maintenance of soil productivity, and degradation of waste.
· Habitat destruction by human activities, especially in the tropics, is the primary cause of extinction and the worldwide loss of biological diversity.
· An adequate global systems of parks and reserves, guided by an overall conservation strategy and coupled with well-conceived programs for sustainable economic development, limiting population growth, controlling exploitation of species, and restoring damaged ecosystems, could preserve a substantial part of our planet's biological diversity.

Every animal and plant species exists within a specific set of environmental conditions: climate, food availability, shelter, etc. This set constitutes the species' 'home' or habitat. With-out the particular conditions that a species' habitat affords, it cannot exist. These conditions may be more or less broad. The habitat of humans and cockroaches, for example, covers an extremely wide range of ecological regions, due to their great adaptability. The requirements of other species, are much narrower.

Wildlife has great ecological, social, and economic importance. Bacteria, plants, algae, fungi, and invertebrates are involved in essential ecological processes, such as oxygen generation, nitrogen fixation, nutrient cycling, waste decomposition, water cleansing, and soil formation.

The word 'biodiversity' means variety of life. There are millions of species of plants, animals, and microorganisms on our planet. This is referred to as 'species diversity'. There is also biodiversity within single species. Dogs, for example, come in different shapes, sizes, colours, and temperments. This is referred to as 'genetic diversity' since it depends on the variety of genetic material present in a single species. Another form of biodiversity is 'ecosystem diversity'. Meadows, forests, and wetlands are examples of different types of ecosystems. They are the natural neighborhoods of organisms; they provide different species with home, food, and access to other members of their own species.

The incredible variety of life on our planet is the product of millions of years of evolution. This makes life on our planet far richer and healthier than it would otherwise be. The living organisms of the Earth make up an intricate living system: since no species exists in isolation, the loss of any one species will disrupt may others. Biodiversity is a source of strength not just for us but for our world as a whole.

Why is it important to have many different species?

What can kids do to slow the destruction of natural habitats?

Activity:

Have the class draw a food chain that shows different species of animals, plants, insects, microbes, etc.. Discuss what would happen to this "web of life" if different species where removed from it.

Bibliography

"The Global Ecology Handbook : What You Can Do About the Environmental Crisis" / Global Tomorrow Coalition ; edited by Walter J. Corson. Boston : Beacon Press, c1990.

"A Primer on Environmental Citizenship." Consultation ed. [Ottawa] : Environment Canada, Environmental Citizenship Learning Program, c1993.

"The State of Canada's Environment" Ottawa : Govt. of Canada, 1991.

"Clearcut : the tragedy of industrial forestry" / edited by Bill Devall San Francisco : Sierra Club Books/Earth Island Press, c1993.

"Greenkids Teachers' Kit, Second Edition"

"Environmental Education Activity Guide" American Forest Foundation, c1993

"Seeds 4" by Mervyn Lynch : Society, Environment & Energy Development Studies Foundation, c1981