CONSERVATION

Protecting Planet Earth

A Guide for Leaders and Youth Leaders

Ontario 4-H Council

4-H 400 00 LE

Ontario Ministry of
Agriculture, Food and Rural Affairs

The Ontario 4-H Program provides opportunities
for the personal development of youth.
http://www.4-hontario.ca

THE 4-H PLEDGE

"I pledge:
My Head to clearer thinking
My Heart to greater loyalty
My Hands to larger service
My Health to better living
For my club, my community and my country."

TABLE OF CONTENTS

This project was originally prepared by M. Paul Dyszuk,
Cambridge and updated in 1999 for the Ontario 4-H Council.
Special thanks to the original advisory committee:
Kimberley Carkner, 4-H member, Vankleek Hill, Dr. Murray Height, Faculty of Environmental Studies, University of Waterloo, Waterloo, Gail Potts, 4-H club leader, Stirling
and OMAFRA staff.

©Copyright Ontario 4-H Council and Queen's Printer For Ontario, 1999.

The Ontario 4-H Council, the Ontario Ministry of Agriculture, Food and Rural Affairs and Agriculture and Agri-Food Canada jointly funded this project.

CONS00LE

ISBN 0-7778-8921-8

KIDS HELP PHONE
JEUNESSE, J'ECOUTE
1-800-668-6868
http://kidshelp.sympatico.ca

BE A "GREEN" 4-H CLUB

The 4-H program uses a lot of paper. Please help us to reduce our costs, and save a few trees, by remembering these tips.

- Only 4-H members (10-21) and screened volunteers should receive 4-H resources.
- If your club plans to do this project again, keep the resource materials so you don't need to reorder.
- If your club has extra resources, please return them promptly to the Ontario Ministry of Agriculture, Food and Rural Affairs office so someone else can use them.

WELCOME TO 4-H!

It has often been said that, "Volunteer 4-H club leaders are a blend of friend, teacher and parent." That's a big order to fill! But you will discover that you have many talents as a 4-H leader. Having an interest in young people and their development and being willing to take up the challenge of 4-H club leadership is the first step to success.

This project focuses on environmental conservation. However, the development of members as individuals is your real goal. You will get to know the club members very well and where their interests lie. Use this knowledge, as well as your own expertise and imagination to plan a fun, interesting and challenging club program for your members. Enjoy being a 4-H volunteer!

WHAT ARE MY RESPONSIBILITIES AS A 4-H CLUB LEADER?

Before your project begins:

1. Familiarize yourself with current provincial and local 4-H policies;
2. Attend a leader training session (if scheduled);
3. Advertise the project and organize a club with a minimum of six eligible members and one volunteer leader per club except in cases deemed to be unique and approved by the local 4-H Association; and
4. Review available resources and begin planning the club program.

During the project:

1. Attend each meeting and the Achievement Program;
2. Assist members in planning and presenting the club program;
3. Provide a FUN, learning atmosphere;
4. Ensure the club membership list is completed and forwarded to the Ontario Ministry of Agriculture, Food and Rural Affairs office before the second meeting;
5. Order awards and project and name plates once membership list is completed.
6. Help each member to set and achieve goals for personal development;
7. Encourage members to work together as a group;
8. Provide guidance in choosing and completing an Achievement Program; and
9. Evaluate the club program. Share the evaluation with the 4-H Association and the Ontario 4-H Council.

4-H CLUB PROGRAM PLANNING CHART

MEETING OR EVENT	DATE	TOPIC ACTIVITY OR TASK	PEOPLE WHO COULD HELP	PRESENTATION IDEAS TO CONSIDER

WHAT IS AN ACHIEVEMENT PROGRAM?

- An opportunity for members to share the knowledge and skills they have gained during this 4-H project.
- Each member should be involved in some way.
- Informs the public about the purpose and goals of the 4-H program.

SUGGESTIONS

1. Go to a nearby forest, river/stream valley and clean it up. Advertise the event on the radio, local television station and with hand drawn posters. It may be possible to get a local store to help cover the costs of garbage bags and removal. Take pictures before, during and after the event and submit them to the local newspaper for publication.

2. Organize an environmental discussion to address a topic of local environmental interest, eg, a landfill site. Involve other youth groups such as Boy Scouts, Girl Guides and people such as a local politician, an environmental advocate, a farmer and someone from a local industry. Have it broadcast on the local television network or radio. Or make a home video of the discussion that could be used by other organizations interested in the environment.

3. Organize a picnic where everyone brings a garbageless meal. Have people bring their meals and drinks in reusable containers and use cloth napkins. Have the members present their projects at the picnic. Before leaving the picnic site make sure it is cleaner than when you arrived.

4. Develop a puppet show related to one of the topics in this project. Puppets are to be made from recycled material. This helps illustrate that there are uses for our wastes. The members could present this performance for another youth group, eg., Boy Scouts, Girl Guides, or in a public setting like a shopping mall. An example of a play could be "What would happen if our garbage gets out of hand?"

5. Make some bottled music! Have the members collect bottles for recycling but before you turn them in have some fun. Your 4-H Bottle Choir could entertain parents, or visit a home for the elderly. All you need is at least 8 glass pop bottles, all the same size and shape; water; sticks or spoons to tap the bottles. Fill the first bottle with water, almost to the top. This is your scale's lowest note "Do" or C. Tap the bottle and listen to the note. Fill the second bottle with about an inch less water than the first one. This will be "Re" or D. You can tune the bottles to a musical instrument. Fill the rest of the bottles with water. Each bottle should have a little less than the last one. Tune them so you can play the scale, Do, Re, Mi, Fa, Sol, La, Ti, Do on them. Now try out some simple tunes. Here's one to get you started:

   Me Re Do Re Mi Mi Mi Re Re Re Mi Sol Sol
   Mi Re Do Re Mi Mi Mi Mi Re Re Mi Re Do

GUIDING YOUR 4-H MEMBERS: TRICKS OF THE TRADE

Stop and think for a moment about the people that have most affected your learning. What special qualities did they have? Do you try to include some of these qualities when you work with your members?

Working with 4-H members should be a fun, rewarding experience, full of exploration and discovery. The challenge to you as a leader is to set up an exciting learning environment - to lead in such a way as to make the topics come alive. Remember that your own enthusiasm is contagious, and that it is perhaps your greatest asset as leader. Here are a few "tricks of the trade" that may help you when working with young people's lively energies - channelling them away from mischief, and toward more constructive and satisfying pursuits.

YOU DON'T HAVE TO BE AN EXPERT

You don't have to be able to give all the answers. Facts and technical knowledge are much less important than attitudes. Don't be afraid to say, "I don't know". You are not expected to know everything and it is more important that you be honest and willing to learn along with your members. Try to find answers together. A good leader is someone who makes learning a lifelong challenge and inspires that attitude in others.

BE A POSITIVE ROLE MODEL

Actions speak louder than words. Your attitude and mannerisms will make a tremendous impression on a young person. You cannot talk about the importance of keeping our environment litter-free and then toss a candy wrapper in the woods; your words will have suddenly become meaningless. Be positive in your attitudes toward new and different experiences; be flexible and adaptable, show you care about the environment, dress comfortably and appropriately for outings; and most of all SMILE and show you're having a good time and want to be with the members.

LEAD WITH QUESTIONS

It is important to keep the interest and involvement of the members throughout your project meeting. One way to do this is by asking questions, to draw out their ideas and thoughts about what they're doing or learning. Instead of giving them facts and information, let them explore a problem or situation and interpret things for themselves. This will help them feel in control of their own learning. Give them an opportunity to think, to look for clues, and to piece mysteries together, on their own or as a group. Make sure everyone is participating by directing questions to each member. Be sure to acknowledge and reinforce every answer, and be positive in your response.

START WITH WHAT IS FAMILIAR

People learn something more easily when they can relate it to something they already know. For example, relate the community of living things in the natural environment to your own community. Relate a food web to a spider web.

LAUGH TOGETHER

People learn more with smiles on their faces! If you are happy, the members will be too. Don't be afraid to get your feet wet and your hands dirty. If you have a good time at meetings, your members will be counting the days until the next one.

"Tricks of the Trade" was adapted from "I Can Teach In The Outdoors" by Stephen P. Carlson. 1982.

SPECIAL NOTES FOR THIS PROJECT

1. Any page numbers refer to the Members' Manual unless otherwise indicated.

2. The Members' Manual has been designed as a reference source. Hopefully, the members can leave their manuals closed for most of the meeting, allowing them to observe, learn and take part in the discussion and other activities.

3. The Members' Manual title for each meeting includes the meeting topic and not the meeting number. This frees leaders to change the order of meetings and information without confusing the members. The schedule of meeting dates can be recorded on page 5.

4. Remember to Refer to Your 4-H Volunteers' Handbook - You will find many useful tips and ideas covering topics such as program planning, successful meetings, parliamentary procedure, and effective communicating and presentation methods. Refer to your Volunteers' Handbook as you plan meetings. If you do not have a handbook, please ask your OMAFRA contact.

5. Judging - Judging is an optional activity in meetings one, three and five in this project. Each member should have a 4-H Judging Handbook (4-H-1550-91) and be encouraged to use it. These can be obtained from your local OMAFRA office.

6. You may find the OMAFRA Factsheet, Procedures for Meetings, 96-009, helpful.

7. Special Project - In the Members' Manual suggestions are offered (page 2-3) You may have a more appropriate subject in mind. A member or group may prefer a subject more relevant to their situation - go with it. In groups of 2 or 3, members may make a presentation to the club at a suitable and pre-arranged date. If appropriate, you may ask one of the groups to present material as part of a Meeting, thus involving them more in the learning/teaching process. The purpose of the presentation is to learn confidence in speaking to groups. It is also helps stimulate clear expression of ideas and thoughts.
   Note: You may choose to end each presentation with a critique by members.

FEEDBACK – LET US KNOW WHAT YOU THINK!

The 4-H Resource Development Committee of the Ontario 4-H Council reviews and evaluates 4-H resources. Comments and suggestions about 4-H manuals and guides are always welcome. They may be sent to the following address:

4-H Resource Development Committee
Ontario 4-H Council
R.R.#1 Thornloe, ON P0J 1S0
1-800-937-5161
lduke@ntl.sympatico.ca

MEETING ONE WORLDS WITHIN A WORLD

OBJECTIVES

This meeting provides members with the opportunity to get to know each other, and to introduce the concept of ecosystems and how they play a vital role in the survival of our world.

PREPARATION AND EQUIPMENT

- Name tags. Make them big and in shapes, eg., sun, tree, drop of water. Cut or tear them in half.
- Large piece of paper you can tack to the wall or a tree.
- String, small pieces of paper, scissors, markers, pins.
- You may find the OMAFRA Factsheet, Procedures for Meetings, 96-009, helpful.

TIME GUIDELINES

Time guidelines have been provided for activities at the meetings but please remember that these are guidelines only. The number of members, their maturity, specific interests and the way in which the meeting is structured will all influence the duration of various activities.

IN A NUTSHELL

Find Your Partner	5 min.
Roll Call	5-10 min.
Getting Started	15 min.
A Road Map To Good Meetings	20 min.
Looking at Our Environment and	
We're All In This Together	5-10 min.
Chains and Webs	
Pyramid of Life	10-15 min.
The Webbing Game	10-15 min.
Wrap Up	5 min.
	75-95 min.
Optional: Digging Deeper	

FIND YOUR PARTNER (5 minutes)

As members arrive, welcome them. Give each member half a name tag and a pin to wear it with. Make the names large and don't forget to wear a name tag yourself. Tell the members to find the person with the other half of his/her name tag shape. The partners should get to know one another and then introduce each other to the rest of the group. You and your co-leader might like to be partners.

ROLL CALL (5-10 minutes) page 7

Write the word Environment on a large piece of paper tacked to the wall. Have each member respond to the question, "What do you think when you hear the word environment?" Have each member represent a letter in the alphabet. For example the first member might say air, the second might say biodegradable, the third might say conserve and so on.

GETTING STARTED (15 minutes)

1. Begin with the 4-H pledge.
2. Welcome the members. Introduce leaders. Have members introduce themselves (if not already done). Introduce the youth leader (if this has been decided). Ensure that everyone has a name tag (optional).
3. Complete membership list.
4. Outline the opportunities members have such as taking part in the local fairs, 4-H Go For The Gold, 4-H Members' Conference, Future Leaders In Action etc...
5. Distribute "4-H Club Member Lives Here" and "4-H Project" signs if available.
6. Distribute the Members' Manuals.
7. Give a brief summary of what club is about and topics covered.
8. Discuss the members' requirements for the project (page 2). Outline any expectations you have of the members.
9. Briefly discuss the Achievement Program possibilities.

A ROAD MAP TO GOOD MEETINGS (20 minutes)

It is important for everyone to become familiar with the basics of running a good meeting. Review with members the purpose of an agenda and the executive's responsibilities. Have the club members elect an executive. You may find the 4-H Volunteers' Handbook and the OMAFRA Factsheet, Procedures for Meetings (96-009) helpful.

LOOKING AT OUR ENVIRONMENT and WE'RE ALL IN THIS TOGETHER (5-10 minutes) page 7

Use the material in the members manual to discuss this topic. Put it in your own words, don't read from the manual. You may find it useful to use a terrarium or aquarium as an example of an ecosystem.

CHAINS AND WEBS page 8

PYRAMID OF LIFE (10-15 minutes)

This game demonstrates how a food chain works, and how important each link is to maintaining a stable ecosystem. This game requires at least six players and is best played in a clearing outdoors. Give each member a piece of paper and have him/her write on it the name of a plant or animal that lives in the area.

Leader: "From what source does the earth get its energy? ... From the sun! ... Right! What form of life is first to make use of that energy? ... Plants! ... Right! Now we're going to build a pyramid of life. The plants will be on the bottom, because all animals depend on them directly for food."

Have the plants kneel down on all fours, close together in a line. Now have each of the other members read off what animals they are from the slips of paper. As a group decide whether they are plant eaters or meat eaters. Plant eaters kneel on top of plants and meat eaters kneel on top of the plant eaters.

If there are more people on the upper level group than the supporting plant levels, it may be impossible to build a stable pyramid. Similarly this can also happen in a food chain resulting in an unstable ecosystem. Challenge the members to reconstruct their own pyramid into one that will easily support all its members. Clearly the higher up the food chain, the fewer the number of animals there are. Demonstrate the importance of plants by pretending to pull one of them out of the pyramid.

THE WEBBING GAME (10-15 minutes)

This game shows the essential interrelationships among all the members of nature's community.

MATERIALS NEEDED

* ball of string or yarn
* paper and pins for name tags
* markers
* large sheet of paper
* scissors

WHAT TO DO

1. Write the word "Sun" at the top of the large sheet of paper. Tack to a wall or tree.
2. As a group, choose an ecosystem eg. forest, lake, ocean, pond, etc. Make a list of some plants and animals that live in that habitat and write their names under the word Sun.
3. Each member then chooses to be one of those plants or animals and writes his/her new name on a name tag. One member should be the Sun.
4. Have everyone form a circle and face the centre.
5. The Sun takes the ball of string and passes it to someone that depends on the Sun as its energy source. For example, in a forest community the Sun might pass the string to grass.
6. The ball of string is then passed to another plant or animal that eats, is eaten by or somehow depends upon the organism holding the string. For example, grass might pass the string to rabbit, rabbit might go to fox, and fox might go to mouse. As each player receives the ball he/she should hold onto the string and unravel the ball to the next player.
7. Continue playing until everyone is connected to at least one other person. One person could be connected to many others.
8. Once the relationships between plants, animals and the Sun have been established, discuss with the members what has happened ... you have created a web!
9. Demonstrate the way each living thing affects the others. Ask one member to pull gently on his/her string. Who feels the tug?
10. Next, pull out your scissors. Ask the members what they think might happen if one particular plant or animal from the food web was somehow harmed or killed off eg. acid rain, oil spill.
11. To demonstrate what happens, cut the string that extends from that organism. It affects all others that are connected to it. Indirectly, it affects the connection between all living things because they are all interrelated.
12. If your members have not included humans in the web, ask them what they think is the role of humans. Where do we fit into the web? What organisms do we influence?

WRAP UP (5 minutes)

Summarize the meeting by going over definitions of an environment, ecology, and ecosystem. Emphasize how ecosystems are vital to the survival of the world and they are the core of all environmental issues. Encourage the members to select a project from the suggestions early in the club. Thank them for participating.

BEFORE THE NEXT MEETING page 10

1. To prevent dropping out take time with new members to make sure they know what is expected of them. The first meeting can be a little overwhelming for a new member. Make him/her feel welcome and offer to help in any way. It often helps to give a new member a telephone call before the next meeting. Don't forget to make parents feel welcome and informed too - both the members and you need their support.

DIGGING DEEPER – Optional Information for Seniors, Separate Handout

If the senior members are already familiar with the concepts of food chains and webs, they may be interested in discussing the more detailed information in this section.

MEETING TWO SPLISH, SPLASH

OBJECTIVES

This meeting will help members to appreciate the importance of water and wetlands, and gain an understanding of the causes and effects of water pollution.

PREPARATION AND EQUIPMENT

- Listen to the Chariots of Fire music and practice the script a few times
- Prepare situation cards for Eco-Acts activity
- Jar full of water
- Pail of muddy water
- Clear plastic pop bottle
- Paper coffee filter
- Some sand
- Some powdered charcoal

IN A NUTSHELL

Roll Call	5-10 min.
Second Hand Water	5-10 min.
The Water Cycle and Our Watery Planet	20 min.
Just Turn On The Tap	10-15 min.
No Swimming, No Fishing, No Drinking	5-10 min.
The World of Wetlands	15-20 min.
	60-85 min.

Optional: Digging Deeper

ROLL CALL (5-10 minutes) page 11

Members should bring a recent newspaper or magazine article about water to the meeting. They will present the main message of the story to the rest of the group. Use this as an introduction to the importance of the role of water in all of our lives.

SECOND HAND WATER (5-10 minutes) page 11

The first part of the meeting deals specifically with water, and where water comes from. Start the discussion with a simple demonstration using a jar filled with water. Ask your members what percentage of water on earth is freshwater as opposed to salt water. The answer is 3%. Pour out what you guess to be 97% of the water from the jar, leaving 3% in the bottom. Next ask members what percentage of the water left is drinkable water. The answer is 0.3%, in other words less than 1%. Pour out almost all the water to demonstrate the amount of drinkable water in relation to all the water in the world. We are very fortunate in this province to have so much freshwater and it is important to emphasize the need to keep it clean so it continues to go around.

THE WATER CYCLE and OUR WATERY PLANET (20 minutes) pages 12-13

This activity deals with the water cycle. It is a guided fantasy with music. This mental journey takes members through the changes and processes that happen to water as it moves from the earth's surface to the air, and back down to earth again. The music is the theme music from Chariots of Fire, by Vangelis.

First of all, make sure your members are relaxed and comfortable. If you're outdoors, they could be lying in the grass. If you're indoors, they could lie down or sit comfortably, make sure that everyone has his/her eyes closed. Tell them you are going to take them on an interesting and unique trip and that they must concentrate completely on your voice and the music.

When you're all ready, start the music. Follow the time on the script below, and feel free to add your own words to make the experience more meaningful. Use the time cues as guidelines.

THE WATER CYCLE

0 mins. 0 secs: "You are lying on the beach. Hear the waves washing in, the warmth of the sun on your face and body ... begin to melt into the sand, flow into the ocean; now you are part of the water."

2 mins. 10 secs: "Feel the swaying waters on the ocean."

3 mins. 50 secs: "There's a breeze over the water; feel yourself drifting up to the clouds; now you are part of the clouds. You begin to move inland."

5 mins. 40 secs: "You begin to climb up the side of the mountains; look down and see the trees; feel the warmth of the breeze at your back."

7 mins. 0 secs: "You've climbed so high that you're heavy now. Now you are rain and you begin to fall, splashing on the rocks and leaves, forming puddles, small lakes."

7 mins. 40 secs: "You begin to make the downward journey, rushing over smooth rocks."

8 mins. 50 secs: "You come to a sheltered valley; you begin to move slowly again."

10 mins. 40 secs: "Look ahead, you can see the valley will soon drop off sharply."

12 mins. 10 sec: "A sharp drop, falling, falling, falling, rushing down the mountainside, curving around rocky shores, spray shooting up in the air. Majestic in your strength, you flow into a large lake at the bottom of the mountain."

14 mins. 30 secs: "You are drifting about the lazy lake."

16 mins. 30 secs: "Finally you find your outlet, part of a small stream drifting back to the ocean."

17 mins. 0 secs: "Now you are back to the ocean."

17 mins. 30 secs: "Now you are washed up on the beach; slowly begin to form into yourself, laying on the warm sand."

20 mins. O secs: (MUSIC OVER) "You may rejoin the group when you are ready!"

Credit for the Water Cycle activity:
John Miller, from "The Compassionate Teacher"

JUST TURN ON THE TAP (10-15 minutes) page 14

When sewage is treated, the "purification" process removes the solids, allowing for the break down of ordinary organic wastes and the killing of bacteria. Sewage treatment is designed for household wastes and not industrial and hazardous household wastes. Toxic contaminants, solvents, pesticides and industrial chemicals are not removed during the process. The by-product of the sewage treatment process is sludge (treated sewage solids). Sludge is sent to landfill sites, burned or spread on agricultural lands.

The activity below can be used to demonstrate how filtering works. Most towns and cities get their water from lakes and rivers. This water has to be cleaned before it is safe to drink. Chemicals are added to the water to kill germs. The water flows through tanks with sand and gravel in them to filter out the dirt.

WHAT YOU NEED

- a pail of muddy water
- a clear plastic pop bottle
- a paper coffee filter
- some sand
- some powdered charcoal

WHAT TO DO

1. Cut the top off the bottle about 4 inches down from the mouth.
2. Turn the top of the bottle upside down and set it in the bottom of the bottle.
3. Put a coffee filter in the top section. Put a layer of sand in the filter. On top of the sand put a layer of charcoal then another layer of sand.
4. Slowly pour the muddy water into the filter. Don't let it overflow. The water will drip through the sand and charcoal into the bottle underneath.
5. Although the water will look cleaner, it is not safe to drink. In a real water purification plant, chemicals are added to kill the germs in the water.

The following list has been provided as supplementary information. You might use it as a discussion guideline while you are waiting for the water to drain through the filter.

MAJOR TYPES OF WATER POLLUTION

1. Oxygen demanding wastes such as sewage, animal manure and industrial waste require oxygen to decompose them. If there is too much waste in the water it uses up the oxygen and kills many species of plants and fish.

2. Disease causing agents are the infectious organisms such as bacteria (fecal coliform, typhoid) and viruses (hepatitis) that are carried into the groundwater by domestic and animal wastes. Other sources include meat packing plants and tanning plants.

3. Inorganic chemicals and minerals are the acids, salts and metals that may increase the acidity, salinity and toxicity of the waters. They reach water from mining and oil fields.

4. Synthetic organic chemicals include pesticides, herbicides, plastics, detergents and industrial chemicals. The long-term effects of small amounts of these are still not known.

5. Plant nutrients include nitrites and phosphates. They come from fertilizer and manure runoff, detergents and sewage treatment plants. In excess they cause alga blooms, weed growth, odour and taste problems. This is often the cause of groundwater and well water contamination.

6. Soil, sand and mineral particles are washed from the land through natural runoff, soil erosion from agricultural practices, mining and construction practices. The sediment fills the stream channels and water reservoirs reducing fish and shellfish populations and reducing the amount of light that can reach aquatic plants.

7. Pollution can result from mining radioactive ores, testing and using nuclear weapons; poorly operating nuclear generating plants, leakage and spills from transport and long term storage of radioactive materials and wastes.

8. Heated water is returned in large quantities to streams, lakes and oceans by industry and power plants. Excess heat reduces the amount of oxygen in the water, which decreases the survival of some forms of aquatic life.

NO SWIMMING, NO FISHING, NO DRINKING (5-10 minutes) page 14

Drought poses all sorts of strain on our water supplies. We are familiar with our midsummer water bans on lawn watering and car washing. How would you deal with a situation where your water supply was severely reduced because the well or reservoir became depleted?

Here's the challenge to present to your members: your water supply has been reduced to provide just enough for drinking, cooking and personal health. Everyone in your family takes a shower with the plug in the tub and saves the water. Discuss or draw all the ways you can use this grey water before it disappears down the drain.

You may want to break members up into smaller groups for this discussion.

THE WORLD OF WETLANDS (15-20 minutes) page 15

The purpose of this activity is to get the group thinking about how wetlands are threatened and why people endanger or destroy wetlands. By acting out situations, they have a more visual idea of what goes on in the battles over wetlands. They can also learn the two sides of these battles, and decide for themselves where their priorities lay.

Cut up the situations on page 17 of this Guide and put in a bowl or hat. Have a member come up and draw a card. Another member is selected to act out the situation with him/her. Use these dramatisations to lead into a discussion about wetlands.

BEFORE THE NEXT MEETING

If showing a film or video, make sure the film is available, and book it through the local library or resource centre.

Collect a water sample from the local pond, lake or stream and if possible catch some rainwater to be used in the pH Line Up demonstration.

DIGGING DEEPER - Optional Information for Seniors, Separate Handout

Senior members may be interested in a more detailed discussion of the effects of acid rain.

ECO-ACT SITUATIONS

You: An environmentally minded person.
Situation: Your neighbour at the cottage decides to fill in the marsh in front of the shoreline to extend his/her property. You are upset and call a meeting of the neighbours in the area. No one can see anything wrong with the idea and it is up to you to convince him or her that the marsh serves a valuable purpose, physically and aesthetically and that its destruction will affect everyone.
Other person: Neighbour.

You: Wild Rice Harvester
Situation: For years, yourself and other people in your community have been gathering wild rice from the wetland area near your village. This harvest has provided you and your family with a good part of your yearly income. A developer has purchased a large portion of the wetland area to build a resort. A village meeting has been called and the developer has agreed to come. You have been elected to present the situation to the developer on behalf of the other members of your community.
Other person: Developer

You: A happy landowner
Situation: Part of your property includes a small wetland area, which backs onto a creek. In the summer you can't stand the mosquitoes biting, so you automatically go to spray your marsh with insecticide. A horrified neighbour catches you and gives you a big lecture on the effects of insecticides on everything else in the wetland as well as how it affects surrounding plant and animal life. He/She points out the other areas in your yard where mosquitoes can breed besides your marsh. You respond to your neighbour's complaints.
Other Person: Neighbour

You: Cottage owner
Situation: There is an area of wetland at the edge of your property. You want to have the area dug out to create a small harbour where you can build a new dock for your boat. You bring this topic up at the supper table. Your son/daughter who is taking the Conservation 4-H project is very upset with you and explains why this wetland area should be left the way it is. You try to explain to your child why you should go ahead with your plan.
Other Person: Your son/daughter

MEETING THREE THE SKY'S THE LIMIT

OBJECTIVES

This meeting focuses on air pollution, discussing sources and effects such as acid rain, the greenhouse effect and the disappearing ozone layer.

PREPARATION AND EQUIPMENT

- Borrow film or video from library and arrange for the necessary audio-visual equipment.
- Blindfolds
- 8-10 small clean jars (baby food jars work well)
- pH paper and pH colour chart OR pH testing kit
    - pH testing kits are available from swimming pool dealers ($8-$15)
    - you could make arrangements to get supplies from a local secondary school science teacher, he/she might even come and help at the meeting!
- Samples: liquid bleach, soft drink, milk of magnesia, milk, apple juice, tomato juice, vinegar, lemon juice, sample from local pond, stream or lake, rain water
- Cut up paper for scrambled acid story
- Hat or bowl

IN A NUTSHELL

Roll Call	5 min.
The Breath of Life	5 min.
Hot Stuff and the Disappearing Sunscreen	10 min.
Rain Rain Go Away	10-15 min.
What Acid Rain Does	
The pH Line Up	15-20 min.
The Scrambled Acid Rain Story	15-20 min.
Before The Next Meeting	5 min.
	65-80 min.

Optional: Digging Deeper
Film or Video

ROLL CALL (5 minutes) page 17

Name a cause of air pollution. To make this roll call more entertaining and challenging, add a twist. After the first member gives his/her answer, the next member must repeat the same answer and add another. So as each player gets a turn, he/she must repeat all the previous causes of air pollution.

THE BREATH OF LIFE (5 minutes) page 17

Introduce the concept that ideally air can't be seen, touched, smelled or tasted so its importance is often overlooked.

HOT STUFF and THE DISAPPEARING SUNSCREEN (10 minutes) page 18

A brainstorming session around the types of day-to-day activities that contribute to air pollution and greenhouse effect would be a good way to cover this material. Encourage members to come up with alternatives.

RAIN RAIN GO AWAY (10-15 minutes) page 19

MORE ON THE GREENHOUSE EFFECT

The greenhouse effect is caused by the release of over 20 gases into the atmosphere. The major gases are carbon dioxide, chloroflorocarbons (CFCs), nitrous oxide, methane, and ozone. These gases come from the burning of fossil fuels in boilers, furnaces and automobile engines. CFCs, are found in air conditioners, refrigerators and some foams and aerosols. There are not as many CFCs as carbon dioxide but they are stronger. CFCs can trap more of the heat radiated by the earth. Nitrous oxide comes from vehicle exhaust, coal combustion and the use of agricultural fertilizers. Methane is produced by rotting garbage in landfill sites and by burning wood and vegetation. Ozone, which is part of the upper atmosphere that shields us from ultraviolet rays of sun, at ground level is greenhouse gas.

Another reason for the greenhouse effect is global deforestation. Plants absorb carbon dioxide from the air, so when trees are cut down there are fewer of them to absorb the gas. Carbon dioxide is released into the air when forests are cleared through burning.

To help introduce the concept of acidity, have the members do a taste test of various substances to distinguish which ones are acidic. Have members work in pairs. Blindfold one partner. Have the other partner place a small amount of substance on partner's tongue. Can the substance be identified? Which substance is the most acidic? Have partners switch roles.

Suggested substances: vinegar, lemon juice, milk, milk of magnesia, baking soda

WHAT ACID RAIN DOES (30-40 minutes plus time for video if used) page 20

THE pH LINE UP (15-20 minutes)

WHAT YOU NEED

- 8-10 small clean jars
- pH paper (1 small piece for each substance/member)
- pH colour chart
- liquid bleach (pH 11.0)
- carbonated soft drink (pH 3.0)
- milk of magnesia (pH 10.5)
- milk (pH 6.6)
- tomato juice (pH 4.2)
- apple juice (pH 3.0)
- vinegar (pH 2.2)
- lemon juice (pH 2.0)
- sample of water from local pond, lake or stream
- sample of rain water

WHAT TO DO

1. Prepare the samples and put in numbered jars on a picnic table. Keep your own list of the identity of each of the samples, along with its correct pH.
2. Cut the pH paper into small pieces to avoid wastage.
3. Have members place a drop of the sample on a piece of pH paper.
4. Immediately compare the colour of the pH paper with the pH colour chart.
5. Repeat the procedure for all the samples using a fresh piece of paper each time.
6. Rank the samples, from lowest to highest pH.

FILM OR VIDEO – (Optional - 20-30 minutes)

A picture tells a thousand words. For many people it is difficult to understand the effects of acid rain until they actually see the destruction. For some clubs it might be possible to visit an acid dead lake or observe tree or crop damage. For others this is not feasible and a film or video would be a good alternative. Some of the information presented in these films is more suitable for senior members, but junior members will be able to grasp main concepts and definitely benefit from the visual image. Because two of the films suggested are quite long you might choose to only show part of them. The suggested films were produced in the early 1980s but are still current enough to be valuable resources. The following films are available through Ontario Library Services. You may have to book it in advance, as your library might not have it at their branch.

Acid Rain: A North American Challenge
Video, 1989, 16 minutes
From maple trees in Quebec to the Statue of Liberty; from lakes in Ontario to farmland in the American midwest, acid rain is destroying North America's natural and man-made environment. This film explores the environmental, economic, and health effects of acid rain and reveals what needs to be done to reduce the damage it causes on both sides of the border.

Acid Rain: Requiem or Recovery
Film/video, 1981, 27 minutes
Intended to increase public awareness about a growing and serious threat to North American environment, this video looks at the impact of acid precipitation on our woods, waters and wildlife. Graphs, maps and scientific experiments serve to examine what acid rain is, where it originates and how its insidious advance threatens not only natural life around us, but our man-made environment.

Crisis in the Rain
Film, 1981, 28 minutes
Shows the harmful effect of acid rain on Northern Ontario Lakes. Emphasizes that the Canadian and U.S. governments must act now to develop effective emission controls to stop the already increasing destruction of aquatic life.

THE SCRAMBLED ACID RAIN STORY (15-20 minutes)

The members can learn about acid rain damage by organizing themselves into the logical sequence of the acid rain story "My Childhood Lake". Cut the story (pages 21 to 27, this Guide) into sections and put in a hat or bowl. (There are 14 pieces to this story. If you have fewer than 14 members, join sections together to give you the necessary number of pieces.) Have each member draw a piece of paper. To make the task easier, each section has a date on it. Tell the members to arrange themselves in sequence, then have them read the story out loud.

Some of the words in this story may be difficult for junior members to read out loud. You might choose to alter the activity by having groups of members (2-3 per group) illustrate one section of the story on a piece of paper. Once the drawings are done, have members piece the story together in a mural and explain their section of the story in their own words. Don't worry if they miss a few details.

The aquatic element is only one of the aspects of the environment that is suffering from the effects of acid rain, but this story can be used to stimulate discussion.

BEFORE THE NEXT MEETING page 22

Remind the members to bring in toilet paper samples for the next meeting. It might be a good idea to collect some yourself as members sometimes forget. Don't forget to start putting together some "staged" garbage if doing the Just What Is Our Garbage activity.

DIGGING DEEPER, - Optional Information for Senior Members, Separate Handout

Senior members can use the questionnaire in this section to find out what the "person on the street" knows about acid rain. Depending on the location for your meeting this could be done sometime during your meeting.

MY CHILDHOOD LAKE: THE SCRAMBLED ACID RAIN STORY

When I was growing up my family went to a cottage each summer in Northwestern Ontario. The cottage was on a beautiful lake and I remember what fun we had in the water and watching all the wildlife. We used to catch so many fish. Each year I kept a journal while I was at the cottage and now as I read back over the years I can see how things changed as a result of acid rain. I would like to tell you the story of my childhood lake.

1965

The lake is about 100 hectares, with marshland around it. It is surrounded by a pine and maple forest. The bedrock is typical Canadian Shield granite and the soil is a thin organic layer on sand. The water is roughly 30 meters in depth and when my family first went there it had a pH of 6.8.

1970

A number of years ago the lake supported thriving plant and animal communities. There were plenty of fish - lake trout, yellow perch, white suckers and a variety of forage fish, such as common shiners and lake chub. Crayfish, clams and snails crawled on the lake bottom, water beetles scooted across the surface and dragonflies and mayflies hovered above it. Frogs crouched on lily pads waiting for unwary insects, snakes slithered in the mud and turtles sunned themselves on the rocks around the shore.

1972

The aquatic creatures provided a rich diet for many birds. Kingfishers and a pair of loons nested on the lake and blue herons were seen from time to time. Various mammals, such as a family of mink, made their homes along the shoreline and beavers had built a large dam on the outlet stream. Moose came to feed on the waterlilies and otters visited occasionally to hunt for fish.

1975

As North American industrialization grew, the environment around the lake received increasing punishment from acid rain. Upwind, nickel and copper smelters and several coal fired generating stations were spewing tons of sulphur dioxide into the air every year. Growing cities jammed with cars, trucks and buses added smog of nitrous oxides. Small industries contributed their smoke, and prevailing winds carried this pollution over lakes and forests. In the atmosphere the emissions were transformed into acid, bringing the pH of the precipitation down until it was rarely higher than 4.2.

1978
For a while the natural alkalinity of the lakes and its surrounding soils counteracted the acid rain, but the granite bedrock contained very little of the calcium carbonate needed to neutralize the increasing acidity. Within a few years the normal slight rise and fall in the pH of the lake had begun to tilt to greater and greater extremes of acidity.

1979
It was not long before the lake's inhabitants began to suffer from the effects of these acid shocks. One spring the eggs of leopard frogs spawning in pools of meltwater failed to hatch, and in the inlet streams a new generation of white suckers died as soon as they emerged as fry.

In the next spring melt, the young of the Johnny darter were lost too. The lake was unable to recover fully from the constant acid loading of heavy rains during the summer, and its overall pH began to rise.

When the lake pH reached 5.6 the opossum shrimp were gone and their predators, young lake trout, were becoming skinny.

1980
During the next few years the changing chemistry of the water affected not only vulnerable eggs and fry, but also the adult aquatic creatures. Aluminium, leached from the soil by acid run-off, was reaching poisonous levels in the lake. Stressed by this and the low pH, many of the lake's inhabitants failed to reproduce.

Because of the water's acidity the crayfish found it difficult to harden their exoskeletons. They became more vulnerable to parasites and the females ceased to be able to carry their eggs protectively, leaving them to be eaten by the remaining fish.

1982
While the falling pH was taking its toll on the animal population, several unpleasant species of plant life had begun to grow. Slimy alga blooms appeared in the water with increasing frequency and another variety of algae gave the lake a garbage dump odour.

1983
One year a rapid spring melt produced an acid shock that brought the pH of the lake down to 5.3 and several species of fish, such as the common shiner, disappeared completely.

Other species, such as the lake trout and turbot, had failed to reproduce for several years, so the remaining fish population consisted largely of older generations.

Within a few years there were no frogs in the lake. When the pH dropped below 5.5 the birds, accustomed to finding plenty of snails in the shallows, discovered that this food source was scarce too.

1985
When the overall pH of the lake dropped below 5.0, the only fish left were acid resistant species such as yellow perch and lake chub. All of the crayfish and clams had gone, closely followed by the mayflies and dragonflies.

The loons, the mink and many birds, faced with starvation, moved on in search of lakes that could still maintain a food supply for them.

1987
Eventually, the alkalinity of the entire watershed was exhausted and when the lake's pH fell to about 4.7, it ceased to fluctuate so wildly and simply decreased at a steady rate. There were no birds, no fish, no amphibians and no mammals.

1989
Before long, the lake had reached a pH of 4.3, almost as low as the acidity of the precipitation itself. It still looked beautiful, but the healthy blue-green clarity of the water hid the fact that most of its natural inhabitants had gone. Only a few undesirable life forms suited to acid conditions remained. A complex and abundant ecosystem had become an acid reservoir. The lake was dead. I guess I won't be taking my children on vacations to my Childhood Lake.

2000
People are making better use of our environmental resources. The acid rain picture may be brightening. People are using energy efficient appliances and insulating their homes more effectively to reduce the consumption of fuels at home. Everyone is driving smaller, more fuel efficient cars. My family and I are walking wherever we can and we all have bicycles, which we use! People use only organic pesticides and fertilizers on crops and gardens. Everybody on our street has a backyard compost.

An international agreement between Canada and the United States has committed both countries to reducing their emissions by 50%. All countries in the world have made a commitment to reduce their emissions by 30%. I wonder if I should take the kids for a drive up to the lake that I went to when I was younger?

MEETING FOUR WASTE NOT, WANT NOT

OBJECTIVES

In this meeting members will gain an appreciation for the amount of waste we as humans produce and the need to reduce waste.

PREPARATION AND EQUIPMENT

Remember, don't feel you have to cover everything in the members manual. Focus on what you feel your members will be most interested in.

- bags of "staged garbage", more details below
- 5 - 10 wide mouthed glass jars with lids (all the same size)
- water
- masking tape
- marker
- a few brands of toilet paper (just in case the members forget)

IN A NUTSHELL

Roll Call	10 min.
What a Waste and Full of Garbage	15-20 min.
Out of Sight, Out of Mind	10 min.
Hazardous Wastes and What You Can Do At Home	20 min.
The Real Dirt - Composting	5 min.
Judging	20 min.
Before the Next Meeting	5 min.
	85-90 min.

Optional: Environmental Sing-a-long
Practice the 4 Rs
Digging Deeper

ROLL CALL (10 minutes) page 23

Members will create litter slogans.

WHAT A WASTE and FULL OF GARBAGE (15-20 minutes) pages 23 and 24

Put together a few bags of "staged" garbage and the let the members examine the contents. Have them decide which items could go in the compost heap, the recycling box, the garbage and which items could be used again. Since it might be messy, the members might like to wear gloves. Use this activity to stimulate discussion.

Contents might include: (for the compost heap) egg shells, potato peels, banana peels, plant clippings, apple core; (for the recycling box) telephone book, newspapers, bottles, paper, plastic dairy product containers, soup cans, pop cans; (for the garbage) clean disposable diapers, styrofoam containers, candy wrappers, drink box, aerosol cans, plastic wrap, toiletries eg. deodorant, disposable razors; (for reuse) old clothing, old shoes, shiny magazines, toys, bleach containers, plastic containers, tin pie plates.

OUT OF SIGHT, OUT OF MIND! (10-15 minutes) page 25

HOW DEGRADING

Some of the waste sent to landfill sites will decompose. But even the waste that does decompose does so at different rates. Even different brands of similar products will vary in their rate of decomposition.

Some brands of toilet paper are more biodegradable than others. Find out how fast some different brands break up in water.

WHAT YOU NEED

1. Have members bring as many different brands of toilet paper as they can get. Try to get some white, some coloured and some pieces of the kinds used in public washrooms, restaurants, schools, etc.

2. Wide mouthed jars with lids (all the same size). You will need one jar for each kind of toilet paper.

3. Masking tape.

WHAT TO DO

1. Tear two pieces from each kind of toilet paper. Keep all the pieces the same size.

2. Tape one piece on the outside of the jar along with a label showing the brand name. Put the other piece inside the jar. Do the same thing with every brand name you have.

3. Fill the jars with water and put the lids on tightly.

4. Shake each jar 20 times. Notice any changes in the paper.

5. Leave the jars till the next meeting (about 1 - 2 weeks). Shake the jars again 20 times. Which kind of toilet paper has broken down the most? Which kind has broken down the least? Do you notice a difference between coloured and white paper in speed of break down? Which kind of toilet paper do you think would pollute the environment the most?

HAZARDOUS WASTES and WHAT YOU CAN DO AT HOME (20 minutes) pages 25-27

Have some household products displayed so that members can identify the hazardous symbols. This could lead to a discussion around the topic of how necessary these products are. How many of the products could be replaced with some of the environmentally friendly suggestions provided in the members' manual?

THE REAL DIRT - COMPOSTING (5 minutes) page 29

Ensure that members understand what composting is. There may be some members interested in preparing a composter. This might be a good activity for junior and senior members to work on together.

JUDGING ACTIVITY (20 minutes)

HOUSEHOLD WASTES

Set up a class of household wastes for members to practice their judging skills. The members could judge and give reasons individually, or in small groups. Provide access to the 4-H Judging Handbook to all members who don't already own one. Familiarize yourself with the material in it.

Here is an example of a class that could be used and the reasons for the placing.

The Class

Which household waste is the friendliest to the environment?
#1 drain cleaner
#2 apple core/peelings
#3 glass jar
#4 styrofoam container

Sample Reasons

I place this class of household wastes 2 - 3 - 4 - 1.

I place 2 at the top and over 3 because an apple is totally biodegradable and will break down or decompose more quickly than glass. It is an organic waste and can be put into a composter where it can be turned into natural fertilizer. Two requires less space at the landfill site than 3.

I place 3 over 4 because glass can be recycled to make new glass. Recycling glass means less waste will be sent to landfills, and fewer natural resources and energy will be used to produce glass. Although styrofoam could be recycled, we don't have the systems in place yet to do this. Also because it is so light, styrofoam can blow away more easily than glass, causing litter. Some styrofoam contains CFCs which can damage the ozone layer. Styrofoam can be harmful to marine life because when broken into pellets it looks like food and is eaten by aquatic life.

I place 4 over 1 because styrofoam is not as harmful to humans and animals as drain cleaner. Styrofoam can be placed in a landfill site but drain cleaner should be sent to a hazardous waste depot.

I placed 1 last because drain cleaner is a hazardous waste, which is corrosive and toxic. It can be harmful to animals and humans. Wastewater treatment plants aren't designed to handle large quantities of drain cleaner and can result in water contamination. Disposing of drain cleaner in a landfill site doesn't work either, since wastes can seep into groundwater, run into surface water or pollute the air.

For these reasons I place this class of household wastes 2 - 3 - 4 - 1

Cuts

5 - 2 - 3

BEFORE THE NEXT MEETING page 29

1. You may want to do a quick demonstration - for the benefit of junior members - of how to weigh the garbage bags.

2. Finalize arrangements for the field trip to the landfill site. Make members aware of the details of the field trip: when, where to meet, what to take, what to wear, etc.

SUPPLEMENTARY INFORMATION

OPTIONAL: ENVIRONMENTAL SING-A-LONG

Divide your club members into groups of 2 - 3. Have each group develop a verse for a song to help spread the word about recycling. Use the tune of "Frere Jacques".

Example: Save your tin cans, Save your tin cans
Bottles too, Bottles too.
Put them in the Blue Box.
Put them in the Blue Box.
Good for you! Good for you!

PRACTICE THE 4 Rs

If you feel that your club members would like to learn more about what to do at home, use this information as a beginning.

The principle of the four Rs is that we as responsible consumers must do what we can to reduce waste.

1. **Reduce**
Reduce the amount of garbage by avoiding over packaged and disposable products. Use durable goods and things that can be repaired. Be the house on your street or road that puts out the least garbage on garbage day!

2. **Reuse**
   Use things again and again by giving an old product a new use. Use refillable bottles, give magazines and books and clothes to someone else when you are finished. Use containers for leftovers, not plastic wrap. Pantyhose cut into strips are perfect for plant ties and blend in with the greenery. Use fireplace ashes to sprinkle on slippery sidewalks instead of salt.

3. **Recover**
   Both materials and energy can be extracted from waste. Composting is a form of material recovery that is easy to do. Compost is organic material that has been decomposed into usable soil.

4. **Recycle**
   Something that you think might be waste, can be broken down and used again - give something a new life. There is life after waste! Glass bottles and jars can be crushed and melted down to make new containers. Aluminum cans can be melted down and the metal used over again. As much as 80% of everyday waste materials can be recycled. Recycling saves money and energy and cuts down on pollution. How much are you recycling at your house?

DIGGING DEEPER - Optional Information for Senior Members, Separate Handout

Some senior members might be interested in preparing a composter.

MEETING FIVE HERE TODAY, GONE TOMORROW

OBJECTIVES

Most 4-H members and leaders enjoy field trips. A visit to the local landfill site can provide an excellent opportunity to explore the topics of land use planning and waste management.

PREPARATION AND EQUIPMENT

- Don't forget the results of the "How Degrading" experiment. If you are meeting at a different location (such as the landfill site) than the last meeting, pack the jars in boxes and take them with you.
- Be sure to select a 4-H member to thank the person who was responsible for explaining how the landfill site works and for answering questions.

IN A NUTSHELL

Roll Call	5 min.
How Degrading (Revisited)	10 min.
Land Use Planning	45-60 min.
Before the Next Meeting	5 min.
	65-80 min.

Optional: Digging Deeper

ROLL CALL (5 minutes) page 31

Look around your neighbourhood. How has it changed over the past years? Can you remember what it looked like 5 or 10 years ago? Are there new buildings around? Have the old buildings been removed? Are there more animals than before?

HOW DEGRADING (REVISITED) (10 minutes)

Have members shake the jars 20 times. Which kind of toilet paper has broken down the most? Which one has broken down the least? Is there a difference between coloured and white paper in the speed of break down? Which kind of paper is the friendliest to the environment?

Familiarize the members with the term biodegradable, which means that bacteria and other micro-organisms in the soil can break the material down. Have them list some things that are biodegradable and some that are not. Although some things will eventually breakdown, they might take hundreds of years (eg. newspapers).

Biodegradable	Not Biodegradable
100% cotton T-shirt	polyester T-shirt
apple core	styrofoam cup
wooden popsicle sticks	plastic sandwich bag
paper bags	plastic shopping bags
used note paper	shiny magazines

LAND USE PLANNING (45-60 minutes) page 31

FIELD TRIP TO LANDFILL SITE

Questions for members to ask are suggested in the members' manual.

In the follow up discussion use the questions given in the members' manual as a guide. Discuss the pressure that urbanization puts on our land, and introduce to the members the concept of land use management.

WRAP UP

Remind members about their projects and the Achievement Program.

BEFORE THE NEXT MEETING (5 minutes)

Contact a representative from an environmental group to speak at your next meeting about their organization. Be sure to inform them about the age and number of members, attention span of members and meeting facilities. You should also make the guest aware of the topics the members have been exploring and some of the activities they have done. Encourage the speaker to actively involve the members in some way. A list of provincial organizations is given below. You can check with the provincial group to get a local contact or call your library for help.

ENVIRONMENTAL GROUPS

Friends of Earth
701-251 Laurier Street West
Ottawa, Ont.
K1P 5J6
613-230-3352

Greenpeace
578 Bloor Street West
Toronto, Ont.
M6G 1K1
416-538-6470
http://www.greenpeacecanada.org/index.html

Canadian Coalition on Acid Rain
401-112 St.Clair Avenue West
Toronto, Ont.
M4V 2Y3
416-968-2135
http://library.uwaterloo.ca/discipline/SpecColl/acid/

Canadian Nature Federation
453 Sussex Drive
Ottawa, Ont.
K1N 6Z4
613-238-6154
http://www.cnf.ca/

Canadian Organic Growers
Information: Mary Perlmutter
348 Briar Hill Avenue
Toronto, Ont.
M4R 1V2
416-485-3534
http://gks.com/cog/index.html

Energy Probe
225 Brunswick Avenue
Toronto, Ont.
M5S 2M6
416-978-7014
http://www.nextcity.com/energyprobe/index

Federation of Ontario Naturalists
355 Lesmill Road
Don Mills, Ont.
M3B 2W8
416-444-8419
http://www.ontarionature.org/home.html

Pollution Probe
12 Madison Avenue
Toronto, Ont.
M5R 2S1
416-926-1907
http://pollution probe.org/

DIGGING DEEPER - Optional Information for Senior Members, Separate Handout

Senior members might be interested in having a debate regarding land use planning.

MEETING SIX THINK GLOBALLY, ACT LOCALLY

OBJECTIVE

The purpose of this meeting is to encourage members' ideas, and show them that their local efforts to protect the environment do make a global difference.

PREPARATION AND EQUIPMENT

- Confirm arrangements to have a member from an environmental group visit your club and share what their organization does. A list of some environmental groups was given on page 38 & 39 of this Guide.
- If possible, set up a video camera to tape the members' commercials.
- A box of props to use when making the commercials, eg. lumberjack shirt, stuffed animals, hats, glasses, globe, doll.
- Bristol board, construction paper, markers, glue, scissors

IN A NUTSHELL

Roll Call	5-10 min.
Guest Speaker	20-30 min.
NIMBI: (Now I Must Become Involved)	20-30 min.
Environmental Commercials or Exhibit Boards	
Achievement Program	15 min.
Wrap Up	5 min.
	60-85 min.

Optional: Digging Deeper

ROLL CALL (5-10 minutes) page 37

GUEST SPEAKER (20-30 minutes)

NIMBI (Now I Must Become Involved) 20-30 minutes) page 37

Use one of the following activities to get members thinking about what each person can do to help the environment.

ENVIRONMENTAL COMMERCIALS

Choose from the following activities…

Using their imagination and oral skills, have the group make up radio or TV commercials on the selling points of protecting our environment. Members divide into smaller groups of 3-4. Each group is responsible for making up a commercial within a specified length of time (10 minutes should be enough time). Encourage members to make good use of the information in their manuals. A commercial could be created around the top 5 things you can do to save the environment.

Each group will act out their commercial for everyone else. A box of props may be provided for everyone to use in order to add interest and fun. Video taping the commercials adds an extra dimension to the activity and will be a great reminder of the club.

EXHIBIT BOARDS

This activity gets the group involved in creating a display about this project so that others can learn from it. It could be used as an exhibit at the local fair. One method of doing an educational display is to use each letter of a word to write a short summary of the significance of the word. An example for the word Wetlands is included on the next page. You might want to make up a display board using this example as a model for your club members. Members might use the word Ecosystems or Environment.

ACHIEVEMENT PROGRAM PLANS (15 minutes)

Finalize the arrangements for your Achievement Program, and presentation of special activities.

DIGGING DEEPER - Optional Information for Senior Members, Separate Handout

Senior members might be interested in carrying out a community clean up activity. Be sure to make safety a top priority.

PROJECT COMPLETION

A Certificate of Completion and a Project Summary have been included in this Guide, pages 44 and 45. Your signature on either of these indicates you feel the member has completed the project to the best of his/her ability. Space is provided for you to add some individual comments to offer encouragement to the member. The Project Summary sheet also asks for written feedback from the member and his/her parents/guardians. (The questions on this sheet have been selected from the informal evaluation sentences, listed below.) Select whichever sheet best meets your needs and make copies for the members.

It is recommended that the certificates not be awarded until the Achievement Program. If you give them out before this time, some members mistakenly assume that they don't need to participate in the Achievement Program.

INFORMAL EVALUATION

Take a few minutes at the last meeting to do an informal evaluation with members. One way to do this is to ask them to complete one/all of the following sentences.

- I joined this club because ...
- I really enjoyed ...
- I didn't enjoy ...
- I had a hard time ...
- My favourite meeting activity was ...
- My least favourite meeting activity was ...
- If I was to take this project again, I would change ...
- I learned ...
- I've changed ...
- I'm glad ...

It Worked For Us!

Your experience in leading this club would be helpful to another leader in your area. You are encouraged to make some comments about the project, what resources you discovered locally and the members' feelings about the project and pass this information on to your 4-H Association. The Resource Development Subcommittee of the Ontario 4-H Council is interested in your comments too. Their address is in this Guide, page 4.

What is a wetland? A wetland is land covered with shallow water for part of or all of the year. The four major kinds of wetlands are: swamp, marsh, fen, bog.

Energy: In a wetland ecosystem energy from the sun is trapped by plants and transferred among the animals when they eat. As plants and animals die the energy they stored is released to the soil to start the cycle again.

Temporary: To some animals, wetlands are only a temporary habitat. Toads live their adult life on dry land but come to the water to lay their eggs. The tadpoles develop into adults in the wetland.

Life: There is a tremendous number of creatures that live in wetlands. Plants as small as algae and as big as maple trees grow in wetlands. Animals are also plentiful - birds, fish, insects, amphibians, reptiles, and mammals.

Amphibians: They spend part or all of their lives in wetlands. Examples include frogs, toads, and salamanders. They provide food for other animals such as fish, muskrat, and racoons.

Nesting: Thousands of birds come to wetlands every year to build their nests and raise their young. The tall grasses and reeds in the marsh provide excellent protection against predators.

Decomposers: These include microscopic organisms and snails. They breakdown dead plant and animal material into basic elements which can be re-used by the plant community for growth. They are natural recyclers!

Storage: Wetlands act as a storage area for water when levels are high, especially in the spring. They release the water slowly into rivers and streams. This reduces the frequency and damages of flooding and prevents drought in some areas.

WETLANDS

PROJECT SUMMARY - PROTECTING PLANET EARTH

(Complete at the end of the project)

A. Member Comments:

1. I joined this club because ... _____

   _____

   _____

2. I really enjoyed ... _____

   _____

   I didn't enjoy ... _____

   _____

3. If I was to take this project again, I would change ... _____

   _____

   _____

4. I learned ... _____

   _____

5. I'm glad ... _____

   _____

B. Parent/Guardian Comments: _____

_____

_____

C. Leader Comments: _____

_____

_____

This project has been completed satisfactorily.

Member _____ Leader _____

Date _____ Leader _____

CONSERVATION

Protecting Planet Earth

Congratulations on successfully completing this 4-H project.

_____

_____

_____

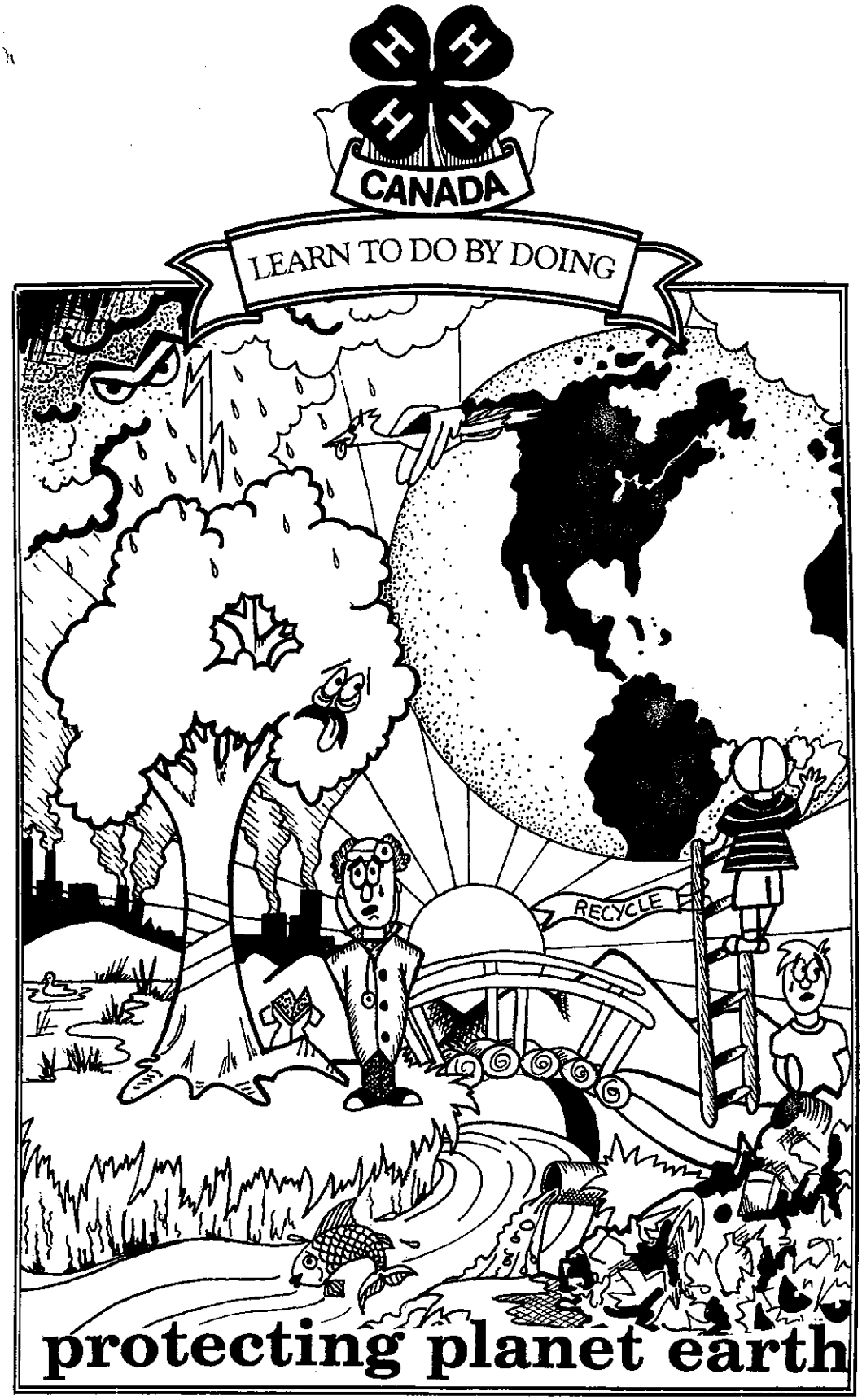
_____

_____

_____

_____ _____

Date **Club Leader's Signature**



NAME _____ AGE _____

CLUB _____ NUMBER OF CLUBS _____

Ontario 4-H Council

Ontario

Ministry of Agriculture, Food and Rural Affairs

4-H 400 00 ME

The Ontario 4-H program provides opportunities
for the personal development of youth.
http://www.4-hontario.ca

THE 4-H PLEDGE

"I pledge:
My Head to clearer thinking
My Heart to greater loyalty
My Hands to larger service
My Health to better living
For my club, my community and my country."

TABLE OF CONTENTS

This project was originally prepared by
M. Paul Dyszuk, Cambridge and updated in 1999 for the Ontario 4-H Council.
Special thanks to Jennifer Murphy, Waterloo 4-H member for designing the cover,
and to the original advisory committee: Kimberley Carkner, 4-H member, Vankleek
Hill, Dr. Murray Haight, Faculty of Environmental Studies, University
of Waterloo, Gail Potts, 4-H club leader, Stirling
and OMAFRA staff.

©Copyright Ontario 4-H Council and Queen's Printer For Ontario, 1999.

The Ontario 4-H Council, the Ontario Ministry of Agriculture, Food and Rural Affairs
and Agriculture and Agri-Food Canada jointly funded this project.

CONS00ME

ISBN 0-7778-8919-6

KIDS HELP PHONE
JEUNESSE, J'ECOUTE
1-800-668-6868
http://kidshelp.sympatico.ca

Welcome!

PURPOSE OF THE 4-H PROGRAM

The primary purpose of the 4-H program is the personal development of youth in rural Ontario.

In 4-H, members will be:

- encouraged to develop self-confidence, a sense of responsibility, and a positive self-image;
- helped to develop their skills in communications, leadership, problem solving, and goal setting; and
- offered the opportunity to learn about the food production, processing, and marketing systems and the heritage and culture of Ontario through projects such as livestock and crop production, financial management, food preparation, nutrition, recreational activities, and career development.

INTRODUCTION

This project is about the environment that surrounds us. You will learn about ecosystems and how they play a vital role in the survival of the world. Topics include acid rain, water as a resource, reducing wastes, land use planning and taking action. Throughout this project you will learn how you can play an important role in protecting and preserving our planet.

> "Each of us alive today shares a commitment to the continuing health of this planet. It is not just our home - it is a home we share with all other things. Our future depends on our working together to maintain and improve the quality of the environment for life on this planet."
>
> - Project WILD

OBJECTIVES

As a member of this club you will:

1. Have a good time learning about our environment,
2. Discover ecosystems and how they are important to our environment,
3. Learn what is happening to our environment,
4. Learn what you can do to help protect our environment,
5. Develop the confidence to show others how they can help, and
6. Meet new friends and learn from each other.

GENERAL REQUIREMENTS

A member will complete this project satisfactorily by:

1. participating in at least 2/3 of his/her own club meeting time,
2. completing the project requirements to the satisfaction of the club leader(s), and
3. taking part in an achievement program.

SPECIAL ACTIVITIES (Optional)

Individual clubs will decide if junior and/or senior members will be required to complete a Special Activity. Here are some suggestions for Special Activities. Encourage the members to display, present or share in some way the results of their activity. This could be done at a club meeting, the Achievement Program or another 4-H event.

SPECIAL ACTIVITY IDEAS (Optional)

If you are a junior member you may find the ideas marked with a (*) a little easier. Senior members can choose the more difficult options, or put their own creative spin on one of the simpler ideas.

*1. Create a poster to help save our endangered planet. Include a catchy title and a picture of what you feel is the main threat to our planet.

*2. Put together a collection of 10 photographs and/or pictures depicting our endangered planet and some actions that have been taken to help protect the planet earth. The collection should tell a story, so be sure to label your pictures.

*3. Make up a series of flash cards showing the parts of an ecosystem. On the back of the cards briefly explain why it is a valuable link in the ecosystem.

4. Start your own compost heap at home. Encourage the rest of your family to participate in the program.

5. Write a children's book on one of the topics discussed in the meetings. The book must appeal to children between the ages of 3 and 6 years old. Remember that pictures and very short sentences are the keys to a good book. Try the book out on your younger brother or sister or a friend.

*6. Create your own environmental message on one of your favourite T-shirts or sweatshirts. Magic markers or fabric paint, available in craft stores can be used. Example: KEEP THE GREAT LAKES GREAT!

7. Interview a local environmental/conservation group and find out what conservation/preservation techniques they are using in your area. Ask questions about how they educate the public and what campaigns have been most successful. Share what you learn with your fellow members at a club meeting or the Achievement Program.

8. Put together a photographic essay showing the parts of an ecosystem. The ecosystem chosen can either be that of a pond, marsh/wetland, forest or any other ecosystem in your area. The photo essay should consist of at least 20 labelled pictures.

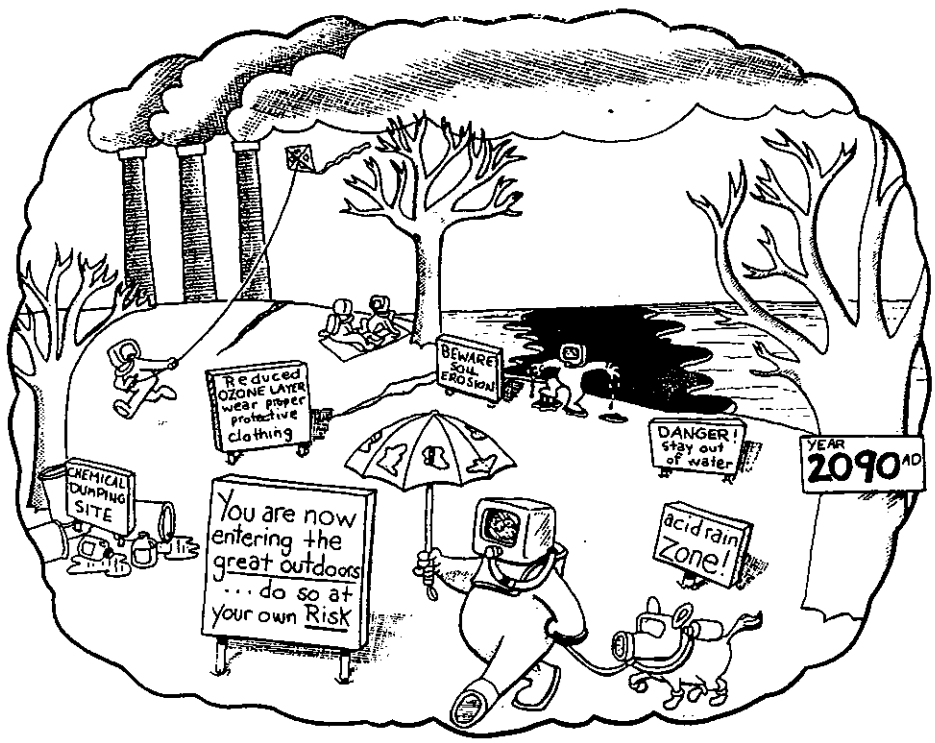
9. Write a story that follows the life of a drop of water from the time it leaves the clouds as a raindrop to the time it returns as water vapour. Describe the experiences you encounter along the way and any problems (pollution, erosion). The story should include your travels across land, through the water table and in a stream.

10. Create a recipe book designed around ingredients that are usually discarded. The recipes should include conservation cooking methods in the kitchen. i.e., orange rinds used to make an orange loaf; cooking a meal in one pot.

11. Create a recipe book of alternative household products for cleaning and gardening that are environmentally friendly.

12. Create an environmental song following the lead of well-known pop singers i.e., Bruce Cockburn.

13. Using a video camera, create a commercial advertising our planet. The commercial should be 3 to 5 minutes long. It should show the beauty of our planet along with any measures we are using to keep our planet alive.



Illust. - North York Environment Committee

GET INVOLVED

Be willing to let your name stand for an executive position. It is a rewarding and fun experience. Following your club's elections, complete this club executive chart.

CLUB EXECUTIVE:

	Name	Phone
PRESIDENT		
VICE-PRESIDENT		
SECRETARY		
TREASURER		
PRESS REPORTER		
OTHER		

CLUB MEMBERSHIP:

Members, Phone	Members, Phone

Leaders, Phone	Leaders, Phone

OMAFRA Contact, Phone	4-H Association Contact, Phone

MEETING SCHEDULE

	DATE	TIME	PLACE
MEETING ONE			
MEETING TWO			
MEETING THREE			
MEETING FOUR			
MEETING FIVE			
MEETING SIX			
ACHIEVEMENT PROGRAM			

The 4-H Resource Development Committee of the Ontario 4-H Council reviews and evaluates 4-H resources. Comments and suggestions about 4-H manuals and guides are always welcome. They may be sent to the following address.

4-H Resource Development Committee
Ontario 4-H Council
R.R. #1
Thornloe, Ontario
P0J 1S0
lduke@ntl.sympatico.ca

Worlds Within A World

ROLL CALL

What do you think of when you hear the word environment? Try to think of at least one word that relates to the environment that begins with each letter of the alphabet. It could be a thing, a place, a feeling, or anything so long as it is about the environment. For example, **A**cid rain, **B**ogs, **C**oncern, **D**...etc.

****

LOOKING AT OUR ENVIRONMENT

Environment is a word we hear a lot these days. When we turn on the T.V. or read the newspaper, we hear about PCB scares, the horrors of the greenhouse effect, the dangers of endless garbage, and the poisons in our air and water. We learn that the environment is being harmed by careless human beings. But what exactly is the environment and where is it?

Your environment is everything around you. All the living and nonliving things in our world are part of our environment. Your bed, your room, your house, your family, are all part of your environment. The air you breathe, the ground you walk on, the water you drink, the food you eat are all part of your environment.

Most people live in cities or towns today, and sometimes it is easy to forget that we are still a part of nature. Think about the food you eat, your home and the objects in it, and the gas in your family's car. Without nature we would have no shelter and nothing to eat, in fact we wouldn't even be here. Our living environment supports all living things and that includes you!

WE'RE ALL IN THIS TOGETHER

Have you ever cared for a goldfish? If you have, you know that it takes a lot of work to keep it healthy. You have to put a few plants in the fish tank to keep the water clean. Plants need sunlight to grow, but you have to be careful not to let the water get too warm. You might add some snails to the tank to clean out the algae. But sometimes the snails reproduce until there are too many and you have to take some out. You have to keep adding water to the tank as it evaporates. And, of course, you have to feed the fish!

Do you ever wonder how these jobs are taken care of in a lake or pond? Life goes on without a person around to add plants or snails, change the water or drop in food. The plants and animals and micro-organisms live together in their community in balance with each other.

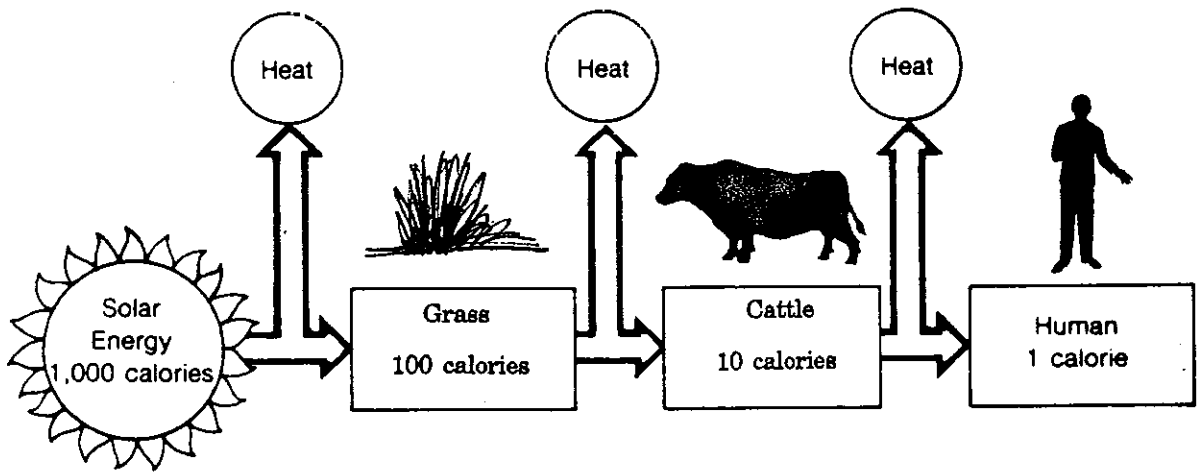
An ecosystem is a community of creatures living together, all needing each other, and using nonliving things such as soil, water and air. Ecosystems can be as small as your goldfish tank or a terrarium, or as big as a pond or a forest.

Most plants and animals are suited to a certain habitat (where they live) - a home that offers everything they need to live. When habitats are destroyed, most creatures that live there can't just move to a new location. Instead, they simply die. So, when swamps are drained or filled in, when lakes and rivers are polluted, when forests are cut down, what happens? Many of the creatures that lived there are homeless and may even become extinct.

CHAINS AND WEBS

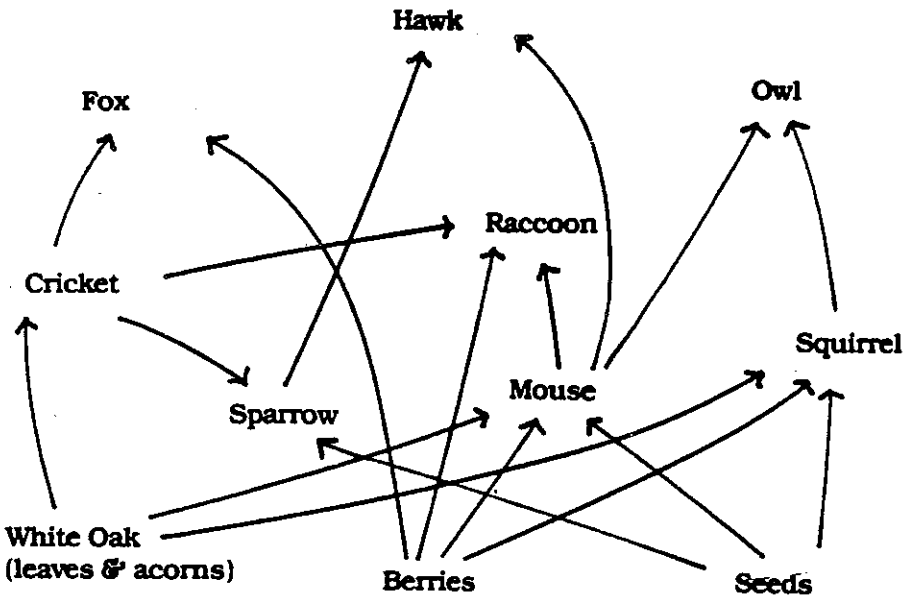
In an ecosystem, plants, animals and micro-organisms should be in balance with each other. All of the living things on this earth are connected together and need each other. One of the most basic ways in which we and all other living things are related is through a food chain. A food chain shows the connections between plants and animals by their eating habits - it shows the flow of food energy, measured in calories, from one living thing to another. For example we get energy from cattle when we eat beef; and cattle receive energy from grass; and that grass received energy from the sun. So that food chain looks like this:

SUN → GRASS → CATTLE → HUMANS



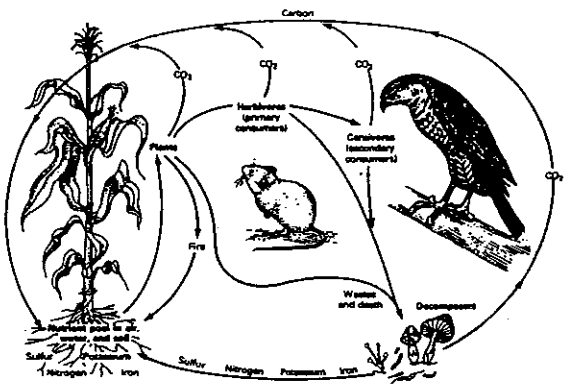
Food chains always start with plants because plants are the only living things that can capture the sun's energy and use it to make their own food. When you get right down to it, plants are the only food on earth. To get energy, animals must eat plants or eat animals that eat plants. The higher up the food chain an animal is, the more plants are needed to feed the animal. A field of clover could be enough food for 100 mice - but the mice might be enough food for two owls. At each link of the food chain some energy is lost. For example, when a mouse eats clover it gets some of the energy stored in the clover but the mouse also uses up energy breathing and running around. When an owl eats the mouse, the owl gets some energy the mouse took from the clover - but not all of it. Because energy is always being lost from food chains, new energy from the sun is always needed. The earth needs lots of plants to turn the sun's energy into food for us!

The food web is another way of describing all the different relationships found in nature. Here is an example of a food web you might find in a forest.



THE NUTRIENT CYCLE

All plants and animals need nutrients to survive and grow. These nutrients flow through the ecosystem from the nonliving to the living, and then back to the nonliving and are used over and over again. There are many nutrients needed to keep things alive. Nutrients cannot reproduce themselves. Those that exist are always moving from their storage spaces in the air, water and earth into the food chains and webs, and then back into their storage spaces again. The sun powers this cycle, and if there was no sun, the nutrient cycles would stop running.



Illust. - Environmental Science: Living Within the System of Nature. Newton: Allyn and Bacon Inc.

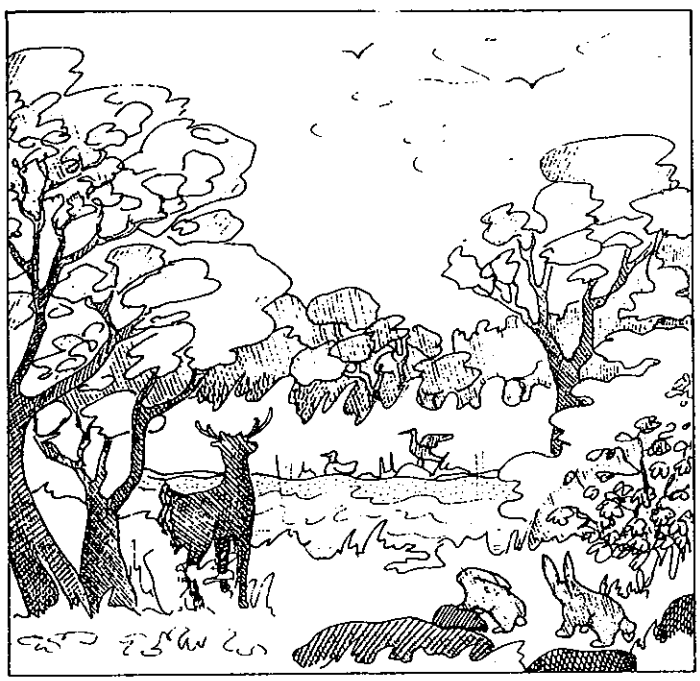
Each ecosystem in our environment is an example of how air, rocks, plants and animals function together in a balanced web of life. Each member of the ecosystem is important to the whole community, and when any member is taken away, every other member is affected. For example, if pollution in the water harms seemingly unimportant tiny plants, it can mean death for the fish that depend on them for food. Understanding ecosystems is important when we look at problems that affect our environment.

> "The earth does not belong to man; man belongs to the earth. All things are connected like the blood which unites one family... Whatever befalls the earth befalls the sons of earth. Man did not weave the web of life; he is merely a strand of it. Whatever he does to the web, he does to himself."
>
> Chief Seattle, 1855

BEFORE THE NEXT MEETING

1. If doing a special activity - select one.

2. Find a recent newspaper or magazine article about water to bring to the Splish, Splash session.



Splish, Splash

ROLL CALL

Bring a recent newspaper or magazine article about water to the meeting. Share the main message of the story with the rest of the members in your club.

****

SECOND HAND WATER

The water you used this morning to brush your teeth might have been the same water your Mom gave you a bath in when you were a baby. In fact, maybe it was the water your grandmother bathed your Dad in. How could this be? For at least three billion years, earth has been using the same water, over and over again. All life on this planet is supported by a fixed quantity of water.

We can't make new water, any more than we can make new air. If we misuse the water we have, we can't send out for fresh stuff.

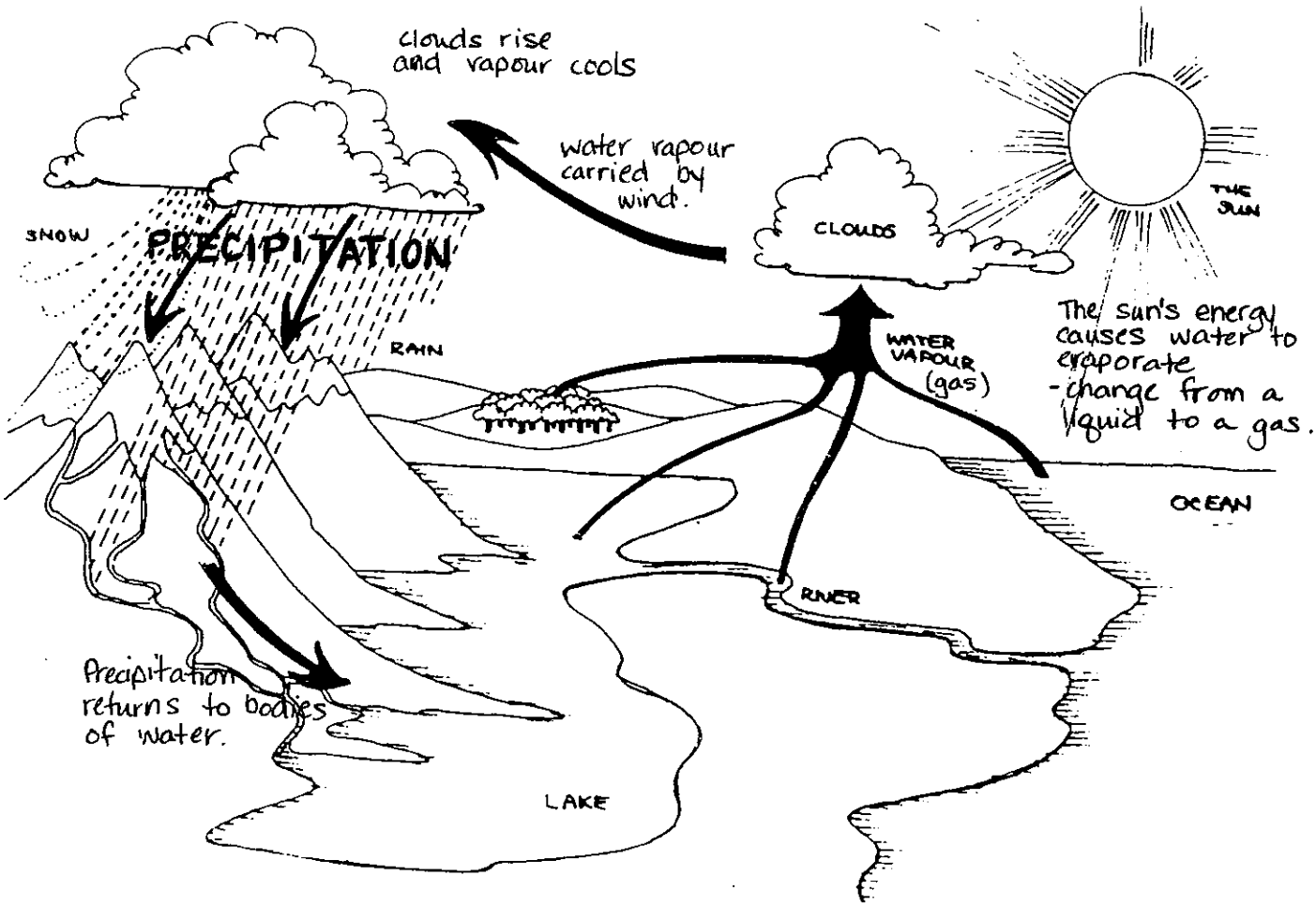
Because water seems to come out of the tap in unlimited quantities whenever we want it, some of us make the mistake of assuming we have lots available.

Illust. - North York Environment Committee

Where does our water come from? It might have come from a lake, a reservoir, a stream or an underground well. But where did that water come from? It probably came from rainwater. But rainwater isn't "new" water that falls to earth from somewhere in outer space. Rain is the earth's water being recycled.

Did you realize that water is moving around us constantly? It does not always flow downhill either; a good deal of it is being pulled up into the atmosphere by the sun.

THE WATER CYCLE



Not all of our water is in circulation all the time. In fact only a small amount of the total is in circulation annually. The oceans hold over 97% of the water on earth. A very small fraction is held in the atmosphere, and the rest exists as ice, ponds, lakes streams and underground water.

Water that falls as snow or rain on land may seep into the soil, where it becomes groundwater. Some rock layers allow water to pass through more easily than others. If groundwater reaches a rock layer that it can't pass through, it tends to collect above the layer and may form an aquifer - an underground water storage area. The upper surface of such underground water is called the water table.

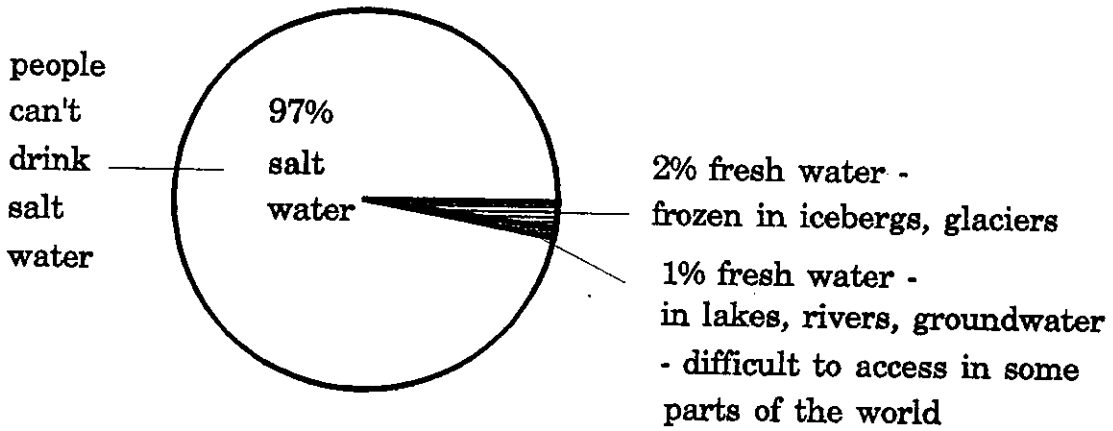
Some rain ends up as runoff carrying soil and minerals to streams, lakes, and rivers, from which some evaporates and the rest makes it downhill to the ocean.

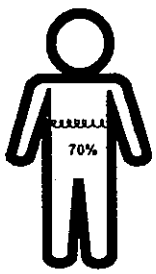
Plants and trees can affect the water cycle. Plants slow the speed of raindrops falling on the soil. This, along with the roots of plants, reduces erosion. Plants extract the water they need and give off water vapour as the water evaporates from the exposed parts of the plant, such as the leaves. This evaporation has a cooling effect, which helps to control the temperature.

OUR WATERY PLANET

Our earth is a very watery planet. Water and ice cover over 70% of the earth's surface. Yet there are many places where people must limit their use of water because of shortages. In some places, people do not have enough water to drink. If our planet is so watery, how can this happen?

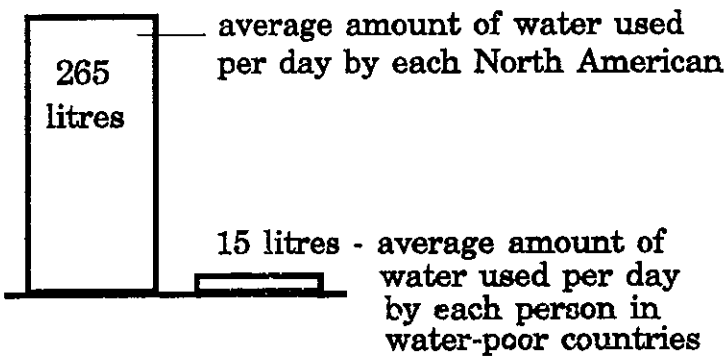
This chart shows all the water on our planet.





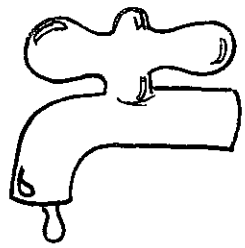
All living things, including humans, need water to survive. In fact, our bodies are about 70% water. Everyone of us needs about 2.4 litres of water every day to replace what we lose by breathing, sweating and going to the bathroom. We drink some of the water we need, and some of it comes from the foods we eat.

Of course, we use much, much more water than this. We put it through our washing machines, toilets, sinks, dishwashers, car washes and water our gardens and lawns. We use it to wash our windows, sidewalks and streets. We use it in the production of plastics, steel and paper. We hose down chemical spills and industrial sites with it. We put out fires with it and spray it in the air for pretty fountains.



We've grown used to seeing water flow out of our taps and down the drains. What if we had an automatic shut-off on our household water that limited us to say 50 litres of water a day? Or what if we had water meters beside our kitchen sinks and they read dollars instead of litres?

JUST TURN ON THE TAP



Before water comes out of our taps, several things happen. In cities we have to find a source of water, and need machinery to pump it, piping to carry it and plants to treat it. In rural areas, we usually pump our water from a well and in cottage country it is taken from the lake or river.

Water purification plants treat lake or river water to make it safe to drink. The water goes through a series of tanks that allow the dirt to settle out and then chemicals are added to take away bad tastes, smells and germs. In many households, chlorine has become an acquired taste as a result of water treatment. After the water is treated, it is kept in holding tanks before being piped to homes. At our homes another series of pipes is required to pipe the water to different parts of the house. We even heat some of the water for washing both ourselves and the dishes.

Once we've used water, we have to get rid of it. Another network of pipes and drains carry our dirty water and sewage to a septic tank or a treatment plant. In some places, this water is dumped directly into rivers, lakes and oceans.

NO SWIMMING, NO FISHING, NO DRINKING

Water is one of our most precious resources (we can't live without it), yet we're often careless with the water supply. Much of our water supply is polluted. Water pollution is anything that prevents us from using the water as a resource. For example, a polluted lake may be suitable for some recreational activities such as boating, but you can't eat the fish from the water.

Illust. - North York Environment Committee

Pollutants enter waterways either directly or indirectly: directly when dumped into water, or indirectly through runoff, seepage of pollutants into the groundwater or the settling of chemicals floating in the air. Pollution may be deliberate, as in the case of sewage being dumped into a lake or ocean, or it can be accidental, such as an oil spill.

The major sources of human caused water pollution are: industry, agriculture, household wastes, mining and construction.

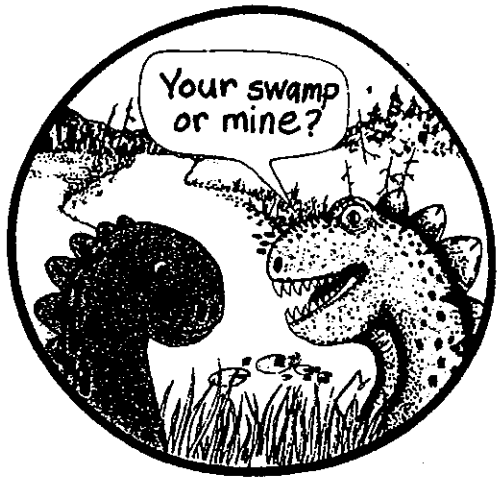
Water pollution causes many problems, including:

1. Damage to plants and animals
2. Damage to humans
3. Damage to property
4. Water that tastes awful, smells bad and looks terrible
5. Disruption of major ecosystems.

THE WORLD OF WETLANDS

A wetland is land that is covered with shallow water for part or all of the year. The four major kinds of wetlands are: swamp, marsh, fen and bog. They are a very valuable natural resource for many reasons.

1. They keep water clean by filtering out sediment and trapping many harmful chemicals.
2. They provide a vital habitat for hundreds of species of plants and animals, some of which are on the endangered list.
3. They can store water and can reduce the frequency and severity of flooding as well as drought.
4. They provide a source of income to many Canadians through trapping, fishing, harvesting of wild rice and cranberries.
5. They provide recreation and sport such as canoeing, fishing, hunting, hiking and birdwatching.
6. They are nice to look at.



Illust. - Federation of Ont. Naturalists. Introducing Wetlands.

Unfortunately, even though wetlands are important, they are being destroyed at a rate of 1 - 2% per year in Ontario. Many of Ontario's wetlands are now farmland, harbours, roads and waste disposal areas. Two major reasons for this destruction are the lack of understanding about the values of wetlands, and the lack of protection.

ENVIRONMENTAL EXTRA!!

Le Stinke!!

When tourists visit Paris, one of the biggest attractions is under the city - in the sewer system. Tour guides lead people through dripping tunnels and past smelly collection pits. The sewer tunnel is like a mysterious underground city stretching over 2,000 kilometres laid end to end (driving distance from Toronto to Winnipeg).

The Sky's The Limit

ROLL CALL

Name a cause of air pollution.

****

THE BREATH OF LIFE

You must have heard someone say, "The room didn't have a thing in it", and "This box is empty" "As far as we could see ... nothing." They couldn't have been more wrong - because it was there. You can't see it, touch it, smell it, or taste it, but it's every bit as real as a mountain or lake. We're talking about air! Without it, we wouldn't be able to live. A person can live for weeks without food, a few days without water, but only a couple of minutes without air.

But what is air? Air is a gas. That means that its molecules (the littlest particles that are the building blocks of all things) aren't packed together tightly enough to make a liquid or a solid. Normal air contains about:

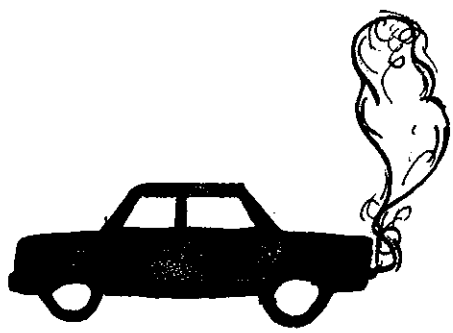
78% Nitrogen	21% Oxygen	1%

↑
Carbon Dioxide,
and other gases.

Oxygen is the gas that our lungs take out of the air we breathe, the gas that we exhale is called carbon dioxide. Carbon dioxide is the gas that plants breathe, and they "exhale" oxygen during the daylight.

Air forms a shield called the atmosphere, around the earth. The atmosphere keeps out many of the sun's burning rays and lets other rays through to warm the earth.

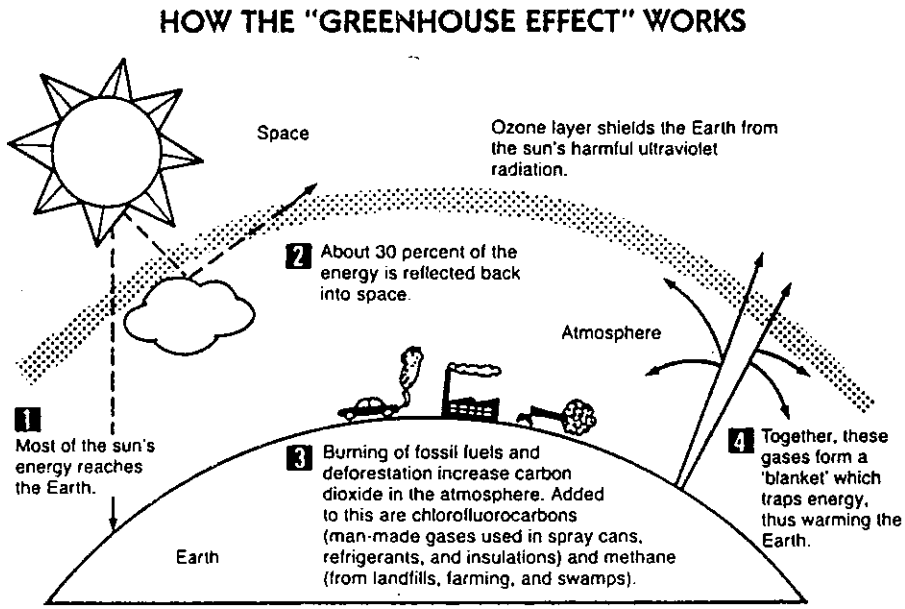
In the last hundred years, human beings have been changing the air we breathe. When large areas of forest are cut down, there are fewer trees to take in carbon dioxide and give out oxygen. We've been releasing a lot of poisonous chemicals into the air from our cars and factories. In many cities today, we can see and smell the air because it is so dirty! The changes in the air have given us lots of problems.



HOT STUFF!

Have you ever noticed that on a sunny day, a car gets extra hot inside? Sunlight comes through the glass windows but the heat can't get back through the glass. Glass greenhouses use the same kind of trapped heat to help grow vegetables and flowers.

Some gases in the atmosphere, including carbon dioxide, can act just like window glass. They let the sun's rays through to warm the earth. The earth absorbs some of the sun's heat, but releases the excess in the form of heat radiation. Carbon dioxide traps this heat radiation in the atmosphere like a thick blanket over the earth. The atmosphere gets hotter and hotter as a result of the trapped heat. We know that the earth is already 1°C hotter than it was 200 years ago. That's when people started to put up factories, which add carbon dioxide and other gases to the atmosphere. If this warming continues, changes to the climate are expected. Agriculture will be drastically affected. Increased temperatures could cause melting of polar ice; leading to rising ocean levels and flooding of coastal areas.



Illust. - Save Our Planet. New York: Dell Publishing Co.

THE DISAPPEARING SUNSCREEN

About 15 to 35 kilometres above the earth's surface is a layer of gas called ozone. This layer protects the earth from 90% of the sun's ultraviolet (burning) rays. This layer is very important to us because if people get too many ultraviolet rays they get sunburned. Years and years of this exposure can cause skin cancer and eye disease, can damage marine life, and can kill trees and crops.

In 1985, scientists made a startling discovery - there was a "hole" as high as Mount Everest and the size of the United States in the ozone layer over Antarctica. Most scientists think the ozone layer is being destroyed by chemicals such as CFCs (man-made gases used in spray cans, refrigerants, insulations). They are believed to drift up through the atmosphere and destroy ozone. Since that discovery, governments all over the world have made rules against using some of these chemicals that destroy our natural sun shield... scientists think that thanks to these efforts, the ozone layer is slowly repairing itself.

SHARING THE AIR

Since the earth's air flows around the whole planet, there is no way to keep air inside the borders of a country. When a fire broke out at a nuclear power plant in Chernobyl in the Soviet Union, Sweden had radioactive chemicals in its air within a few hours. Chemicals sprayed on fields can sometimes be found 100s of kilometres away. Since we all share the same air, we must all work together to clean it up.

RAIN, RAIN GO AWAY

A century ago, coal miners would carry a canary into a mine to check the air quality of their environment. If the level of harmful gases rose, the canary would die. When miners couldn't hear the canary's song they knew it was time to get out.

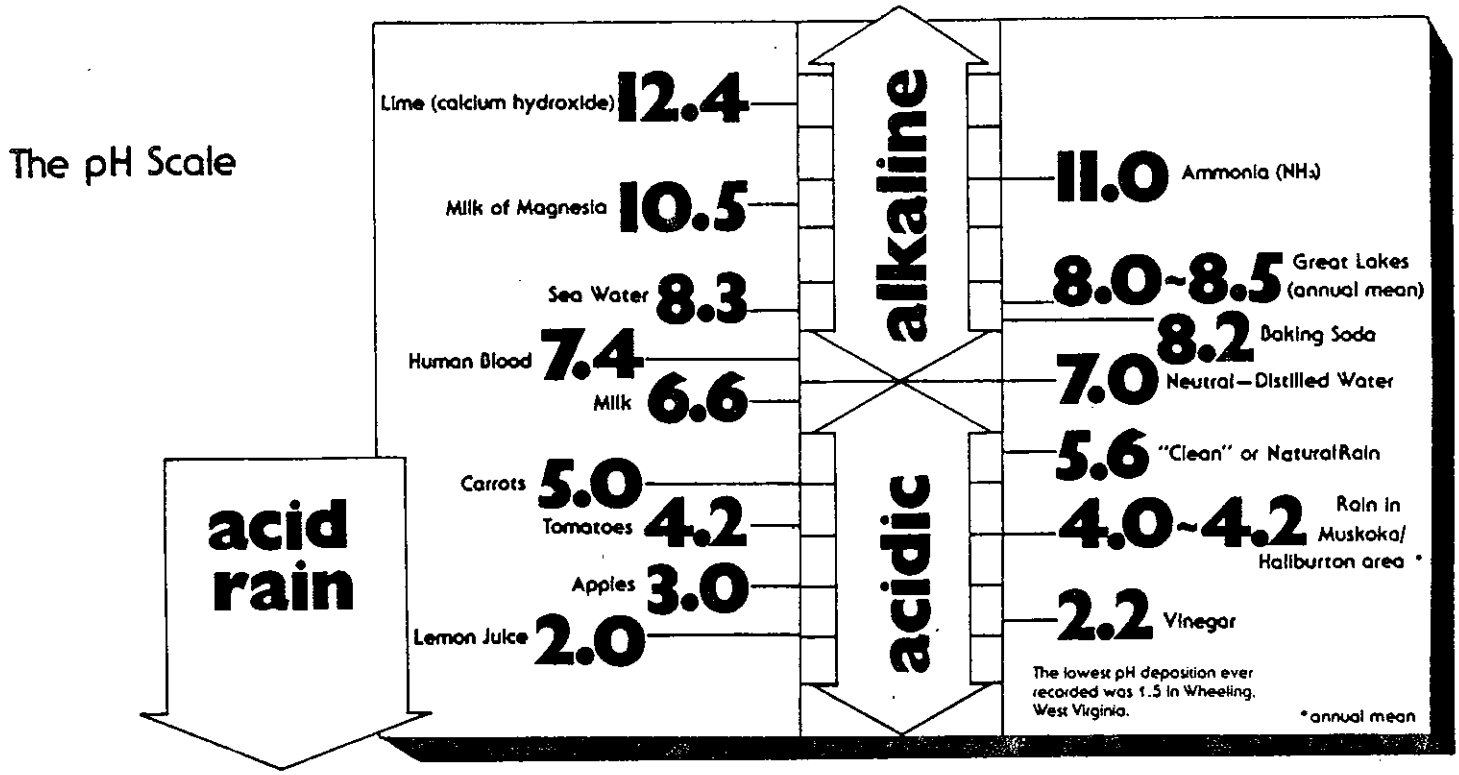
Imagine a crystal clear blue-green lake. You can see right to the bottom, where there is a perfect leaf resting on the sand. The lake is still and beautiful. It is also dead. There are no fish, birds, amphibians, or mammals. This is the effect of acid rain. Are the fish in acid lakes telling us the same story as the miners' canary?

Acid rain - including rain, snow, fog, sleet, hail, dew, dust, and particles - is the result of sulphur dioxide and nitrogen oxide gases that are released into the air. They mix with moisture, sunlight and oxygen to create sulphuric acid and nitric acid, which falls to the earth as acid rain or dry acidic particles.

Acid rain is killing forests, lakes and animals; damaging buildings and structures; and harming human health. Acid rain is probably the world's most destructive man-made pollution.

Illust. - Federation of Ont. Naturalists. Acid Rain Deposition Kit.

Acidity is measured using the pH scale, which goes from 0 to 14. A solution of pH 7 is considered neutral. A pH less than 7 is acidic, and a solution with a pH greater than 7 is basic. Clean, or pure rain has a pH of 5.6, rain with a pH lower than this is acid rain.



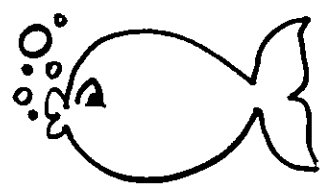
Throughout North America, thousands of tonnes of sulphur dioxide and nitrogen oxide, the raw ingredients of acid rain, spew forth daily from a variety of sources - the smokestacks of coal fired generating stations, ore smelters, steel mills and chemical factories, and from the exhaust of buses, cars, and trucks.

Sulphur dioxide and nitrogen oxide can travel long distances in the atmosphere, so that acid rain may fall hundreds of kilometres away from the pollution source. Because acid rain cartwheels all around the world, countries must work together to solve the problem.

WHAT ACID RAIN DOES

1. ### Aquatic Effects

An aquatic ecosystem is negatively affected if the pH of the water is below 6. Few fish can reproduce if the lake is below pH 5. If the pH of the water drops below pH 4.5 most fish and other organisms will die. Fish are threatened not only by increased acidity of their environment, but also by toxic metals such as lead, mercury and aluminum that filter into the water from the surrounding rocks and soils. The metals dissolve more easily in acidic water. The metals build up in fish, and if the fish are eaten by birds or humans, the poisons move up the food chain.



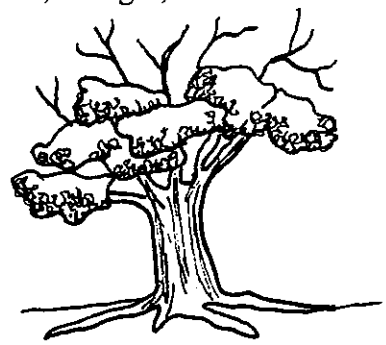
2. Effects on Land

Acid rain also affects the pH of soil and therefore the health of any plant that grows. The more acidic the soil, the easier it is for nutrients necessary for growth to be leached out of the soil.

While damage occurs in the soil below, plants are also affected by the acid rain that lands on their leaves and bark. As plants become more damaged and weakened, they lose their resistance to natural enemies such as insects, fungus growths, drought, frost and wind.

<u>Signs of Tree Damage From Acid Rain</u>:

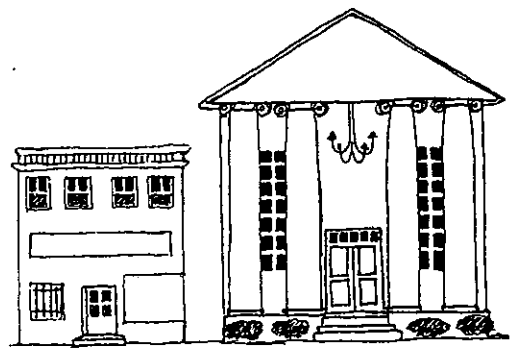
- Branches at the top of the tree are bare
- Leaves are sparse on the branches
- Remaining leaves are discoloured
- Leaves begin changing their colours earlier than autumn



Farmers are well aware of the need to maintain the proper pH on their croplands. For years they have been managing soil acidity by liming their land when necessary. The use of fertilizers can help protect farm fields from acid rain's ability to leach away essential plant nutrients. But, acid rain may cause direct damage to crops. Scabs and spots on the leafy parts may make them less appealing to shoppers. Crop yields may be lowered through the leaching of nutrients from the foliage.

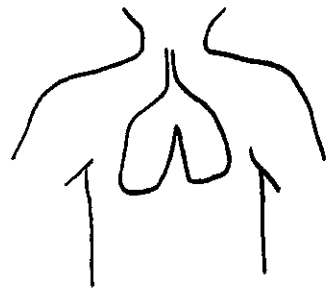
3. Effects on Materials

As you can see from the effect of a dripping tap on an enamelled sink, water corrodes material over time. With acid rain, the natural corrosion speeds up. Metals, plastics, bricks, stone, and concrete are all affected. Acid rain literally dissolves away the surfaces of buildings and monuments and corrodes cars. In Ontario cemeteries, the historic marble and limestone graves of our ancestors are being worn down bit by bit with every acid storm.



4. Human Health Effects

Acid rain has been taking its toll on human health as well. Small acidic particles carried in acid rain can enter the breathing passages and end up deposited deep in the lungs. The possible result: bronchitis, emphysema and other respiratory illness.



WHAT YOU CAN DO AT HOME TO HELP

Making better use of our environmental resources could brighten the acid rain picture considerably.

- Energy efficient appliances, durable products and well-insulated buildings reduce our overall consumption of electricity and fuels at home and at the generating station.
- Driving a smaller, more fuel-efficient car and making more use of the public transportation system can reduce nitrogen oxides and other pollutants in the air. Better still, walk or ride your bike!
- Use only organic pesticides and fertilizers in your garden and on your lawn.

ENVIRONMENTAL EXTRA !!

ACID SHOCK!

What's the most dangerous season for many lakes? Springtime! This is because hibernating among the snowflakes waiting for springtime is a potent dose of sulphuric acid. When it is released into lakes and rivers in the spring melt, it packs the knockout punch of a heavyweight prizefighter. Sometimes the acid level of the lake can become 1,000 times greater in just a couple of weeks. This sudden "acid shock" kills insects, frogs, and fish.

BEFORE THE NEXT MEETING

Bring as many samples of toilet paper as you can to the next meeting. Be sure to make note of the brand name. If possible, get a sample from a public place like a school or restaurant.

Waste Not, Want Not

ROLL CALL

Create a litter slogan. Here are a few examples.

Don't Be A Quitter
Help Stop Litter!

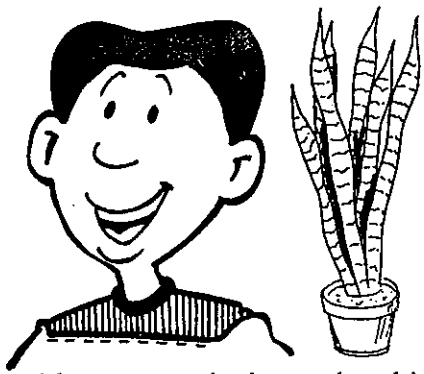
Look Around
Clean Up The Ground!

Don't Be Mean
Keep Our Town Clean!

****

WHAT A WASTE!

All living things make waste. If you have ever had a pet, you know that not only did you have to feed it, but you also had to clean up after it.

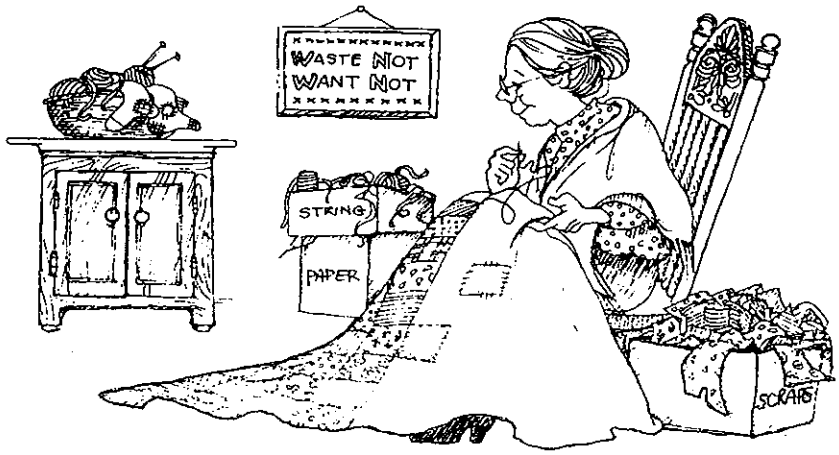


What's interesting is that the wastes of one organism can be useful for another organism. For example, we breathe out carbon dioxide, as a waste from our lungs. Plants need carbon dioxide to live. Plants breathe out oxygen through their leaves because they don't need it. We need oxygen to stay alive!

Dead leaves that fall on the forest floor decay. Bacteria and molds grow on the leaves breaking them down, and these materials are food for worms, insects and new trees.

The valuable things on our planet like soil, water and air aren't endless and every living thing has to share them. Nature keeps recycling things, using them over and over again. Unfortunately, humans aren't as good at dealing with the wastes we make.

People make things out of stone, brick, glass, plastic and metals. These things don't recycle naturally like things that were once alive. Most people live in cities and towns, and therefore a lot of waste is produced in a small area.



Illust. - Looking at the Environment. Toronto: Stoddart Publishing Co. Ltd.

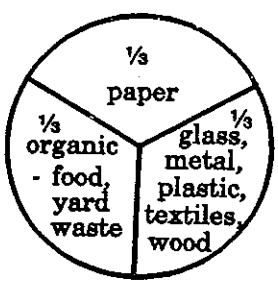
In the past, people didn't throw as much away; they were taught to use everything over and over again. Your grandparents might say things like: "Waste not, want not", "Make it do, wear it out, use it up", "Buy less and repair more", "Don't buy something new when the old will do". They grew up during the Depression, when things were hard to get and they had to make do with what they had. Thriftiness was a necessity. Most clothing was made of natural fibres rather than today's synthetics. "Elbow grease" (muscle power) was the main ingredient in home cleaning. Today, powerful chemicals do the job. The changes since our grandparents' days reflect a higher standard of living, but we use more of almost everything. When we are finished using something we throw it out. But where does it go?

FULL OF GARBAGE

Did you know..?

- The average Canadian produces 1 to 2 kilograms of garbage at home every day!
- Ontario residents throw away 7 million tonnes of garbage each year.
- Packaging accounts for 1/3 by weight and 1/2 by volume of household garbage.
- 20% of the food we buy ends up in the garbage.
- Households are the largest single group of hazardous waste producers in Canada.
- The useful life of a fast food package is often minutes, but it may persist in the environment for years.

Household Garbage



TOXIC
Materials that are poisonous to humans and animals, even in small quantities.
Eg. pesticides, cleaning fluids

All products that have these symbols on them are harmful to the air, water, soil, and all living things, including us! Some household wastes are hazardous and should not be thrown out with your garbage.

Hazardous wastes must be handled in ways to prevent them from building up in our environment. For example, when a hazardous chemical is dumped on the ground, it could get into the groundwater. Groundwater doesn't change much. If we poison the water, the poison is there for thousands of years and we have no way to clean it out. We can manage hazardous wastes by reducing the amount we produce, by recycling wastes, by treating them to make them non-hazardous and, as a last resort, by placing them in specially sealed landfills.

KEY TO HAZARDOUS WASTE MANAGEMENT METHODS

DRAIN
In areas serviced with wastewater treatment plants, waste can be flushed down drain with plenty of water. If you have a septic tank, read product labels to make sure no damage will result.

TRASH
Can be safely disposed at a sanitary landfill site.

HOUSEHOLD HAZARDOUS WASTE DEPOT
Product and product container can be brought to a certified household hazardous waste depot in your community.

RECYCLE
Opportunities exist to reuse or recycle the waste.

HOUSEHOLD HAZARDOUS WASTES

Many products that we use in our homes are hazardous. The list includes things such as furniture polish, moth balls, paint thinners, drain cleaners, oven cleaners, toilet bowl cleaner, batteries, bug sprays, flea collars, shoe polish, art supplies, and weed killers. We have grown used to the convenience of these products but we need to change our habits to protect our environment.

We are running out of places to put our garbage. For years we simply put our bags and cans out at the curb, to be picked up and taken away. Now, with our dumps rapidly filling up we are discovering that - surprise, surprise - nobody wants our garbage! If New York and Toronto can run out of garbage dump spaces, then so can Kitchener, Peterborough or Ottawa. "It'll never happen here", you think. That's what everyone thought ten years ago.

OUT OF SIGHT, OUT OF MIND

Have you ever wondered where your garbage goes? The garbage truck comes along, picks it up and it's gone. Or is it? Where does it go?

Most of the waste ends up in a garbage dump or landfill site, a small portion is burned at very high temperatures. Burning results in ashes and gases. When garbage is dumped in landfill sites, it is being stored and reduced by compaction, decomposition, shredding or baling. One of the problems with some landfill sites is that wastes find their way into the groundwater, or they are washed into streams, rivers and lakes. Landfill sites are smelly and unattractive. It is not surprising that most people don't want to live near a landfill site. Would you like to have one next door to your house?

HAZARDOUS WASTES

A substance may be hazardous because of what it is made of, because of its quantity, and because of its resistance to break down in the environment. Hazardous wastes may be explosive, flammable, corrosive, radioactive or toxic wastes. Sometimes the danger from hazardous wastes can be seen immediately, sometimes we don't notice it for a very long time.

There are four major sources of hazardous waste:

- by-products of industrial manufacturing,
- consumer products that are discarded,
- accidental spills from storage sites or transportation, and
- discarded products from laboratories and institutions like hospitals.

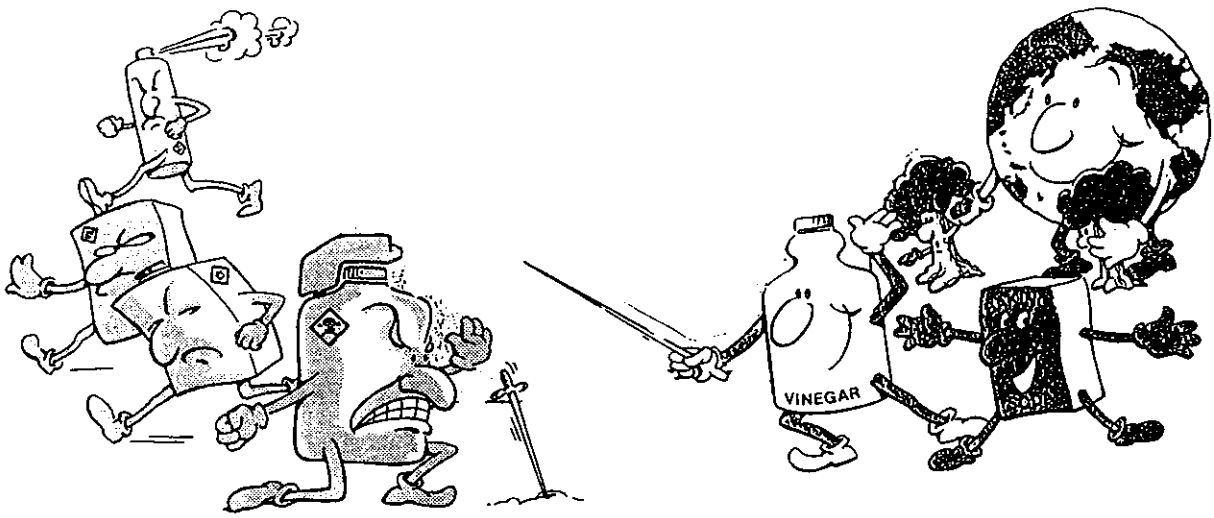
Hazardous wastes require special disposal to reduce the hazard.

KEY TO HAZARDOUS WASTES

CORROSIVE
Substances that eat and wear away at many materials.
Eg. battery acid, drain cleaner

FLAMMABLE
Liquids that can ignite.
Eg. gasoline, BBQ starter

REACTIVE
Materials that can create an explosion or produce deadly vapours.
Eg. bleach, pool chemicals



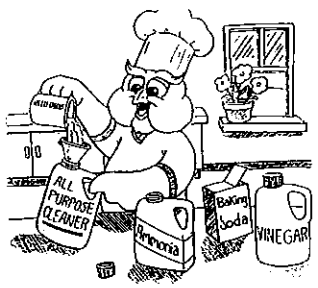
Every time you dump some cleaning product down the toilet or drain, it goes into our sewage system, and back into our lakes, rivers and streams from which we take our drinking water. How does your tap water taste now?

WHAT YOU CAN DO AT HOME TO HELP

REDUCE
REUSE
RECOVER
RECYCLE

1. Use an alternative household cleaner. Home recipes for cleaners are easy to make, easy to use and easier on the environment.

All Purpose Cleaner:	125 mL ammonia 125 mL white vinegar 125 mL baking soda 4.5 L of water
Furniture Polish:	50 mL lemon juice 125 mL olive or mineral oil
Window Cleaner:	25 mL vinegar 1 litre water (use an empty spray bottle)



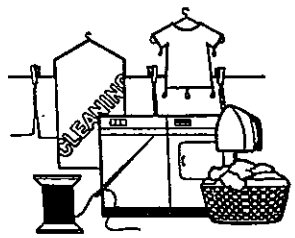
Illust. - North York Environment Committee

2. Use a natural fertilizer on your garden. Chemical spraying of your lawn not only kills pesky bugs and insects, but also wipes out their natural predators. Try homemade alternatives.

   Garlic Spray:
   - 3 cloves garlic
   - 5 mL very hot pepper (cayenne)
   - 1 litre water

   Steep for 10 minutes. Strain through a stocking. Dilute in water 1:4 ratio before spraying on plants. Use for chewing and sucking insects, mildew, leaf spot, rust and spore diseases.

3. Wash your clothes only when they need it. Use laundry soap instead of detergent. Most detergents break down very slowly if at all. Phosphates, which are in most detergents, fertilize the natural algae in our lakes, causing them to grow at an explosive rate. The algae use up the oxygen in the water and choke out aquatic life. As bleach breaks down, many toxic and cancer causing substances are produced.



4. In the store, read the label before you buy a product. Make sure it will do what you want or, if you can, switch to a product that will not produce hazardous waste. Don't buy more than you need. That way you won't need to dispose of the leftovers.

When shopping, look for the EcoLogo. Each bird represents a part of society - consumer, industry, and government. Together the birds form a maple leaf. The logo identifies products that are the least harmful to the environment.

5. Don't pour household hazardous wastes such as paint and varnish down the drain.

6. Recycle hazardous wastes. Used motor oil turned into a collection centre can be burned as fuel or re-refined for use as a lubricant. When a car battery is traded in, the lead in the battery can be recovered and used again.

7. Some communities have waste depots where hazardous wastes can be safely disposed. Others hold special Hazardous Waste Days, when householders can take their hazardous wastes to a central location to be sorted and transported to a special facility. What does your community do?

THE REAL DIRT - COMPOSTING

Composting is the name given to the process of putting organic (yard and food) waste materials into a place so that they will decompose.

> If everybody practised composting their kitchen and garden waste, we could reduce our world wide garbage problem by billions of tonnes per year.

By buying or constructing a composter we can put these wastes to good use. Gardeners discovered that if they placed organic wastes into the composter, a little while later they could dig out compost or soil and return it to the land.

ENVIRONMENTAL EXTRA!!

GARBAGE DAY

We ought to take the garbage out
Before it takes us first.
It's sat around for fourteen days
And this one's been the worst!

A house where people live
Is not the ideal place
For pits, and peels, and scraps from meals ...
But why not outer space?

That's it! Let's build a rocket ship
And fill it to the nose
With dirty bones and sausage skins
And last night's sloppy joes.

We'll send our garbage to the Moon!
Now don't you think that's clever?
On second thought, some trash might spill
And orbit the Earth forever.

We'll need to hatch another plan,
And do it right away,
The smell of week-old sauerkraut
Has made the goldfish grey.

We'll have to take the garbage out
Today is garbage day.
Oof! These bags are heavy!
But it is the only way.

We should have done it sooner
Now listen to my plan:
Next time, let's make less garbage
And recycle if we can.

Author Unknown

BEFORE THE NEXT MEETING

1. Which Weighs More - You or a Year's Worth of Garbage?

   - Your weight is _____ kg
   - Stand on a scale with a bag of garbage from your house.
   - How much do you now weigh? _____ kg
   - Weight of a bag of garbage. _____ kg
   - How many bags of garbage do you throw out each week? _____ bags
   - Each week you throw away _____ kg of garbage.
   - Every year you throw away _____ kg of garbage.

2. For the session Here Today, Gone Tomorrow, you will be visiting a landfill site. Review the questions below before going on the trip.

FIELD TRIP TO LANDFILL SITE

General Questions

1. Where is the landfill site located?
2. How was the site chosen?
3. How long has the landfill site been there?
4. What is the capacity of the site?
5. Is there a plan to replace the present site?
6. When will this occur?
7. What are the plans for the future use of the present site?

Technical Questions

1. What types of wastes are accepted? Not accepted?
2. What testing is done to determine the type of wastes being deposited?
3. What monitoring is done (air, water, groundwater) in and around the site?

On Site Observations

1. What type of land uses surround the landfill site?
2. What is the shape of the land of the site? (i.e. Are there hills or valleys?)
3. Is there water near the site? Describe it.
4. Are there special ecological concerns in the area?
5. What are the transportation routes like near the site?
6. What are your general feelings about the site?
7. Is the waste material being compacted and buried? How is this done?
8. What are your general impressions of the site?
9. Would you like to live next door to this site?
10. Ask the landfill site operator what types of waste s/he sees being delivered. How could the waste be used differently?
11. What wastes do you think should be coming to this site? What shouldn't? What else could be done with it?

Here Today, Gone Tomorrow

ROLL CALL

Look around your neighbourhood. Tell of one change that has taken place in the last 5 or 10 years.

****

LAND USE PLANNING

Illust. - Pollution Probe Foundation

Have you taken a good look around lately and noticed anything different? Perhaps a group of trees are missing or the field you played in is now a mud bowl with a bunch of orange wooden stakes in the ground. Or what about the roadside stand where you and your family used to buy fresh corn and vegetables? Is it still there, or has it been replaced by houses? These are all examples of land use and land use planning. Are you happy with the changes? Were they the right choices?

Land use planning plays an important role in the future of our world. Presently a lot of our land is treated as something that can be bought and sold. The number of shopping centres, plazas, manufacturing plants and residential areas are on the increase. Unfortunately, some of the land being used for these projects is being wasted when it's paved over.

In Ontario, the "Planning Reform Act" is looking at new rules for environmental assessment before any development can take place.

We need to keep some of the land to support plant and animal life, and supply us with food and energy. This is where wise land use planning comes in. Every day more agricultural land, forests and wilderness are lost to civilisation. Land is a limited resource - we cannot manufacture or grow more.

A BIRD'S EYE VIEW

When we look at the earth from outer space we see that 72% of the surface is covered by water and ice. That leaves only 28% to be divided between forests, deserts, tundra, urbanization and agricultural land. Urban (city or town) land represents less than 1% of the earth's used land surface, however it creates a lot of demand on the rest of the land. Urban areas must be supported by a number of farmlands, pastures, forests, recreational areas, and marine fisheries. All of these areas combined are the life support system for a city.

When we are deciding what to use land for, we are faced with two problems. The first problem is figuring out how to preserve a balance of forests, wilderness, croplands, pastures and other ecosystems to support an increasing urban population. The other problem is how to organize and plan the use of land for urban and recreational purposes.

We can choose to mange the land in three ways.

1. **Economic** or **"use it"** - where we use the land in such a way that the greatest amount of money will be gained from it.

2. **Conservationist** or **"preserve it"** - involves using the land to maintain beauty and an ecological balance.

3. **Economic-Ecological** - where each use of the land should be studied for its ecological value in addition to economic value. In other words a compromise between preservation of the land and the economic use is to be made.

Without wise land use planning we will eventually lose lands that feed us and lands that help to regulate our environment and the recreation areas that we visit.

AGRICULTURE: No Land, No Food

Urban growth and some farming practices are threatening the land that is used to supply us with food. In Canada, we have very little Class 1 land - only 0.5%. Class 1 land is agricultural land of the highest quality for crop production. Class seven land, the lowest class, has no agricultural capability.

Of the land available in Canada only 11% is suited for agriculture and 5% is suitable for crop production.

To give you an idea of how much high quality land has been used for urban growth, take a look from the top of the CN tower in Toronto. What you are looking at is one third of Canada's Class 1 land, but all you see are buildings and highways. This is why land use planning is important - to prevent loss of valuable land.

In Ontario 51% of the Class 1 land is in southern Ontario, which is where most of the people live. So it is hard to plan the use of the land effectively.

Land use management is an important part of land use planning. This is also true of farmland. Over the years a lot of topsoil has been lost. At one time the average field had 20 to 25 cm of topsoil; now it is about 10 to 15 cm. Erosion is the most widespread threat to agriculture in Canada.

In by-gone years, most farms had some livestock, which meant there were hay or grass crops rotated with row crops (ie. corn, soybeans). This meant that cultivation did not occur on every field every year. As well, hay crops give the soil 100% cover and have a root structure that helps hold the soil in place.

Today many farmers cultivate every field, every year, which can increase soil erosion. Going back to crop rotations using grasses and cover crops along with reduced tillage techniques will reduce the risk of soil erosion.

Some modern farming techniques need to have chemical fertilizers added to the soil to increase the nutrient level. If too much fertilizer is added, it can run off with the soil in surface erosion. It can also collect in the groundwater. It can then add to the pollution problem in our rivers and lakes.

THE WILDERNESS: No Place to Go

Throughout the years we've been overcutting forests and destroying ecosystems. Like farmland, the wilderness is being pressured by the city. A good example of wilderness being lost is wetlands. Unfortunately, many people consider wetlands wasted space, so over 75% of the original wetlands in Ontario have been lost.

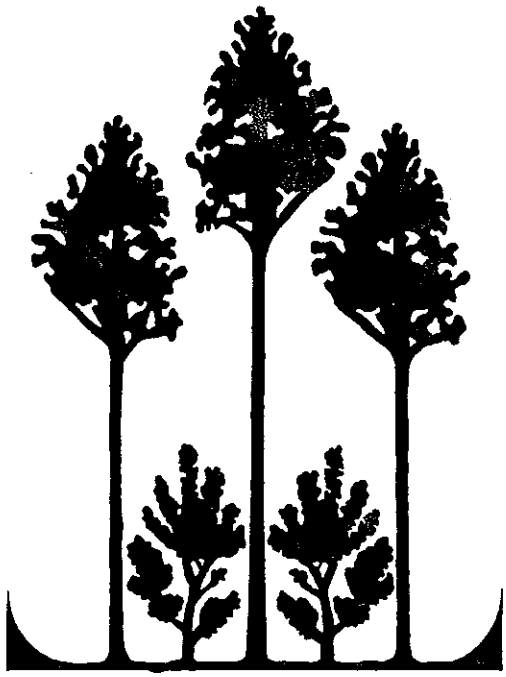
When wetlands are drained to make more room for urban development, we are destroying valuable ecosystems. We are also threatening many species of mammals, birds, reptiles and amphibians, fish and plants.

Illust. - Looking at the Environment. Toronto: Stoddart Publishing Co. Ltd.

FORESTS: Woodland to Wasteland

In Ontario, provincial parks protect 6.5% of the land and water. Logging or forest harvesting can have severe impact on woodlands. Forests are cut down to make room for residential areas, farmland, and industries. The pulp and paper industry also processes a great quantity of wood. With proper management forests can be used to accommodate a variety of interests.

Clear cutting, a forest harvesting technique, is the practice of cutting down everything in an area. From this, only the selected timber is removed and the rest is left to rot. Although this method is economically efficient, it probably damages the forest the most. Large clear-cut areas can lead to landslides, erosion, and reduction of the quality of the soil and loss of habitats and plant species. Clear-cut areas of 30 acres or less can in fact increase habitat at the edge of the clear-cut area.



selective cutting

Selective cutting is another method of forest harvesting. In selective cutting only specific trees are cut. The goal is to have woodlands that contain mature and medium sized trees with saplings and plenty of seedlings. This method ensures that there will always be trees to cut.

A third method of tree harvesting is known as the **shelterwood system**. This is done over a period of 2 or more years. In the first stage, diseased or poorly growing trees are removed. As a result, the new saplings will be from the seeds of healthy trees. In the second stage, some of the parent trees are removed, this allows new seedlings to establish themselves in the gaps. The final stage consists of removing the mature trees when the younger trees are healthy and growing quickly.

Every year forest companies, such as the logging and the pulp and paper industry cut down forests the size of Prince Edward. Improper land use management has resulted in these companies replacing only about one-fifth of the trees they have harvested. As a result, one eighth of Canada's productive forest area has deteriorated to the point where it's going to take more than 80 years before the forest can be harvested again for good economic value.

Under the "Crown Forest Sustainability Act," companies must replant the trees they remove in Ontario. Staff of the Ministry of Natural Resources can provide more information.

RESIDENTIAL: Down Goes the Tree, Up Goes the Home

In urban and rural areas across Ontario, developers are clear cutting forests to make room for residential areas.

There are three basic ways to prepare the land for development.

1. Go in and level everything in sight. This is the easiest and quickest way. It also makes it easier to move construction equipment around.

2. Clear the area but follow the natural contours (the curves of the hills and slopes) of the land. This provides a more pleasing view of the land.

3. Combine contour and ecological planning. Selective areas are cleared of trees and brush, the contours of the land are left in, and the homes are built around the remaining woodlot. This method helps to reduce the impact on any existing ecosystems in the area while providing space for urbanization. Often these are considered "prime lots" and are more expensive to buy.

Think Globally, Act Locally

ROLL CALL

What is something you will do locally to help our environment?

****

NIMBI (NOW I MUST BECOME INVOLVED)

There are over 25 million people in Canada and according to a recent poll, 94% are either somewhat or very concerned about the environment. Given this agreement, why does environmental abuse continue? One reason is that it is easy to talk, but it is more difficult to take action. What holds us back? Here are some excuses.

- "Environmental problems don't affect me."
  If you breathe they do!

- "I'm not the problem, it's the industries."
  We're all part of the problem, and we can all be part of the solution.

- "I'm set in my ways, and it would be too difficult to change my habits."
  Our present comfort is short term. Either we change our habits now, voluntarily or we will be forced to do so when our resources of water, energy and productive soil are reduced.

- "It costs more money to use those environment friendly products."
  Not acting and not making changes may cost us the earth!

- "The problems have become too big. I can't possibly do anything."
  Why not? A million people are very powerful and a group of a million people is just a bunch of individuals.

- "It's the government's responsibility."
  Individuals are responsible for their own actions. Unless we want governments to legislate everything - from how much water we can use to the amount of food we are allowed - we have to be responsible for our choices.

- "What is the point in making changes when other people don't?"
  What if everyone had this attitude?

SMALL ACTIONS DO COUNT

- In Ontario alone (with a population of just over nine million) recycling all of our newspapers would save 16,600 trees every weekday!
- If all Canadians recycled their food and soft drink cans, they would save enough steel in just one year to make 145,000 cars!
- If everyone installed water saving toilets and showerheads, we could reduce domestic water consumption by up to 75%. We might never have to build another water treatment facility!

Illust. - North York Environment Committee

Will you live in a world of ...
Scummy Streams
or Sparkling Waters?
Eroded Land
or Lush, Fruitful Fields?
Smog-bound Skies
or Pure, Unpolluted Air?
You must decide.

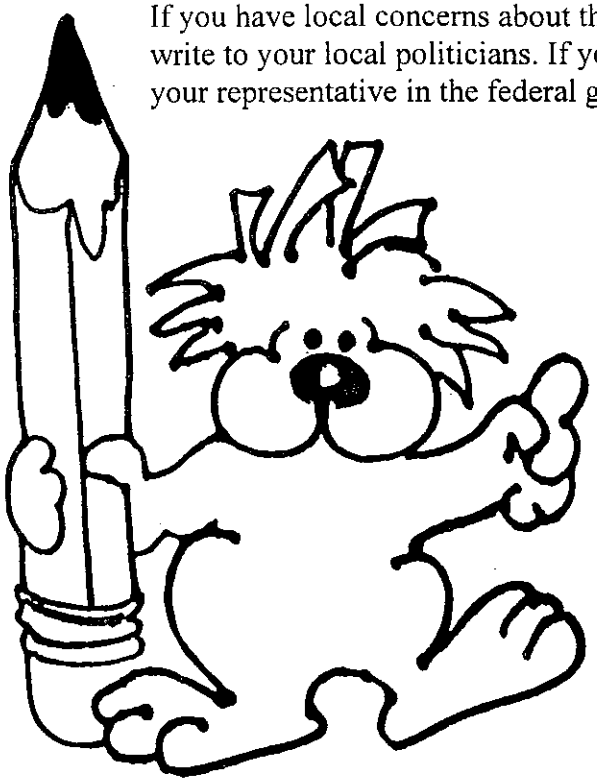
Conservation is a Choice ...
not a Chance.
You must choose
to get involved,
To take part in shaping
the world you live in.

Don't leave your world to chance.
get involved.
You can make the difference.

Public opinion and concerns can direct company policy. For example, a large manufacturer of egg cartons decided to switch from polystyrene foam to paper cartons at its Ontario plant because of consumer complaints.

One way to express your concern is to write letters. If everyone wrote one letter, our politicians and businesses and industries would be swamped with demands for action - and we'd get it! If you have a concern about a product, look for the manufacturer's address on the product and write a letter. Here is an example.

If you have local concerns about things such as landfill sites, water and air quality or land use, write to your local politicians. If you want to address national or international concerns, write to your representative in the federal government. Here is a sample letter to a local politician.



Dear (person's name):

I am writing to you to express my concern over our city's policy of allowing recyclable materials to go to our landfill site. During the past few years municipalities everywhere have started recycling newspapers, cans, bottles, corrugated cardboard and plastics. Meanwhile, our community continues to let those reusable natural resources pile up in the city dump and further destroy our beautiful countryside.

I urge you to begin action to get a recycling program started in our community.

I await your reply.

There are over 1,800 environmental groups in Canada, with many active workers and supporters. They are directly and indirectly shaping the future of our country - in fact of our planet. Environmental groups are involved in educating people about environmental issues and solutions; lobbying for change; and demonstrating by action that we can make a difference.

"Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed it's the only thing that ever has."

- Margaret Mead

IT'S YOUR TURN

If you love this planet, now is the time to prove it. Here are 20 things you and your family can do right now to help save our environment.

1 Keep plants in your house. Although by no means a cure-all, some common houseplants can be used to absorb indoor air pollutants.

2 If there is a baby in your family, encourage your parents to use cloth diapers. Then offer to help wash them!

3 Use washable and reusable cloth napkins at the table instead of paper serviettes. Use a rag instead of paper towels. Take your lunch in a reusable cloth bag and use reusable containers instead of plastic wrap or foil.

4 Give a "Green" gift. Instead of the latest plastic gimmick, consider a gift that will benefit the planet. Examples:

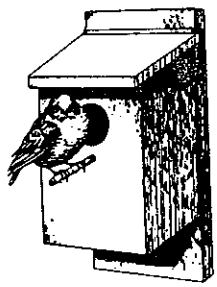
- a hot water bottle so the thermostat can be turned down
- a water-saving showerhead saves 50% to 75% of the water
- a cloth or net shopping bag
- a travelling coffee mug

- for the person who has everything, buy an acre of rainforest for $25, World Wildlife Fund (416-923-8173).

Use your imagination for the gift-wrap. Create colourful wrappings from comics and wallpaper scraps. Wrap a present within a present: home-made cookies in a tin; a piece of jewellery in a wooden box; gloves wrapped in a scarf; a gift in a reusable cloth bag.

5 Before throwing letter-sized paper or computer paper in the garbage, check to see if the backs of sheets are blank. If so, use as notepaper beside the phone, or give them to a child to draw on.

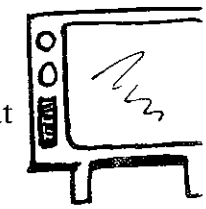
6 Put up a birdhouse. Purple martins are almost totally dependent on people for their dwelling places, and are an excellent control of mosquitoes and other small insects. Remember to keep feeding the birds since they become dependent on you for food.



7 Don't use aerosol cans. Pump spray containers work just as well and don't hurt the atmosphere.

8 Don't buy canned drinks connected with plastic six-pack rings. Birds and animals become entangled in the rings and are strangled to death.

9 Eat an orange to avoid using pesticides and insecticides. Insects don't like the smell your skin gives off when you eat citrus fruits. To cut down on the need for pesticides, plant marigolds in tomato beds and leave saucers of beer for garden slugs.



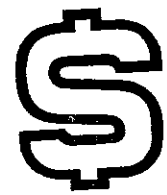
10 Don't waste energy. Turn off the TV when nobody is watching, turn off the lights when you leave a room, and operate an automatic clothes dryer with a full load but don't over dry.

11 Use a permanent razor for shaving. Throwaway razors create mountains of plastic garbage and require more resources to make.

12 Don't litter. Make a habit of picking up litter left by others. Organize a neighbourhood litter clean up day.

13 For foods that don't spoil quickly, buy the largest size you can afford. There is less packaging for the amount of food you get. Take reusable containers to a bulk food store for even less packaging.

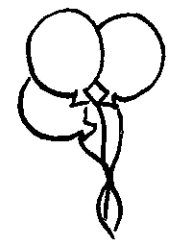
14 Your family probably makes some donations to charities and other groups every year. Is your family supporting a group that works to clean up the environment?



15 Ask your teachers to see whether your school can be a recycling depot for paper, glass, and metal.

16 Don't throw away out grown or out of style clothes. Sell the clothes to a second hand store or give them to a charity.

17 Walk or ride a bike instead of using a car. It is better for you, saves energy and cuts down on pollution.



18 Choose regular balloons for your next party, not helium. If released into the sky, many are carried to where animals, birds and fish eat them, mistaking them for food.

19 Use a garbage can instead of plastic garbage bags. Why spend money on something just so you can throw it away?

20 Talk to your parents, other relatives and friends about the environment and how we can protect it.

GLOSSARY

Acid — A sour substance, with a pH below 7.

Acid Rain — Includes rain, snow, fog, sleet, hail, dew, dust and particles which result when sulphur dioxide and nitrogen oxide mix with moisture, sunlight and oxygen to create sulphuric acid and nitric acid which fall to earth as acid rain.

Aesthetic — Relating to or dealing with the beautiful. An aesthetic value relates to the value placed on beauty.

Algae — The simplest of all green plant forms, having no root, stem or leaf. Algae are found in water or damp areas. Algae range in size from microscopic single cells to branching forms one hundred feet or more in length.

Atmosphere — All the air surrounding the Earth.

Biodegradable — Materials that can be broken down naturally by bacteria and other microorganisms in the soil. Most organic wastes and paper are biodegradable.

Biologist — A person who studies living organisms and their relationship to one another.

Bog — A form of wetland, usually developing in a relatively deep lake with poor drainage. It is characterised by extensive peat deposits, floating sedge or sphagnum mats, heath shrubs such as cranberry, and the presence of coniferous trees such as black spruce and cedars.

Carnivore — A meat eating animal.

Clear-cutting — A method of harvesting trees, whereby all of the vegetation in a specific area is cut.

Community — All the plants and animals in a particular habitat that are bound together by food chains and other interrelationships.

Composting — Organic wastes are broken down naturally by bacteria and fungi in the presence of oxygen. They become a nutrient rich product called humus, which can be used as a soil conditioner.

Condensation — Changing from gas to liquid, as steam to water.

Conservation — The use of natural resources in a way that guarantees their continuing availability to future generations; the wise and intelligent use of natural resources.

Consumer	The first part of an ecosystem is the non-living substance, the second part consists of those organisms which are called "producers", or food makers. Part three of this system is called the "consumer" because it uses the producer for its food; it may in turn be used as food by a secondary consumer. A rabbit is a primary consumer. A fox would be a secondary consumer.
Contaminants	Materials that pollute by contact.
Decomposer	Those organisms (bacteria, fungi) which convert dead organic materials into inorganic materials; a plant or animal that feeds on dead materials and causes its mechanical or chemical breakdown.
Decomposition	The process of decaying and disintegrating.
Ecology	The study of the relation of organisms or groups of organisms to their environment, or the science of the interrelations between living organisms and their environment.
Ecologist	A scientist who studies the interrelations of living things to one another and their environment.
Ecosystem	A natural unit that includes living and nonliving parts interacting to produce a stable system.
Emission	Pollutant that is discharged or released from a polluting source.
Environment	Everything in our surroundings.
Eutrophication	The overnourishment of aquatic ecosystems with plant nutrients which causes plant life to grow rapidly until it crowds out species and uses up the oxygen supply.
Extinction	The condition of having been removed from existence. An animal or plant facing extinction is one in danger of vanishing from our world.
Fen	A wetland with a steady seepage of water through its rich organic soils. Grasses, reeds and sedges grow abundantly.
Food Chain	A series of plants and animals connected by feeding relationships.
Food Web	An interconnecting pattern of food chains.
Greenhouse Effect	The warming of the earth's climate. It is caused when pollutants are released into the atmosphere and trap the sun's heat.

Groundwater	Water that fills the cracks and spaces in rocks and sediments beneath the surface of the earth.
Habitat	The arrangement of food, water, shelter or cover, and space suitable to animals needs; and animals "home".
Hazardous Waste	Those wastes which due to their nature or quantity could be harmful to human health or the environment and which require special disposal techniques to eliminate or reduce the hazard.
Herbivore	A plant eating animal.
Incineration	The controlled process by which wastes are burned and changed into gases.
Landfill	A land waste disposal site located without regard to possible pollution of groundwater and surface water due to runoff and leaching. Waste is covered intermittently with a layer of earth to reduce pollution, scavenger, and aesthetic problems.
Leach	To filter down through soil. Dissolved or suspended materials are flushed from the soil.
Management	The control or directing of habitat and organisms within the habitat, usually to maximize human benefits.
Marsh	A treeless form of wetland often located near a river or lake.
Microorganism	The Earth's smallest living organism that can only be seen through a microscope.
Non-Renewable Resource	A part of nature that humans use, but that cannot replenish itself. (eg. Oil, gas, coal, gold, copper)
Nutrient	A substance needed for the growth and maintenance of an organism.
Omnivore	An animal which eats both plant and animal materials.
Organism	A living thing.
Ozone Layer	A layer of gaseous ozone in the upper atmosphere that protects life on earth. It filters out or reflects the sun's ultraviolet radiation, preventing most harmful rays from reaching the earth's surface.
Photosynthesis	The process in plants of changing chemicals into food by using energy from the sun.

Parasite	An organism that lives by taking benefit from another organism, usually doing harm to the organism from which it takes benefit.
Plankton	Tiny, often microscopic, floating plant and animal life; live in water.
Phytoplankton	Plant plankton.
Pollution	Harmful substances deposited in the air, water or land leading to a state of dirtiness, impurity, unhealthiness or hazard.
Precipitation	To become condensed in clouds as vapour and fall as rain, snow, etc.
Preservation	Protection of natural resources; tends to imply protection without use, contrasted with "conservation" which tends to imply use, but wise use.
Prey	Animals that are killed and eaten by other animals.
Producers	Green plants that are able to manufacture food from simple organic substances.
Renewable Resource	A part of nature that humans use that can replenish itself (eg. Trees, fish, wildlife)
Resource	A portion of an environment upon which people have placed or assigned value, or see as being available for use.
Sanitary Landfill	Land waste disposal site that is located to minimize water pollution from runoff and leaching. Waste is spread in thin layers, compacted and covered with a fresh layer of soil each day to control pest, aesthetic, air and water pollution problems.
Secured Landfill	A land site for the storage of hazardous solid and liquid wastes that are normally placed in containers then buried underground. The location has restricted access, is monitored and located to prevent wastes from leaching into ground water.
Sedge	A kind of plant similar to grass. Sedges usually have solid triangular stems in contrast to the round, hollow stems of grasses. The floating mats of bogs are often composed of sedges.
Selective-cutting	A method of harvesting trees whereby only selected trees are cut. The objective is to have woodland in which trees of all sizes are present and fairly evenly distributed.

Shelterwood A method of harvesting trees whereby diseased and older trees are removed first. When new young trees have established themselves the remaining older trees are harvested.

Species A population of individuals that are more or less alike.

Sphagnum A light green, water absorbent moss characteristic of bogs. Peat is comprised chiefly of the partly decayed remains of sphagnum moss plants.

Swamp A form of wetland characterised by moss and shrubs or trees such as maples. They have fair drainage. They may develop in shallow water basins, sluggish streams and flood plains.

Water Table The water table is underground water supply to which people dig when they need a well. The water table gets its supply from rain and snow. This moisture soaks into the soil until it reaches a layer of clay or rock that it can't soak through and it is held in storage.

Wetland Any water filled area.

Wildlife Any animal that is not tamed.

ISBN 0-7778-8920-X 4-H 400 00 DDE

CONSERVATION - Protecting Planet Earth

DIGGING DEEPER

Optional Information For Senior Members

Worlds Within A World

THE STRUCTURE OF ECOSYSTEMS

There are four basic components of all ecosystems.

1. **Producers** or food makers. All green plants are producers. They take in chemicals from the soil and air and with the help of energy from the sun transform them by photosynthesis into more complex energy rich chemicals that eventually make up the substance of the plant.

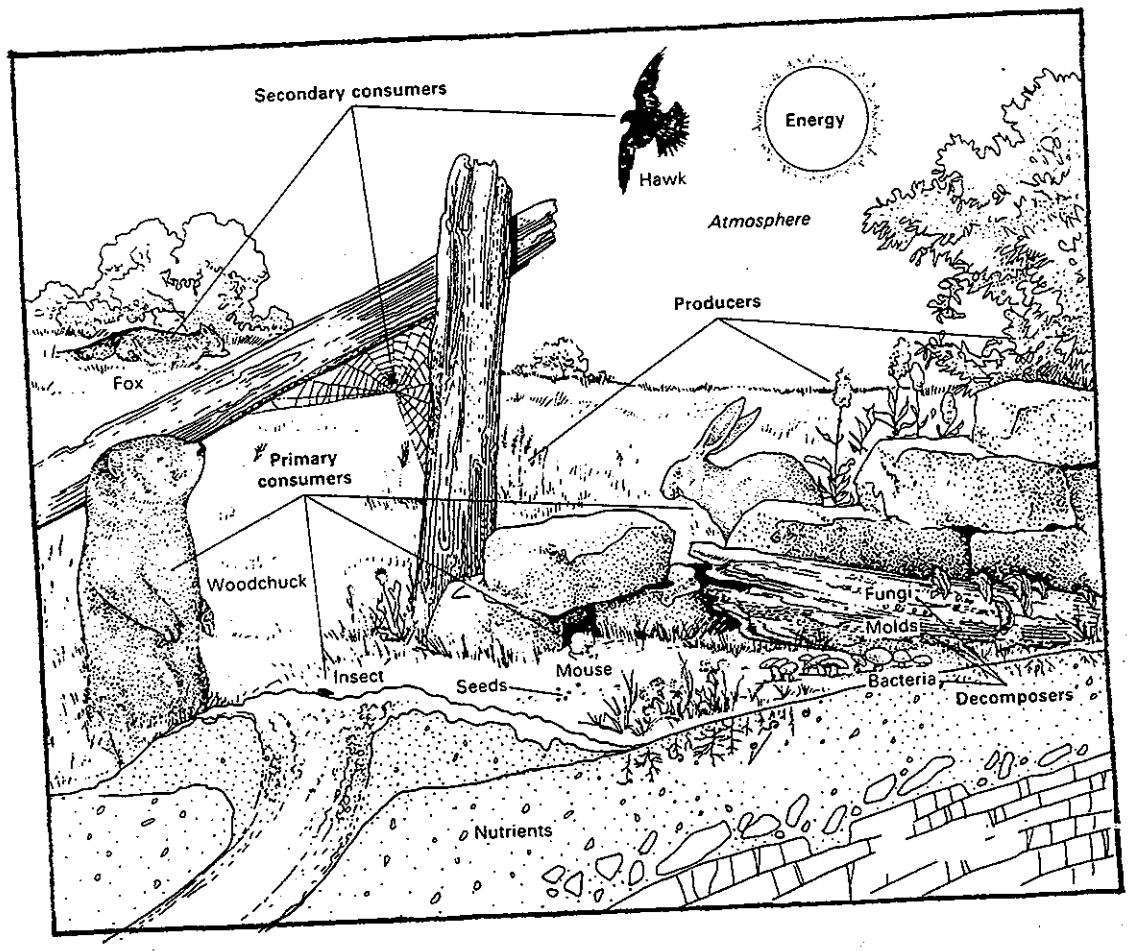
2. **Consumers** are eaters of plants and animals. When animals get their food directly from plants they are called primary consumers. Organisms that eat plant eaters are called secondary consumers. For example, when cattle graze they consume plants. Because cattle eat plants they are called primary consumers. Humans eat beef. They indirectly receive energy from the plants through the cattle. Humans, therefore are secondary consumers.

3. **Decomposers** are a special class of consumers that get food from decaying plants and animals. Sometimes animals and plants die for reasons other than being killed and eaten, and they rot and decompose. The chemicals and minerals from the carcasses or dead plants go to the decomposers. The enormous volume of leaves that forests give up every fall are used by the decomposers.

4. **Nonliving things** include all the materials in an ecosystem that are not a part of an animal or plant. These include water, gases such as oxygen, minerals such as iron, compounds such as acids, and a wide variety of other complex chemicals. The kinds and amounts of chemicals available in an ecosystem regulate the activities of the plants and thus the animals in that system, and may even determine which organisms can or cannot be part of that system.

A FIELD ECOSYSTEM

Each of the roles of producer, consumer, and decomposer is filled by a number of different organisms in a field ecosystem. The same fundamental relationships exist between these classes of organisms in every ecosystem.



Illust. - Environmental Science: Living Within the System of Nature. Newton: Allyn and Bacon Inc.

ENVIRONMENTAL EXTRA!

Within an ecosystem there are many examples of animals and plants that need each other to survive. When both living things are helped, the relationship is called "mutualism" or symbiosis. For example, some small fish can swim unharmed into the mouth of bigger fish and pick their teeth. The small fish get a meal, and the bigger fish get their mouths cleaned. Some of the most interesting pairs are made up of a plant and an animal. For example, a type of ant lives in the swollen thorns of acacia trees; the ants get food and shelter from the tree. What does the tree get out of the deal? If any plant eating animal touches the tree, the ants rush out and drive it away.

SOMETHING TO DO AT HOME (OPTIONAL BUT FUN!)

COMMUNITY IN A JAR

You can create a small plant environment in a bottle. A "terrarium" is a glass container full of plants that will grow together under the same conditions. You can set up an ecosystem - a community that will be able to survive on its own, with very little care from you!

What you need:

- a large clear glass bottle or jar with a lid (a wide mouthed jar is easier to work with)
- a few small green plants (you need plants that will grow slowly and stay
- small - such as bracken ferns, miniature ivy and mosses - many of these can be collected outdoors depending on the time of year)
- small animals such as insects or snails
- small stones or pebbles for drainage
- some charcoal (a few pieces of cooking charcoal crushed or buy charcoal used in terrariums or aquariums)
- potting soil
- newspaper
- funnel or stiff piece of paper

What to do:

1. Wash your bottle carefully with soap and water. Rinse it very well and let it dry.
2. Find a good place to work - either at a big table or on the floor. Cover the area with newspapers. Gather together all the materials needed.
3. Wash any dirt off your pebbles. Put pebbles in the bottom of your bottle. Your pebble layer should be about 2 - 3 cm (1 inch) deep.
4. Break up the charcoal into very small pieces. If you put the charcoal in a bag and break it up with a hammer, it won't make a mess.
5. Put a layer of charcoal into the bottle on top of the pebbles. The charcoal layer should be about 1.5 cm (2 inch) deep.
6. Put in a layer of potting soil next. You will need about 5 cm (2 inches) of soil. You may want to use a funnel or piece of paper shaped into a cone to keep the soil away from the container sides.
7. Plan your garden. On a piece of paper, draw a circle the same size as your jar. Arrange the plants on the paper. Don't crowd the plants - they need room to grow.
8. Make holes in the soil with one finger. Carefully place the plant in the hole, trying not to disturb the roots. Pack the soil down firmly around the base of each plant.
9. You might like to add small decorations to your garden - maybe a shell or a little piece of driftwood.

10. Water the plants well with a mist sprayer. Stop spraying when water begins to seep through into the layer of small stones or gravel in the bottom.
11. Add any insects or snails.
12. Put the lid on your jar. As long as the lid is on, your garden will need only a little water every month or so.
13. Water your garden lightly, only if the soil seems dry. If the glass fogs up with water, your garden has been watered too much. If this happens, take the lid off for a couple of days to let it dry out.
14. Put your garden where it gets light, but don't set it in direct sunlight. Enjoy your ecosystem!

Illust. - Looking at the Environment. Toronto: Stoddart Publishing Co. Ltd.

Splish, Splash

LAKE ERIE - WAS IT DEAD OR ALIVE

Lake Erie was a victim of eutrophication (U-tro-fi-kay-tion). Eutrophication is the overnourishment of aquatic ecosystems with plant nutrients. These nutrients cause plant life to grow rapidly until they crowd out species and use up the oxygen supply. Lake Erie is the shallowest of the Great Lakes and serves the greatest number of people and industrial centres. Approximately 14 million people dump their wastes and sewage (after various degrees of treatment) into Lake Erie. On the average day 5,000 cubic yards of sediment from agricultural lands are carried down the Detroit River to the lake.

Although Lake Erie was reportedly "dead" in the late 1960s, it was in fact too alive. This was due to overnourishment from phosphates, nitrates, organic matter and other by-products of civilization.

As a result of the nutrient rich water, plant life flourished - especially the blue-green algae. This explosion of blue-green algae decreased diversity in the aquatic ecosystem by crowding out other species and disrupting the complex food webs. Although these blooms added oxygen to the water their excessive growth could not be sustained and they started to die off. They fell to the bottom where they decayed. The decaying process consumes a lot of oxygen by the bacteria, and as a result the oxygen became depleted in the bottom layer of the lake. This in turn killed many of the more desirable fish such as trout and made room for the less desirable species i.e. perch, carp.

Pollution has changed the biological character of the lake. According to some people, eutrophication has caused accelerated ageing of the lake. Lakes do not last forever, they eventually start to fill in and give way to marshes. Through the overnourishment of Lake Erie by certain nutrients, it has become shallower with more organic matter and less oxygen.

In the 1970s, major cities such as Detroit and Windsor banned the use of phosphates in detergent to try to curb the nutrient loadings to Lake Erie. Restocking and fish management programs have been introduced to bring fish back. Agricultural runoff has been decreased but not enough to restore oxygen to most of the lake.

With continued support from government agencies, concerned citizens, and industrial leaders there is hope that Lake Erie will be a great, Great Lake again one day.

SOMETHING TO DO AT HOME (OPTIONAL BUT FUN!)

You can do your part to save water at home. Think of saving water this way: what if you had to carry home all the water you needed everyday - in jars on your head!

1. Take a five minute shower instead of a bath. Showers use less water than baths.

2. Turn off the water when brushing your teeth. That will save 4-8 litres of water each time you brush.

3. Encourage your family to use low phosphate or phosphate free cleaning products in clothes washers and dishwashers.

4. Encourage your family to switch to non-chlorine bleach. Chlorine is a powerful cleaner, but if it ends up in streams and rivers it can kill fish and other aquatic life.

5. Wash your hands in a basin of water instead of under running water.

6. Keep a bottle of water in the fridge. Have you ever let the tap run for a minute to get an ice cold drink? By keeping water in the fridge it's always cold and you don't have to waste water running the tap.

7. Learn the cold water hand wash. If every time you wash your hands, you turn on the hot water tap and wait for it to warm up you are wasting anywhere from one to eight litres.

8. Fill a large plastic yogurt or cottage cheese container with water and put on the lid. Then put it in the toilet tank. The water saved will equal the volume of the container used. "Toilet Damns" are also available that basically do the same thing.

9. Use a bucket instead of a hose to wash the car. A couple of gallons of water in a bucket will wash the car as well as a running hose.

10. Revive the rain barrel. Use a plastic garbage can or some other container to catch rainwater. It's great for watering plants or washing the car.

11. Only do the laundry when the washer can be filled. If you have to do laundry before you have a full load, set your water level control for a smaller load.

The Sky's The Limit

THE ACID TEST

Acid rain has been the subject of many books, magazine stories, newspaper articles, radio and television shows. For some people, the amount of information on this topic is overwhelming and confusing. Many environmental organizations believe people must be well informed about an issue before they will be concerned enough to take action. What do you think?

Questionnaires are useful tools for measuring public knowledge and opinions. To find out how much or how little the people in your community know about acid rain, design a questionnaire (or use the one below) and conduct a survey. Try to conduct at least 10 interviews with members of the community. Share your results with the rest of your club members.

Sample Questionnaire

1. Have you heard of the term acid rain? ___ yes ___ no

2. From what source/sources have you heard about acid rain?
___ magazine articles ___ books ___ radio ___ other
___ newspaper articles ___ school ___ television

3. What are the main ingredients of acid rain?
___ sulphur dioxide & nitrogen oxide ___ other ___ don't know

4. From what sources (eg. industries) do the raw ingredients of acid rain come from?
___ coal fired power plants (such as operated by Ontario Hydro)
___ non-ferrous smelter (such as Inco and Falconbridge)
___ don't know
___ motor vehicles
___ home heating
___ industrial boilers
___ nuclear generating stations

5. Which province in Canada is the largest source of acid-forming emissions?
___ Ontario ___ other

6. What are the effects of acid rain?
___ kills forests ___ kills lakes ___ damages buildings
___ damages crops ___ kills animals ___ harms human health

7. Who do you think is to blame for acid rain?

8. What do you think are the best solutions to acid rain?

SOMETHING TO DO AT HOME (OPTIONAL BUT FUN!!)

TEST FOR POLLUTED AIR

Rubber is destroyed by ozone and other gases in polluted air. You can find out how good the air is where you live.

YOU NEED:

- 6-8 rubber bands (all the same size and thickness)
- a wire coat hanger
- glass jar with lid
- magnifying glass

WHAT TO DO:

1. Bend the coat hanger so you can hold the rubber bands straight without stretching them.

2. Slide 3-4 rubber bands onto the hanger. Hang the hanger outside in a shady spot. (Sunlight changes rubber).

3. Put 3-4 rubber bands into the jar. Close the lid tightly and store in the house in a cupboard.

4. Wait a week. Check the rubber bands. Use a magnifying glass to see them more closely. Look for cracks and breaks. Compare them to the bands that were kept indoors in a jar.

5. Try this experiment for another week. If the air is polluted the rubber bands will snap in a week or two.

Waste Not, Want Not

LANDFILLS DESIGNED FOR HAZARDOUS WASTE DISPOSAL

When it isn't technically or economically practical to handle a hazardous waste in any other way, it must be placed in a specially designed landfill. The biggest difference between such hazardous waste landfills and an ordinary sanitary landfill is the amount of care taken to prevent leachate - liquid that has trickled down through the waste, perhaps picking up toxic substances - from escaping into streams or groundwater.

A site is usually chosen away from heavily populated areas. It must be in an area that on average has not been flooded more often than once in a hundred years. Landfills may be built in an excavation or rest on the surface; in either case the soil beneath the landfill should be heavy and resist the flow of water. The best sites have a thick natural layer of clay. The ground on which the landfill will rest is graded so that it slopes, and then it is lined.

The bottom liner consists of several layers. A waterproof sheet of thick plastic or rubber is laid on top of the clay layer, and a layer of sand or gravel is spread on top of the plastic. The gravel layer is for drainage. Sometimes perforated drainpipes are laid in the gravel, sloping down to a sump (depression to collect water) at the lowest point in the layer. For safety's sake, the first drainage layer is then covered with a second. To prevent small particles of dirt from clogging the drainage layers, the second drainage layer is covered with a filter. Monitoring wells are drilled into groundwater around the landfill to test whether leachate has escaped from the landfill.

Wastes placed in a hazardous waste landfill are not jumbled together as they are in a sanitary landfill. Instead a technician sorts them into various groups. Each group includes only substances that will not react with one another. Thick earth walls divide each layer of the landfill into separate compartments, and each compartment holds only one group of wastes.

While the landfill is in operation and wastes are still being added, rain falling on the site can run down through the wastes. The bottom liner traps this water, and it collects in the sump and is treated. Once as much waste as the landfill will hold has been put in it, it is covered by a layer of water-resistant clay and the clay is covered with another sheet of waterproof plastic or rubber. This covering prevents rainwater from getting into the wastes. Gravel is spread over the plastic, and topsoil. Vegetation is planted to hold the soil in place.

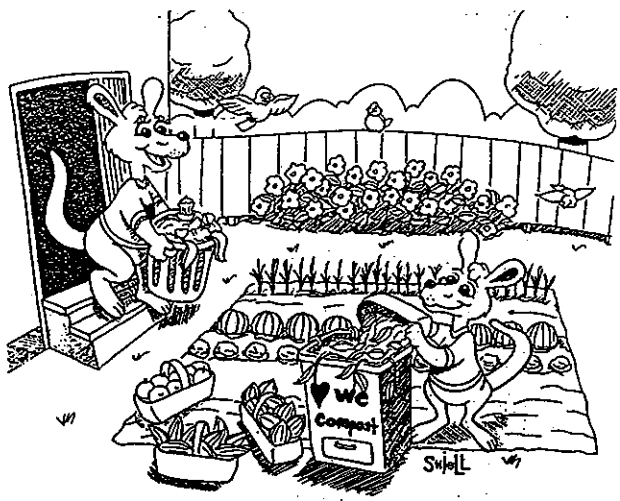
The site of the landfill is closed forever to further development. No houses or other buildings will ever be erected here. It is a cemetery for hazardous wastes.

SOMETHING TO DO AT HOME (OPTIONAL BUT FUN!!)

GARBAGE IN, COMPOST OUT

What You Need:

- a big plastic outdoor garbage can with a lid
- a long stick to stir the compost
- soil
- compost ingredients from your house and yard



Illust. - North York Environment Committee

What to Do

1. Poke about 30 small holes in the lid, sides and bottom of the garbage can. The holes are to let air in. The ones in the bottom are needed to allow extra water to drain out.

2. Put your composter in a sunny spot because warmth speeds up the decomposition. For convenience it should be fairly close to the house.

3. Put some garden soil in the bottom of the garbage can. Now add some food scraps and/or yard wastes.

   Examples: fruit and vegetable peelings, egg shells, tea bags, coffee grounds, leftover vegetables, fruit or vegetables that have started to spoil, grass clippings, flower cuttings. Don't put any meat or bones in your compost as these can attract flies and rats. When you are starting your compost, put about as much vegetable garbage in the can as you put soil.

4. To help get things started, add some decaying leaves and grass clippings.

5. Add some soil-stirring animals such as earthworms and sow bugs.

6. Stir the compost with the stick. Compost should be damp but not soaking wet. Sprinkle a little water on it if it is too dry. Add dry soil if the compost mix is too wet.

7. Add more vegetable garbage every time you have some. Each time, add a little soil to go with it. Stir the mixture every 2 or 3 days.

8. When the can is about 3/4 full, stop adding garbage and let it sit for 3 to 6 weeks. By that time, you should have crumbly, rich, compost for your garden.

Here Today, Gone Tomorrow

DON'T CLOSE IN THE OPEN SPACE

If you have taken a drive lately through a new housing development, one of the things that might strike you is the lack of green or open space. It's all brick and concrete - is there anything to remind us of nature?

The concept of open space means different things to different people. To some it's big blocks of undisturbed space in and around urban areas. For others it's the idea of building new cities farther away from existing cities. On a smaller scale it can be an arrangement or cluster of houses, townhouses and apartments in such a way that land is left open for aesthetic and recreational purposes. It can also mean the purchasing of abandoned railway tracks and other small patches of land in urban areas to create small parks.

Open spaces serve a variety of functions.

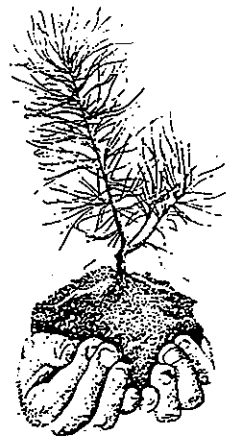
- providing recreation and aesthetically pleasant areas
- providing preservation of historic and cultural sites
- providing an ecological buffer zone between urban areas
- regulating long term urban growth by stopping development patterns
- preventing or reducing adverse climatic effects
- reducing rate of run-off
- reducing and absorbing air pollutants and noise
- providing additional habitats for wildlife living in or near urban areas

Before any of these benefits can be realized, one needs to acquire, preserve or reclaim new and/or existing spaces. Three common methods used include purchase of the land, zoning so that the land can only be used in a certain way, and easements. An easement is the purchasing of the right to do something with someone else's property.

The first option is the surest way, however often funds are limited. Zoning is a frequently used tool to protect open space. Unfortunately, local planning or zoning authorities are subject to political pressure from economic interests. Lately the use of easements has been a successful way in acquiring and preserving open space. Obtaining an easement is a relatively inexpensive way to prevent the owner from cutting down trees, altering a watercourse, or erecting a billboard on his/her property.

Each of the above methods have their advantages and disadvantages, but with the addition of flexibility and creativeness they can be useful in ensuring open space, and providing us with that touch of nature.

SOMETHING TO DO AT HOME (OPTIONAL BUT FUN!)



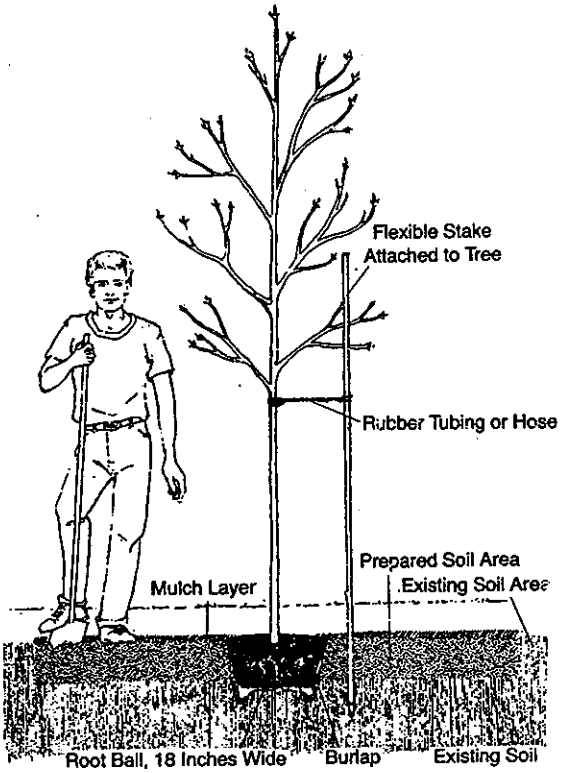
PLANT A TREE

Since we are removing trees from our environment at an alarming rate, we should all take a half hour and replant a tree. By doing this not only are we helping to purify the air we breathe, we are creating a new habitat for an animal that may have lost one.

HOW TO PLANT A TREE

1. Locate a clear, open site for your tree, with generous rooting area and good drainage.

2. Loosen and blend soil in the entire planting area 15 to 25 cm deep. In the centre, dig a hole at least as wide, but only as deep as the root ball.



Illust. - Save Our Planet. New York: Dell Publishing Co.

3. Remove tree from burlap or container and place on solidly packed soil so that the root collar (where the tree's main stem meets the roots) is slightly above the surrounding soil level.

4. Backfill the hole and lightly pack the soil into place around the tree.

5. Spread a 5 to 7.5 cm layer of mulch in the entire area, keeping a 15 to 20 cm distance from the tree trunk.

6. Attach stake to the tree at one-third the height of the tree by using discarded rubber inner tubes. Remove them after one year.

7. Water thoroughly, but do not flood the hole. Water well once a week during dry periods.

Think Globally, Act Locally

NEIGHBOURHOOD CLEAN UP

Organizing a community clean up can help the environment and be a lot of fun! Here are some pointers to help you get one started.

Illust. -Gov't of Newfoundland and Labrador

BEFORE THE EVENT:

1. Decide on area to be cleaned up. Phone the Parks and Recreation Department if you need ideas.

2. Decide on a date and time (12 to 2 hours on a weekend).

3. Contact the local media to advertise the event and invite them to come.

4. Make up flyers and posters to promote the event.

5. Ask local businesses such as hardware stores and co-ops to donate gloves and garbage bags.

6. Ask local businesses to donate prizes. Be sure to give them recognition for sponsoring the event on any promotional materials.

7. Ask a grocery store to donate environment friendly refreshments, such as apples, cookies and pop in recyclable cans.

8. Make arrangements for any recyclable items to be picked up or taken to depot.

9. Make arrangements with Parks and Recreation Department to pick up garbage at end of event (you might want to ask if they will lend you litter sticks).

10. Try to borrow a portable microphone to make the announcements. The local agricultural office might have one.

11. Organize volunteers to help the day of the event.
    - people to give out gloves, sticks and garbage bags
    - someone to make announcements
    - people to be in charge of refreshments
    - someone to speak to the media

THE DAY OF THE EVENT:

1. Welcome everyone and thank them for caring about their environment.

2. Give instructions. eg.
    - three to a garbage bag works well
    - recyclables collected separately
    - wear gloves, some garbage can be harmful

3. Hand ~~out~~ supplies.

4. Have prizes eg. group who brings in the most bags of garbage, youngest garbage collector, oldest garbage collector, first bag filled.

5. Serve refreshments.

6. Be sure that recyclables are taken to the depot and garbage is taken to the dump.

7. Feel proud of yourself and your community. You do make a difference!!