

PROFILE FOR
COMMUNITY
ACTION
SERIES



Troubled Waters: A Profile for Community Action

A Companion to Harmony Foundation of Canada's
Community Action Workshop Manual



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Serving Communities Across Canada and Around the World



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Since 1985, Harmony Foundation has served community groups and educators from every Canadian province and 36 countries around the world. Our goal is to build the skills of individuals, schools, communities and other organizations so that they are prepared to deal with the challenges facing them. As a result of our training, many people have developed school and community projects that have helped raise environmental awareness and contributed to local environmental improvement. Our approach is characterized by:

Self-Sufficiency

Our programs and publications provide the skills and tools that communities, organizations and educators need to deliver their projects self-sufficiently and to organize independently.

Capacity Building

Our programs assist individual action, community initiatives and the development of educational programs and resources. Most importantly, we build the capacity of individuals and organizations so that they can respond positively to the environmental problems they face.

Global Perspective

Environmental education and community initiatives must be understood within their regional, national and global context in order to be truly supported by and integrated into society. Our programs encourage cooperative action on environment and development issues and active Canadian leadership and participation in the global campaign.

National Unity

Through our Institute for Environmental Values Education and other programs Harmony Foundation continues to bring Canadians together around common concerns leading to an increased sense of national unity and pride.

Efficient Use of Resources

By providing our programs and resources to organizations across Canada we avoid duplication of effort and encourage efficient use of resources. Through our partnerships with other organizations we respond to the needs of the public in a cost-effective way.

Leveraged Support

We have maximized our support by using it to persuade other corporations, foundations and government agencies to join our efforts – thus leading to more extensive results. This approach has helped us attract a broad base of support and cooperation from corporations, foundations, federal and provincial governments and international agencies.



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Foreword

Michael Bloomfield
Founder and Executive
Director, Harmony
Foundation

**'When a group of
people are sailing in a
boat, none of us has
the right to drill a hole
under our own seat'**

For over 15 years, Harmony Foundation has created and delivered education programs for individuals, communities, educators and workplaces working towards positive solutions to environmental problems and their underlying causes. During that time it has become increasingly clear that the most effective solution to environmental problems is prevention, based on the knowledge, skills and cooperation we need to make sound decisions in our own lives and work together internationally, regionally and in the communities where we live. Education will be a central part of any successful strategy.

There is a wide array of environment and community development training and education programs based on single themes such as nature appreciation, resource management or applied science and technology. These approaches, while having their place, have been too limited to deal with the complexity of most community, environmental and social issues.

At the root of global crises such as decline of freshwater are the values that cause us to behave in environmentally destructive and selfish ways. The role of education must be to develop values and skills that lead to environmentally sound and humanitarian decisions and, ultimately, to positive action. Such education must be widely accessible, with a multi-disciplinary focus. It must help people of all ages and backgrounds to understand the interrelationships between values and behaviour and environmental quality, social justice and equity, and it must provide the tools to act on this knowledge. Links between local, national and global concerns must also be stressed. As environmental and community development issues increase in number, importance and complexity, we will be forced to rethink our goals and values to ensure they lead to environmentally sound and just behaviour in communities worldwide, contributing to national efforts and global cooperation.

Our challenge is to provide education and training programs that are comprehensive, integrative, positive and responsive to changing environmental, social and economic realities. We must also counter the stumbling blocks to positive action, including disempowerment, cynicism, lack of knowledge or skills and inadequate leadership. Education, at its best, must develop a population that is aware of the world and concerned about it, and has the knowledge, skills, goals and commitment to work together toward solutions of current problems and the prevention of new ones.

The need for environmental scientists, regulators and advocates is clear. However, to successfully meet our environment and community development challenges we must promote a massive program of training and education that will help individuals develop goals and values that respect others, are compatible with a healthy environment, promote progressive social and economic decisions and lead to positive action for the benefit of people around the world, as well as other species and future generations. We know the problems, we have the means to deal with them, and future generations will judge us harshly if we fail to act.





Table of Contents

<i>Foreword</i>	<i>iv</i>
<i>Introduction</i>	<i>1</i>
<i>Community Action Workshop Agenda</i>	<i>4</i>
<i>Guiding Principles</i>	<i>5</i>
<i>Water Overview</i>	<i>7</i>
Introduction	8
Down the drain? Water uses in Canada	9
Agriculture, irrigation and the need for efficiency	10
Water war or peace?	12
Privately-owned corporations and privately-owned water	13
Dilution is no solution to pollution	15
Are we meeting the standards?	17
Conclusion	19
References	20
Glossary	24
<i>Community Success Stories</i>	<i>27</i>
Introduction	28
Education	29
Conservation	34
Pollution Prevention	39
Industry	44
Agriculture	49
Rehabilitation	54
Improving Access	58
Additional References	62
<i>Water: Fast Facts</i>	<i>67</i>
<i>Personal Action Checklist</i>	<i>71</i>







Introduction

Congratulations on taking an important step towards protecting water. Knowledge is power, and by understanding the vital importance of ensuring a safe and sufficient water supply, you can decide how your community can best add its efforts to the initiatives taking place across Canada and around the world.

You'll find this Profile offers what you need to know about water in clear, accessible language. The **Overview** explains issues of quality and availability of fresh water, why they are important, what's causing problems in Canada and around the world, and what can be done to improve the situation. At the back of the Profile, the **Water Fast Facts** provides a handy three-page summary.

You'll also find inspiration in the pages that follow. The **Success Stories** provide a wealth of ideas on how communities can take action to protect water. Read about what groups across Canada and internationally have done to conserve water, monitor, protect and rehabilitate bodies of fresh water, and manage resources in a sustainable manner. You'll also discover lots of resources for further information in each of these areas.

The **Personal Action Checklist** at the back of this publication has some excellent suggestions on changes you can make in your own life to protect fresh water on this planet.

If this Profile motivates you to action, you may want to consider some of the other publications and programs that Harmony Foundation offers. *Troubled Waters: Profile for Community Action* is only the tip of the iceberg — there are an array of tools available to you through Harmony's **Building Sustainable Societies** program, outlined below.

The Program

As the diagram on page 3 illustrates, *Building Sustainable Societies* is a three-tiered program composed of training sessions, community action workshops, and local initiatives. The goal of the program is to provide community groups with the necessary knowledge and project planning skills to launch local biodiversity projects.

The Training Session

In our Training Sessions, we prepare community group representatives to run Community Action Workshops, by familiarizing you with the activities and facilitation techniques in our *Community Action Workshop Manual*. Call us to find out if we'll be offering one in your region in the near future.

The Community Action Workshop

The Workshop provides your group with an opportunity to work together to learn more about a selected environmental issue, identify community assets and needs, articulate a vision to solve a particular problem of your choice, and develop an action strategy. Above all, it is an opportunity for your group to work as a team. You'll find a more detailed description and agenda for the Workshop on page 4.

In this Profile you'll find facts, resources, inspiration and a wealth of ideas on how to protect water in your community.





Introduction

The Community Action Workshop Manual

This *Manual* is an ideal companion to the Profile you are now holding. While the Profile provides you with a clear understanding of fresh water issues, the *Community Action Workshop Manual* shows you how to take effective local action through a simple and tested project planning framework. Together, the *Community Action Workshop Manual* and *Troubled Waters: Profile for Community Action* provide you with everything you need to tackle the threats to fresh water.

We hope you'll find a wealth of ideas and information in *Troubled Waters: Profile for Community Action* and that you are inspired to act on the knowledge you will gain. Good luck in all your present and future endeavours, and remember that education is the starting point for global change.

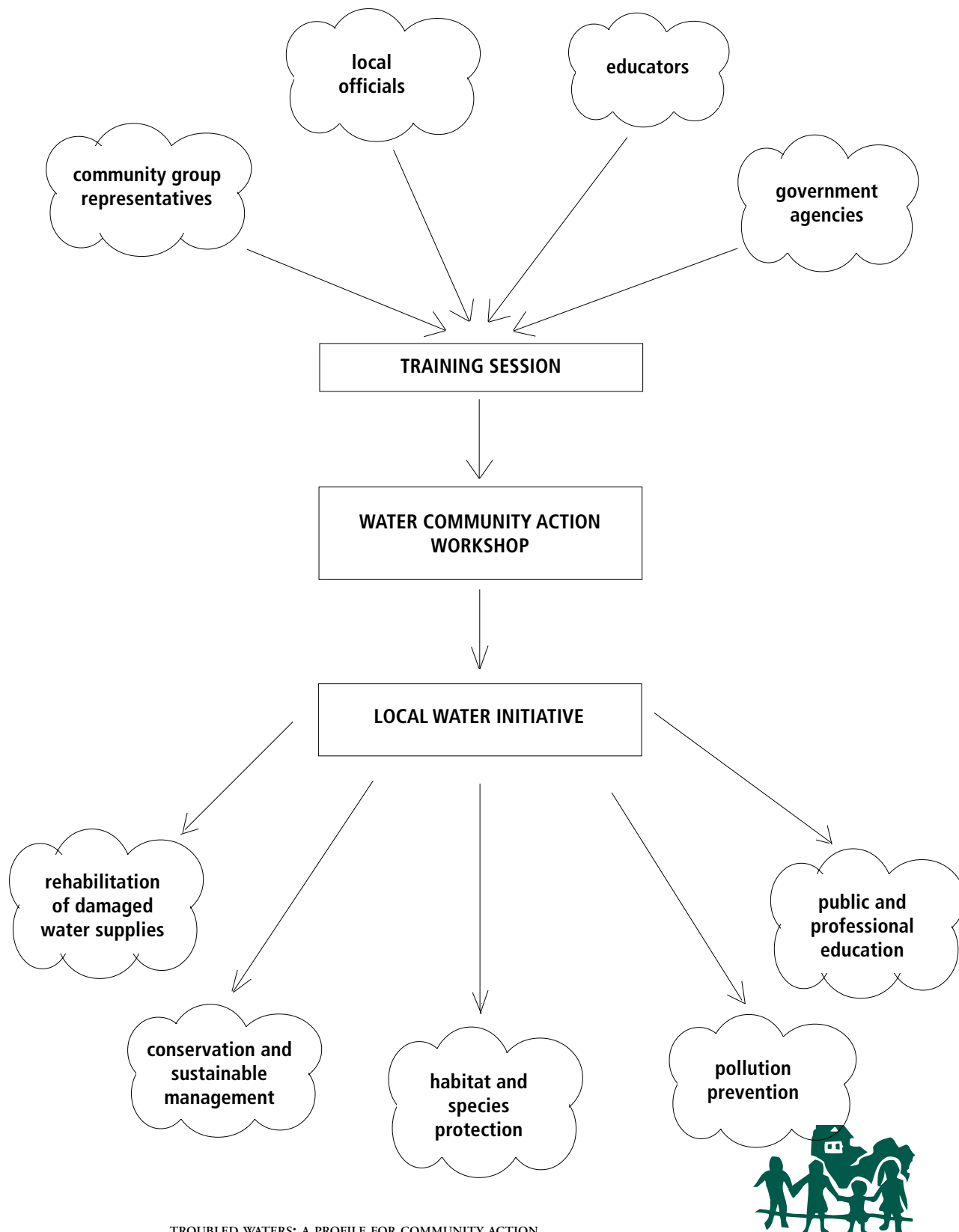
As Margaret Mead famously remarked, never doubt that a small group of committed people can change the world — in fact it's the only thing that ever has.





Introduction

Building Sustainable Societies Project Structure





Community Action Workshop Agenda

Put your biodiversity ideas into action! The Community Action Workshop is designed to guide community groups through the process of planning a local initiative. It takes a funnelling approach: beginning with the “big picture” of biodiversity loss and the global scope of the issue, the focus then narrows to an examination of biodiversity within the community and the selection of a specific local problem to tackle. The workshop culminates in the development of a detailed action plan to address the selected problem.

The Workshop is broken into five modules, for maximum flexibility, and takes approximately 11 hours in total to run. Please see Harmony Foundation’s *Community Action Workshop Manual* for full details.

Pre-Workshop Communication and Planning

Activity 1: Planning the Workshop

Activity 2: Setting Ground Rules

Understanding the Big Picture

Activity 1: Welcome, Opening Remarks, Introductions and Overview

Activity 2: Analysing Our Issue

Activity 3: Values and Behaviour: Widening Our Circle of Concern

Focussing Our Community Vision

Activity 1: Profiling Our Community

Activity 2: Defining a Problem

Activity 3: Mapping Our Assets

Activity 4: Creating Our Vision

Moving From Awareness to Action

Activity 1: Developing Our Action Plan

Activity 2: Meeting the Challenges

Activity 3: Measuring Success

Activity 4: Planning for Follow-Up

Activity 5: Community Action Workshop Closure

Taking the Next Steps

Activity 1: Preparing to Launch





Guiding Principles

Harmony Foundation's leadership training and educational materials are based on the following principles:

Values-Based

An examination of values provides the foundation required to effectively understand one's own and other's world views. From this understanding participants can consciously and conscientiously benefit from various perspectives and actions to generate innovative solutions.

Experiential

Experience is at the base of learning. The experiential learning cycle involves concrete experience, reflection on the experience, concept building and application, and it challenges people to rise beyond their current level of thinking and acting.

Holistic and Multi-disciplinary

Holistic education involves the whole person. It appeals to all dimensions of an individual (i.e., emotional, spiritual, intellectual, physical). A multi-disciplinary approach promotes learning through the integration of subjects. Effective social change education programs examine the interrelationships amongst many fields of study and amongst the various elements of societies.

Systemic

Understanding the systemic relationships between individuals, societies and the environment contributes to an integrated approach to problem solving. Everything we do affects something or someone else.

Cooperative

Cooperative learning is interdependent; we learn with each other and from each other. Both the facilitator and the participants contribute to the educational process.

Based on Critical Thinking

Critical thinking is a process, not a result. Critical thinkers aim to identify and challenge their own assumptions and knowledge about a particular topic or issue, along with information presented to them. They are open to forming new ways of viewing an issue and generating innovative solutions.

Situated within a Global Context

Community-based initiatives are central to effective environmental and social action, yet they must be understood within regional, national and global contexts in order to effectively bring about long-term change. Societal change must happen at all levels in order for initiatives to be truly supported by and integrated into societies.







An Overview of Water

Purpose

This overview is a call to action. Water, essential to all life, is threatened by overuse and contamination. Issues of scarcity, conservation, pollution and protection require urgent attention.

Over 250 million cases of water-related diseases occur each year and lead to the deaths of 5-10 million people (Gleick, 2001a).

As a result of lack of access to safe water 10,000 to 20,000 children die each day worldwide (Gleick, 2001b)

DISTRIBUTION OF WATER ON EARTH:

Atmosphere	0.001%
Rivers	0.0001%
Lakes	0.017%
Soil water	0.005%
Groundwater	0.62%
Ice caps and glaciers	2.15%
Ocean	97.2%

(Moss, 1988)

Global per capita water supply has dropped 58% since 1950.

(Pastel & Wolf, 2001)

On average, each Canadian uses 343 litres of water each day; to survive each person needs 2.4 litres daily. (Environment Canada, 2001a)





Overview

**FIGURE 1:
DISTRIBUTION OF
WATER ON EARTH:**

Atmosphere	0.001%
Rivers	0.0001%
Lakes	0.017%
Soil water	0.005%
Groundwater	0.62%
Ice caps and glaciers	2.15%
Ocean	97.2%

(Moss, 1988)

80% of illnesses in developing nations are water-related.

(Environment Canada, 2001a)

During the 1970s and 1980s, water withdrawals in Canada increased by about 80%. Population increased by only 3% during this period.

(Environment Canada, 2001a)



Introduction

When we turn on the tap we take for granted not only that there will be water but that it will be clean and safe to drink. Yet we've put our fresh water under tremendous pressure, and not simply our drinking water, our lakes, streams, and groundwater are all showing signs of stress.

Water pollution has reached even the most remote areas of the globe. Airborne contaminants have been found in waters of northern Canada, the Rocky Mountains and Antarctica (Kidd et al., 1995; Blais et al., 1998; Environment Canada 2001e). Sewage and agricultural runoff have choked rivers and lakes with plants that thrive on the extra nutrients and acid rain has led to further decline of water quality.

In Canada we use water in our homes and industries as if the supply was inexhaustible, but even in water wealthy Canada supplies in many areas can't keep up with demand. And, lack of water continues to plague much of the world's population. About one fifth of the world's people don't have clean water to drink (Leslie, 2000). Almost one half don't have access to sanitation, living without underground sewage or latrines (Leslie, 2000). Lack of access to safe drinking water has taken a terrible human toll. Over 250 million cases of water-related diseases occur each year and lead to the deaths of 5-10 million people (Gleick, 2001a).

Growing demand for water is another major concern. Over-consumption of water has destroyed the Aral Sea, reduced the flow of many great rivers, including the Nile, Colorado and Yellow, and removed so much underground water in some areas that the ground itself is sinking (Leslie, 2000).

Water scarcity is expected to worsen. As the climate changes, farmers in some regions may need more water to make up for increased evaporation but rainfall may decline. At the same time, the whole water cycle is becoming less predictable (Intergovernmental Panel on Climate Change, 2001). Population growth will exacerbate the situation, leading to an increase in demand for food production and drinking water (Postel, 1998). The net effect may be extreme shortages of water, and dire consequences including war and mass migration (Gleick, 1994).

These prospects have left us at a policy crossroads. In one direction lies sustainability; in the other direction are worsening water shortages and more contamination and humanitarian crises. Domestic programs must stress more efficient water use, prevent future pollution, clean up existing problems and help ensure that the water needed for all life is protected.

Humanitarian issues also demand attention. Pressure is growing to allow bulk water exports. Economics aside, there are questions about the obligations of water wealthy nations to provide water aid to the water poor.



Down the drain? Water uses in Canada

To survive, we each need to consume 2.4 litres of water daily, about one half of which we drink and one half of which we get from our foods (Tesar, 1992). For practical purposes we need far more. We need water to grow our food and to clean our homes and ourselves. We use water to build our houses and cars, and to keep our economy running.

More than 45 billion cubic meters of fresh water is withdrawn in Canada each year (Environment Canada, 1996). Most of this water is used to generate power (63%). The remaining major use is split between manufacturing (16%), municipalities (11%), and agriculture (9%) (Environment Canada, 2001a). (Figure 2)

Existing diversions and removals from North American waters already have had a tangible effect. A single diversion from Lake Michigan to Chicago lowers the water level of that lake by 6 cm, and also lowers the levels of Lake Ontario and Lake Erie (Farid et al., 1997). But water withdrawals are increasing, and the increase is expected to continue. The International Joint Commission estimates that the flow of the St. Lawrence River could be diminished by 9%, and lakes Michigan, Huron and Erie could drop a foot by 2035 simply to meet our ever-increasing demands for water. Climate change could lead to an additional basin-wide drop in water levels of one meter (Farid et al., 1997).

On average, each Canadian uses 343 litres of water a day at home. That makes us the second greediest water users in the world, with Americans taking first place. Our water consumption is more than double that found in France, and almost three times the average amount of water an Israeli uses. (Environment Canada, 2001a). That 343 litres is more than 100 times the amount of water we each need daily to stay alive, and most of that water goes straight down the drain when we flush the toilet (30%) or bathe (35%).

Less than 10% is used in the kitchen for food preparation and drinking water (Environment Canada, 2001a). The remaining 25% is used for cleaning and laundry. (Figure 3)

In the summertime when green grass is our fancy, water use is even more wasteful. Municipalities frequently have trouble keeping up with increased water demand for lawns and gardens, and it's no surprise, given that water demand can increase by as much as 80% during the summer (City of Toronto, 1998). Municipalities across the country have had to restrict outdoor water use to ensure that the water needed for more important uses isn't sprayed on lawns.

Conserving our waters at home

Many municipalities that have been struggling to keep up with growing water demand have pushed residents to install tap aerators, and low-flow toilets and showerheads — simple changes that can cut water consumption by one third (Environment Canada, 2001a). Others have started to distribute barrels to

**FIGURE 2:
WATER USE IN CANADA**

Thermal power generation	63%
Manufacturing	16%
Municipal	11%
Agriculture	9%
Mining	1%

(Environment Canada, 2001a)

Less than 3% of the water treated at municipal plants is used for drinking.

**FIGURE 3:
RESIDENTIAL WATER USE IN CANADA**

Toilet	30%
Bathing and showering	35%
Laundry	20%
Drinking and cooking	10%
Cleaning	5%

(Environment Canada, 2001a)





Overview

1. If you have a 19-litre (L) toilet, in a single year you flush 30,000 L of water down the toilet to dispose of only 650 L of body waste (assuming 4.5 flushes per day). If you switch to a six-litre model you can cut down your flushing to 10,000L.

2. In one year, a tap leaking at a rate of one drip per second will waste 10,000L of water.

3. A standard showerhead (18-27 L per minute) uses about twice as much water as a low-flow fixture (9-11 L per minute). Low flow faucet aerators can also cut water use by one half.

(Canada Mortgage and Housing Corporation, 2000)

collect rainwater for watering lawns and gardens, and are encouraging a shift from water greedy grasses to xeriscaping, landscaping with a focus on water conservation. In water scarce countries like Israel, and even in parts of southern United States, water is frequently reused. It is treated to remove chemicals and pathogens, and the 'grey water' is used to flush toilets, wash cars, and water lawns (de Villiers, 1999). Industrial water conservation programs can also reduce demand for municipal waters.

One of the simplest ways to encourage people to conserve water is to make them pay more. There is a direct relationship between the price of water and the amount of water people use (Environment Canada, 2001a). Water metering is an easy way to encourage conservation. In Calgary (Alberta, Canada) some homes have water meters and are charged according to the volume of water they use. Others have no meters and pay a bulk rate. In homes without water meters people use 50% more water than homes where people pay per litre (Environment Canada, 2001a). Cities that already meter water can go further, adopting pricing structures that encourage conservation. Instead of constant rates, they can adopt escalating rates, where the more water you use, the more each litre costs. This allows customers to get the basic requirements at a low cost, while being charged more for non-essentials like watering the lawn (Environment Canada, 2001a).

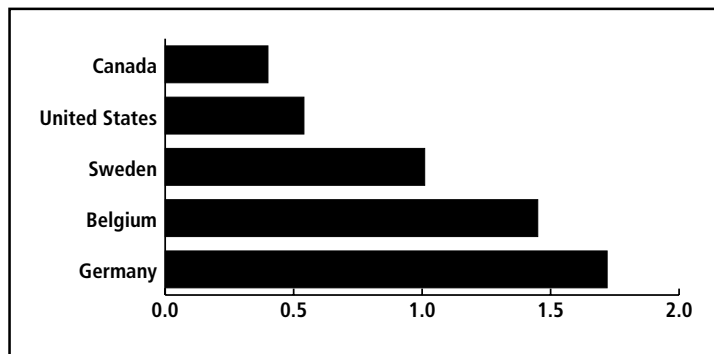


FIGURE 4: WATER PRICING IN DIFFERENT COUNTRIES

Agriculture, irrigation and the need for efficiency

Globally about 67% of water is used in agriculture, and most of this water is spent on irrigation (Intergovernmental Panel on Climate Change, 2001). Nevertheless, food production remains limited by water availability in many parts of the world (Postel et al., 1996).





Overview

Irrigation has contributed to large, and much needed increases in food production. Although less than 20% of the world's cropland is irrigated, this land produces 40% of the world's food (Leslie, 2000). Local dependence can be extreme. For example, Pakistan depends on irrigated lands for 80% of the nation's food supply (de Villiers, 1999).

But irrigation at current rates is not sustainable. Water is being removed from the ground far faster than it is being replaced in much of the world, and many of the world's great rivers fail to reach the sea for periods of the year because so much water is removed for agriculture and urban life (Leslie, 2000). Low river flows affect estuarine habitats (estuaries are coastal zones where salt water and fresh water mix) and alter stream ecology. Lower lake levels contribute to the drying of wetlands, loss of critical fish habitat, and can lead to disturbance of contaminated sediments (Farid et al., 1997).

Disappearing groundwater

Depletion of groundwater — the unseen stores of water below the earth's surface — is a huge problem. The significance of groundwater is immense: it contains nearly sixty times the volume of freshwater in lakes, streams and wetlands. Unfortunately groundwater is being removed far faster than it can be replaced naturally. As a result, water levels are dropping. And weaning people off of this unsustainable supply won't be easy. This water supports 10% of the world's food production (Postel, 2000). The International Water Management Institute has identified groundwater depletion as the "single most serious problem in the entire field of water resource management" (Leslie, 2000).

Because groundwater isn't seen, groundwater depletion is a problem that few people grasp. But there is one dramatic visual manifestation. When you pull out enough water, the land starts to sink or subside. Beijing is subsiding by about four inches a year. Areas of Mexico City are sinking even faster — by up to a foot a year (Leslie, 2000). The cost of land subsidence in the U.S. exceeds US\$400 million each year (Leslie, 2000).

There are other problems too. In Florida, India, and other coastal regions, removal of groundwater has allowed saltwater to move in, making groundwater unusable for agriculture and drinking (Leslie, 2000). And, because groundwater and surface waters flow into each other, depletion of underground stores can pull down the levels of aboveground lakes, streams, and dry out what were once wetlands.

Declining surface waters

Surface waters are also being tapped to dangerous levels. Many of the world's great rivers including the Nile, Colorado, Amu Darya, and Syr Darya have had so much water removed that they no longer reach the sea for days or months at a time (Postel, 2000).

Irrigation and other agricultural activities that put rivers at risk also put the species that depend on them in danger. Agricultural activities in the United States have been implicated in the decline of fifty endangered species.

Although most of the crops grown in North America are rain-fed, depletion of aquifers (underground formations that store water) is occurring too. Use of North America's largest aquifer, the Ogallala aquifer stretching from the Texas Panhandle north to South Dakota, is by definition unsustainable. The Ogallala is a fossil aquifer, containing water deposited thousands of years ago. Because of the geology and hydrology of the region, replenishment of the aquifer is extremely slow. The rate at which the aquifer is being emptied is stunning. Water is being removed eight times faster than it is renewed naturally (Barlow, 1999). To date, 325 billion cubic meters of water have been pulled from the aquifer.

(BBC News, 2000).

India has the dubious honour of having the fastest rate of groundwater depletion in the world. Groundwater in India is being depleted about twice as fast as it is replaced. As a result, aquifers are dropping by 3-10 feet a year (Leslie, 2000), putting one quarter of the country's grain harvest at risk.

(Postel, 2000).

Canada contains one quarter of the world's wetlands.

(Environment Canada, 2001a).





Overview

The stories of the Amu Darya and Syr Darya in central Asia are linked to a much broader tragedy. In an effort to turn the central Asian desert into a cotton plantation, the rivers were diverted and used for irrigation. The Aral Sea, without these two rivers that used to flow into it, has been turned to desert. The volume of the sea has declined by two thirds, and its area has been reduced by half. This has left port towns miles from the shrinking shore, and led to the loss of 24 fish species and 60,000 fishing jobs that depended on them.

(Gleick, 2001b; Leslie, 2000).

**FIGURE 5:
TOTAL ANNUAL RENEWABLE
FRESH WATER RESOURCES
AROUND THE WORLD.
FIGURES SHOWN ARE M3 PER
CAPITA IN 1995**

Canada	98,667
United States	9,277
Japan	4,374
United Kingdom	1,222
Israel	389
Jordan	318
Barbados	192
Kuwait	95
Qatar	91

(De Villiers, 1999)



Nevertheless, many American counties continue to allow farmers to withdraw water from rivers that contain threatened and endangered species (Moore et al., 1996).

Although Canada has the reputation of being water rich, many areas are short on water. The western Prairies are a naturally dry area where evaporation exceeds precipitation. Agriculture and industry on the prairies are only possible due to water flow from the mountains. Long-term drought on the prairies has led to drying of wells, wetlands, shallow lakes and reservoirs. And, further east, levels of the Great Lakes are so low that navigation and shipping have been affected (Schindler, 2001a; Schindler, personal communication, 2002).

Water war or peace

The world’s water supply is not keeping up with demand, and the situation is predicted to worsen. Global per capita water supply has fallen by 58% since 1950, largely because of the growth of the world’s population. By 2015, 40% of the world’s population, or 3 billion people will live in nations where it will be a major challenge to meet water demands (Postel and Wolf, 2001). And, if you factor in climate change and rising unpredictability about where and when rain will fall, consequences may be even more alarming. (Figure 5)

Some predict that worsening water shortages will have disastrous consequences. Boutros Boutros-Ghali, then Egyptian foreign minister, later UN Secretary General, said in 1988 that the next Middle East war “will be over the waters of the Nile, not politics” (Leslie, 2000). The late King Hussein of Jordan concurred, stating that the only issue that could bring war between Israel and Jordan was water (Leslie, 2000).

Local skirmishes already have occurred. In Pakistan, water shortage has led to declining agricultural production, and has pushed rural people to the cities, leading to increased poverty, pollution and violence. In Bolivia, increased water prices led to massive protests, and days of violence. In China, farmers clashed over plans to capture runoff, and send it to the city (Postel and Wolf, 2001). Around the world shortages of food and water already have led to displacement of twenty-five million people (CBC, 1999b).

History may offer hope that water scarcity could lead to cooperation, rather than conflict. During the last century, water conflict has provoked some type of military action only 37 times (Postel and Wolf, 2001). However, water may bring nations together. During the 1980s and 1990s, despite suspended diplomatic contact, Jordan and Israel met yearly, to discuss the Yarmuk River and allocate its waters (Leslie, 2000). Nevertheless, increasing demand and decreasing supply will push pressures for water beyond historic levels, and existing tensions in water scarce areas like the Middle East may become more severe as demand for water increases and water supplies decline.



Overview

Solving the problem of scarcity

There may be solutions to the problem of water scarcity. Postel (2000) suggests that part of the solution is doubling the productivity we derive from of the water we use — a tall order that might just be achievable.

The 67% of the world's water currently allocated to agriculture can be used much more efficiently. The water-use efficiency of traditional flood irrigation has been estimated to be as low as 40%, leaving lots of room for improvement (Leslie, 2000). Drip irrigation offers significant improvement. By providing water directly to the plant's roots, water use can be reduced by 30-70%, and crop yields have been increased by 20-90%. Given that only 1% of irrigated land uses drip irrigation technology, there is a potential for huge water savings, and large increases in agricultural production. The only barrier is cost. Setting up a drip irrigation system costs from \$500-1000US per acre. As a result, it is beyond the reach of most of the developing world (Leslie, 2000).

Switching to crops that demand less water and using water-harvesting methods like small-scale dams will also help increase agricultural output and the efficiency of water use. Simple changes like irrigating at night, in cool weather, and on calm days, as well as irrigating closer to the plant's roots can also contribute considerably to water savings. And, planting drought tolerant crops, or planting smaller areas of crops that provide higher market prices can save water while maintaining farm incomes.

Reducing residential water use, improving the productivity of agricultural water use and increasing water re-use can help prevent the worst-case scenarios but such initiatives require funding and political will. Desalination may also contribute to the solution. Although high cost puts it out of the reach of most nations, its cost is dropping, and currently stands at US \$1-2 for 1000 litres (Leslie, 2000). However, any sensible program will protect marine ecology and favour conservation over technology.

Privately-owned corporations and privately-owned water?

Increasing water demand has pushed up the price of water and drawn the interest and involvement of corporations. This has led to questions about the role of profit in determining access to safe water, something the United Nations has declared a basic human right.

Some would argue that there is a role for private companies in public water. Others wonder whether anyone can really own water, and whether for-profit companies will manage resources for public and environmental good. These are questions that are becoming more important as water shortages intensify and corporate involvement in the water sector increases.

It takes ten litres of water to manufacture a litre of gasoline, more than 300 kilograms of water to produce a kilogram of paper, almost 95 kilograms of water to produce a kilogram of steel, and 1000 kg of water to grow 1kg of potatoes, 1000 tonnes of water to produce one tonne of wheat.

(Postel 1992; Environment Canada, 2001a)





Overview

The bottled water market is booming worldwide despite the fact that bottled water is often of lower quality than the much cheaper water that flows from municipal pipes (NRDC, 1999). The Ontario government has licensed the withdrawal of 18 billion litres of water a year for bottling, and this is expected to grow as the bottled water market continues to expand (Shrybman, 2002). The global industry in 1995 was worth more than US\$14 billion a year, and sales have continued to grow.

(NRDC, 1999).

Worsening global water shortages will lead to increasing pressure for water transfer. Although Canada hasn't taken part yet, water tankers already have made deliveries to Japan, Taiwan, Korea, Greece and the Bahamas.

(Yaron, 2000).



Private companies now own dams and waterways in many countries. They run municipal water utilities, and they sell water in bulk and in bottles (Farid et al., 1997). Trade agreements such as the North American Free Trade Agreement (NAFTA) raise questions about sovereignty over water, and about whether Canadians can control the sale of water, if we choose.

In Canada the focus of the debate over corporate involvement in water has been the issue of water export. Water export can mean a number of things. Water may be exported as a high-priced bottled beverage, in large bags or tankers at a more moderate cost, or may be diverted on a large scale to meet needs for low cost irrigation waters (Thompson and Goodman, 2000).

Sell-out of Canadian waters?

Although two companies have come close, no tankers or water bags have been exported from Canada. In 1998, the Ontario government authorized the Nova Group to ship 600 million litres of water from Lake Superior to Asia. Widespread public pressure forced the government to withdraw the permit (CELA, 1998). More recently, a scheme was promoted to sell water from Newfoundland's Gisborne Lake. Again, public pressure led to the rejection of this proposal (O'Malley and Bowman, 2001).

The predominant concern is that bulk water export from any part of the country could open the legal floodgates across Canada. Although opinions differ on this issue, some contend that if bulk water export were allowed, even for a single project, water would become a commodity under the NAFTA and the General Agreement on Tariffs and Trade (O'Malley and Bowman, 2001).

The Canadian government may not even be able to impose a preventative ban on bulk water exports. Again, although legal opinions differ, prohibiting water export may contravene World Trade Organization (WTO) agreements (Shrybman, 2002). A California company is suing Canada for \$10 billion dollars, claiming that British Columbia's ban on water exports contravenes the NAFTA (CBC, 1999a).

And, although there are provisions in the WTO for governments to protect the environment, the strength of the provisions is questionable. The WTO has never ruled in favour of a domestic environmental law (Shrybman, 2002).

Water export schemes can harm the environment in several ways. If excessive amounts of water are removed the reduced water levels can affect aquatic habitats and disturb contaminated sediments (O'Malley and Bowman, 2001), leading to increased concentrations of toxic contaminants in water. Drying wetlands and exposed sediments can also lead to the release of acids into adjacent waters (Bayley et al., 1992; Yan et al., 1996).



Overview

Increased water scarcity will make tanker transfers more economical, although the distance from Canada to many water markets may mean wholesale shipping of Canadian water is too costly to allow companies to realize a profit. Large-scale water transfer projects may never be economically feasible. If they are built — cost-effective or not — they may cause environmental damage that dwarfs the effects of tanker and water bag-scale withdrawals.

Water aid

There is also the issue of water aid. Canada has a history of providing humanitarian aid. But what if the need was for water? Would Canada export water? Historically, Canada has aided water-stressed nations by helping to build means of accessing water and for using water more efficiently. But if called upon to provide drinking water for a nation in need, many Canadians would have difficulty saying “no.” However, we need a clear policy to guide our decisions.

Canada has been providing some aid and exports in the form of “virtual water” for decades. Global trade in virtual water — the water incorporated into goods like grains — dwarfs the direct trade of water. Nations in the Middle East already import enough of this virtual water to equal the annual flow of the Nile River (Allan, 1998). So even if Canada doesn’t trade water, we do ship water around the world in the form of food aid to nations in need. The question is are we ready to respond to humanitarian requests for direct water aid?

SHARE OF THE WORLD’S RENEWABLE FRESHWATER SUPPLY:

Brazil	18%
Canada	9%
China	9%
United States	8%

(Environment Canada, 2001a)

Dilution is no solution to pollution

Using too much water is perhaps an easier problem to solve than the problems of declining water quality. Sewage, agricultural pollution, urban runoff, and industrial wastes are contributing to water contamination worldwide.

Contamination is so severe that fish consumption is restricted or banned in more than 2500 Canadian lakes (EPA, 2001), and some municipalities have had to abandon their drinking water supplies and bring in safe water from elsewhere (Environment Canada, 2001b). Problems in the developing world are often more severe. Contaminated fish may eliminate an important protein source, and residents may not be able to afford to bring in safe drinking water from elsewhere. Some of this contamination is from natural sources, but it is most often due to pollution

Too much of a good thing: nutrient pollution

Although the nutrients nitrogen and phosphorus are needed at natural concentrations in lakes and streams, excessive amounts bring severe consequences. Growth of aquatic plants and algae is generally limited by the concentration of nutrients. Each year 12,000 tonnes of phosphorus and 304,000 tonnes of nitrogen are added to Canadian waters mostly in sewage and agricultural runoff (Chambers et al., 2001). Effects of eutrophication (nutrient pollution) are not restricted to waters of developed nations, but





Overview

One drop of oil can contaminate 25L of drinking water. Twenty thousand litres of water can be rendered unsafe for drinking by one gram of lead. The pesticide 2,4-D is so dangerous that one gram of the chemical can make 10 million litres of drinking water unfit for drinking. It takes only one gram of PCBs to make up to one billion litres of water unsafe for aquatic organisms.

(Environment Canada, 2001a)

Contamination in Hamilton was so serious as early as the 1870s that drinking water could no longer be taken from the harbour or local wells.

(Shilts, 1999)

The first sport-fish consumption advisory in the great lakes was issued in 1971.

(Shilts, E. 1999. Eco-Audit. Canadian Geographic. May/June: 30.)

affect water bodies wherever agriculture, sewage or other sources have increased nutrient concentrations.

The extra nutrients are a boon to plants, but a bane to the lakes and rivers that receive them. By stimulating plant growth, nutrient additions lead to changes in plant and animal species and in lake and river habitat. A side effect of the increased plant growth occurs when plants start to decompose. Decaying plants lead to a drop in the oxygen concentration of water and this loss of oxygen can lead to the death of animals that depend upon these habitats for survival (Environment Canada, 2001c).

Lake Erie is a familiar example of the effects of increased nutrients. It is also a story of the success of measures to control nutrient pollution. In the 1960s, the lake was considered dead, although its problem was an overabundance of life. Nutrient pollution was so severe that weed growth choked much of the shallow basin, rotting algae fouled beaches, and the lake became clouded with algae. Oxygen levels at the Lake's bottom dropped due to plant decay which caused the decline of fish populations. Phosphorus was the cause. Controls on phosphate in detergent, improved sewage treatment, and better agricultural practices aided Lake Erie's recovery (Fitzpatrick and DiToro, 1999).

Toxic soup

Like the other Great Lakes and many of Canada's rivers and small lakes, Lake Erie has other problems. Chemicals released by industry, agriculture, cars, power plants and garbage incineration have been accumulating in water and fish. The most dangerous are a class of chlorinated organic compounds including DDT, dioxins and PCBs that persist in the environment for decades, accumulate in organisms, and bioaccumulate in the food chain. Top predators like large-mouth bass may have concentrations of these contaminants that are a million times greater than concentrations in water, leading to reproductive problems and other symptoms of poisoning, and can be harmful to people who eat contaminated fish (EPA, 2001).

These chemicals have diverse sources. Some are produced intentionally, while others are unintended by-products. PCBs, DDT, mercury, dioxins, furans, toxaphene and mirex are only a sampling of the chemical soup released into water bodies in Canada and worldwide (EPA, 2001).

Although slow, there has been some progress towards reduction of toxics in the environment. An agreement has recently been signed by more than 100 countries to reduce or eliminate the production and release of 12 persistent pollutants to the environment (UNEP, 2001). Sweden has taken a more aggressive approach, planning a ban on all chemicals that are persistent and bioaccumulate (Baulch, 2001).





Overview

Acid bath

By reducing our reliance on cars and fossil fuels we can improve water quality. Burning fossil fuels releases a large amount of mercury into the environment (Environment Canada, 2001d) as well as causing acid rain. Sulfur dioxide (SO₂), sulfur aerosols, and nitrogen oxides (NO₂, N₂O, NO) are released into the atmosphere primarily by power plants and cars. These gases may combine with water in the atmosphere and fall as acid rain, or may fall from the sky as dry particles. So much acid has been deposited in some lakes in Ontario, Quebec, New York and Scandinavia that many were effectively considered acid dead. The pH of these waters has dropped so much that very few organisms can survive (de Villiers, 1999). And, the problem of acid rain is spreading. Emissions of acid gases are on the rise in the developing world due to increased burning of fossil fuels.

Reductions in the emission of sulphur oxides in North America have allowed some lakes to recover to natural levels of acidity. About 33% of lakes in Eastern Canada are recovering, but the majority of lakes have stayed the same, or become more acidic (Schindler, 1998). At current rates of acid emissions, only limited recovery is predicted. Without control of emissions of nitrogen oxides from automobile tailpipes, the prognosis for acid-sensitive lakes and streams is not good (Driscoll et al., 2001). Lakes may take decades to return to natural levels of acidity, if they recover at all. Acid-sensitive species may never return.

Are we meeting the standards?

Walkerton, Milwaukee, Collingwood, Cranbrook, North Battleford and Kelowna all have something in common: contaminated water crises. Each municipality has made its residents sick through microbial contamination of drinking water, and each has changed its practices to try to prevent similar incidents in the future (Christensen and Parfitt, 2001). Beckwith, Elmira, Manitoak, Angus and Ville Mercier also have had problems; chemical contamination is at the source of their drinking water woes (Environment Canada, 2001b; Sierra Club, 2001).

Environmental sickness is affecting human health, and as residents of Collingwood and Kelowna would testify, effects are not restricted to the developing world. Agricultural pollution has contributed to microbial contamination of drinking water, over-fertilization has led to nitrate concentrations well in excess of drinking water standards, and toxic leachate from industries and landfills has contaminated groundwater. Without adequate treatment, waters polluted by agriculture, industry and other sources can cause illness or death.

Cattle often excrete *E. coli* and *Cryptosporidium*; two dangerous pathogens. Given that one cow can produce the volume of waste of 22 people; it is no surprise that livestock wastes cause contamination. Inadequate drinking

Normal rain has a pH of 5.6. Acid rain with a pH of 3.6 is one hundred times more acidic.

(Environment Canada, 2001a)

Each year in the U.S. it is estimated that 34 billion litres of dangerous chemicals are released into the ground (Sampat, 2000). Leaking fuel storage tanks, landfills, drycleaners, agriculture and industries of all types contribute to the problem.

Nitrate contamination and bacteria affect 20-40% of rural wells in Canada (Government of Canada, 1996). Water quality in native communities is also poor. A government report issued in 2000 reported that the water systems of 67 of 867 reserves were under boil-water orders

(Bailey, 2002).





Overview

Livestock in Canada:

Cattle:	7 million
Poultry:	102 million
Other livestock animals:	14 million

(Chambers et al., 2001).

86% of Germans and 74% of Americans are served by wastewater treatment facilities. Only 57% of Canadians are served by wastewater treatment facilities

(Environment Canada, 2001a).

In Saskatchewan's Wakaw-Humboldt region, a 190 km pipeline was built to bring in water. Existing supplies were of poor quality and couldn't keep up with demand. Most of the \$32 million cost to build the pipeline will be picked up by the 10,000 area residents.

(Sask Water, 2002).

Shanghai has recently spent \$US 300 million moving its water intake 40 km upstream for cleaner water.

(Serageldin, 1996).

water treatment, combined with poor watershed protection led to the contamination in Kelowna and Cranbrook. Officials found that cattle had been defecating into water bodies that flowed into their respective water supplies (Christensen and Parfitt, 2001).

Poor wastewater treatment can also affect water quality. In the developing world, wastewater treatment is rare, contributing to the extensive problems of drinking water contamination, and the deaths of millions annually. More than two million people die each year from diarrhoeal diseases. Improving sanitation, hygiene and water treatment can reduce the incidence of illness by 26%, and could reduce deaths by 65% (Brundtland, 2002).

Agricultural activities can also contribute to the degradation of the chemical quality of water. If fertilizer or manure is applied in excess of the crop's demands, it will leach into groundwater and waterways. This has led to contamination with nitrate, a component of fertilizer and sewage, in areas of rural Canada, the U.S. and China (Sampat, 2000; Thompson, 2000; Christensen and Parfitt, 2001). If people drink water contaminated with excess nitrate, health effects may result: nitrate inhibits the blood's ability to carry oxygen, and can lead to blue baby syndrome (Pasquill, 1997). Pesticide contamination is also a serious problem. In the 1990s the U.S. Geological Survey found that the groundwater in many areas of the U.S. was contaminated. And, at more than one quarter of the sites they sampled they found two or more pesticides were present (Sampat, 2000).

The value of protection and cost of neglect

Protecting water from contamination makes economic as well as environmental sense. The city of New York is spending US\$1 billion over the next ten years on watershed protection. This is instead of spending US\$6-8 billion on new water treatment plants (EPA, 2002). Allowing contamination is costly. In the U.S. Midwest, water utilities spend US\$400 million removing the herbicide atrazine from their drinking water. But the cost of failure to clean up contamination can be much greater. Contaminated water has been associated with increased incidence of birth defects, liver and kidney damage, blue baby syndrome, cancer and other illnesses (de Villiers, 1999; Sampat, 2000).

The need for standards

The question of whether Canadian water is meeting standards is complicated by an additional question: whose standards? Drinking water quality in Canada is chiefly the responsibility of provinces and territories. To date, the federal government has only published a series of non-binding water quality guidelines (Christensen and Parfitt, 2001).

Some provinces lack mandatory sampling; others lack mandatory treatment. Only Manitoba, New Brunswick, Newfoundland and Nova Scotia have enacted watershed or well-field protection legislation aimed at preventing bacteria and chemicals from entering drinking water supplies.





Overview

Unsafe drinking water is a problem that has struck communities across Canada. In May 2001 there were 250 boil-water orders in Newfoundland and 220 in British Columbia. And, as the Walkerton, Ontario disaster illustrated, the problem is killing people. In the United States there are an estimated 900,000 cases of waterborne illness every year that result in 900 deaths. If we assume that the water we're drinking is no better than the water Americans drink, that would mean that about 90,000 Canadians become ill and 90 die — simply because they drank water, and we didn't do enough to ensure that it was safe (Schindler, 2001b).

Conclusions

As a result of lack of access to safe water 10,000 to 20,000 children die each day worldwide (Gleick, 2001b). Unsafe water is not only a problem of developing nations. Water tragedies in the U.S. and in Canada remind us that we cannot take safe drinking water for granted.

Years of neglect and abuse have led to degraded water quality in lakes, streams and groundwater around the world. Aquatic ecosystems chronically have been treated as open sewers. Nutrient pollution, toxic contamination, acid rain and other stressors have damaged ecosystems. Without protection, the situation will continue to deteriorate and essential supplies of good water will be lost and wild species will disappear with their natural habitat.

Fortunately, there is much that can be done. Agreements curbing the use of dangerous chemicals, work to clean up contaminated ecosystems, and efforts extending access to safe water illustrate progress. However, a great deal more work is necessary. Improved sewage treatment, better regulations, enforcement and practices to protect water quality are essential. We must find ways to improve efficiency in our water use and to increase education about protecting fresh waters. Reducing our use of chemicals and fossil fuels, and ensuring that wastes are disposed of safely will further protect water quality. Continued work to ensure universal access to water and sanitation will ease the human toll in the developing world, and ease global water tensions. All of these actions can make a difference and are vital components of serious water conservation and protection.

Across Canada and around the world people are making a difference in their own communities by reclaiming watersheds, encouraging safer use of agricultural, household and industrial chemicals, reporting polluters, cleaning up industry and educating others about how they can make a difference in their own lives. The bottom line is, we can't make more water. We need to make sure that our lives and our economies protect the water we have, and that we use it in a sustainable way, recognizing our obligations to others — other species, other people and future generations.

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Overview

Glossary

Acid deposition: Rain or dry deposition of acid, or acid-forming chemicals that were released by burning fossil fuels

Acid sensitive: Describes water bodies that are particularly vulnerable to the effects of acid rain due to their geology and natural water chemistry.

Aquifer: An underground formation that stores water.

Bioaccumulation: The process of progressive concentration of toxicants up the food chain.

Desalination: Removal of salts from water

Drip irrigation: Highly efficient, low water use irrigation method that provides controlled amount of water to the roots of plants.

Estuary: Coastal area where freshwater and saltwater mix

Eutrophication: Occurrence of high nutrient levels that may result in excessive plant growth and oxygen depletion

Exotic species: Non-indigenous species, also referred to as introduced species. e.g. The zebra mussel is a species exotic to North America.

Grey water: Wastewater treated for use flushing toilets, watering lawns and other functions, excluding drinking and bathing.

Groundwater: Water stored underground in soil or rock.

Microbe: Microscopic organism

Nitrate: The nitrogenous compound NO_3

Non-renewable water: water that is withdrawn faster than it is naturally re-charged.

Pathogen: Disease-causing organism

Persistent chemicals: Compounds that degrade very slowly, or do not degrade in the environment e.g. dioxins, DDT.

pH: unit of measure describing the acidity or alkalinity of a liquid. Values of pH below 7 are acidic, and above 7 are alkaline.

Renewable water: water naturally replenished within relatively short time periods e.g. water in streams or other locations that are refilled by precipitation and runoff.





Overview

Saltwater intrusion: Contamination of coastal aquifers with saltwater due to over pumping. Saltwater intrusion makes water unsuitable for drinking or irrigation.
Subsidence (land subsidence): Sinking of the land surface overlying an aquifer from which water is being pumped.

Virtual water: Water incorporated into goods

Wastewater: Water that requires treatment. Wastewater is often referred to as sewage.

Water consumption: Water withdrawn from streams, lakes or groundwater for use, but not returned to the environment.

Water meter: Device used to measure water consumption

Water withdrawal: Removal of water from streams, lakes or groundwater.

Wellfield protection: Land-use practices or legislation intended to protect groundwater used for drinking water supplies

Xeriscaping: Method of landscaping that emphasizes water conservation







Community Success Stories

Purpose

This section offers a collection of stories about successful water initiatives from across Canada and around the world. The stories are organized into seven categories: education, conservation, pollution prevention, industry, agriculture, rehabilitation and improving access.

We hope that these stories will inform and inspire you and provide the practical information you need to get started on your own water initiatives.





Introduction

The following success stories cover a wide range of water projects making a difference thanks to the efforts of dedicated people like you.

Each story overviews who is involved, funding sources and challenges the organizers have faced. We've also included lists of resources to allow you to learn more about the issues and how to find help to start your own water saving initiatives. General references are provided at the end of our Community Success Stories.

The success stories cover a wide variety of topics and range from small-scale pilot projects to more ambitious undertakings from well-established programs. What all of these profiles have in common is that they have helped ensure that water is used in a sustainable manner, and that it is accessible for all.





Education

Introduction

Many people are concerned about the state of the world's waters. However, some people are confused by the issues while others feel overwhelmed and don't know how to help.

Organizations like the Farm Radio Network, Eco Education BC, and Trout Unlimited — the organizations we've profiled in this section — are dedicated to helping people understand threats to our waters. They run programs that teach participants about how to reduce the pollution they cause and the water they waste, and how to act locally to encourage others to get involved.

By equipping people with information on water problems and ideas about how to solve them, we can go a long way towards protecting water in Canada and around the world. The following profiles describe programs that educate rural people in developing nations, children in British Columbia, and residents of Canada's urban centres. The resources listed below will give you ideas about how to get started, and what you need to learn before you to start to teach others.



Resources

Numerous teaching publications are available free-of-charge from the government of Canada. See: www.ec.gc.ca/water/

The Center for Environmental Education of Antioch New England Institute
40 Avon St.

Keene, New Hampshire 03431-3516

Email: cee@antiochne.edu

www.anci.org

Environmental Protection Association

www.epa.gov/kids/water.htm (website for kids)

www.epa.gov/teachers (EPA environmental education web site)

Give Water A Hand

216 Agriculture Hall

1450 Linden Dr.

Madison, Wisconsin 53706

E-mail: erc@uwex.edu

Give Water A Hand Action Guide is available free from the website. The action guide provides information about community projects for youth to protect water resources.





Education



Harmony Foundation

P.O. Box 50022
Unit 15 - 1594 Fairfield Rd.
Victoria BC V8S 1G1
Phone: (250) 380-3001
Fax: (250) 380-0887
Email: harmony@islandnet.com
www.harmonyfdn.ca

A series of education materials including the Community Action Workshop Manual and its companion library of profiles for action on issues such as biodiversity, climate change and water are part of a comprehensive program of education.

Learning for a Sustainable Future

45 Rideau St., Suite 303
Ottawa ON K1N 5W8

Water Education Foundation

717 K St., Suite 317
Sacramento, California 95814
Phone: (916) 444-6240
Fax: (916) 448-7699
www.water-ed.org





Eco Education BC

Eco Education BC, Vancouver

Goal of Project:

To educate students about water, how it supports life and how humans use and impact water, and in doing so to inspire students to participate in water stewardship activities

Number of People-hours Involved:

Three full time staff for the water program

Length of the Project:

Water program has been running for 4 years

Budget:

\$650,000 per year for all programs (Water, Environmental Protection, Waste Reduction, Grizzly Education and Life Cycles)

Partnerships Involved:

Environment Canada, British Columbia Ministry of Water, Land and Air Protection, British Columbia Conservation Foundation

Major Funders:

British Columbia Ministry of Water, Land and Air Protection, National Science and Engineering Research Council of Canada and some additional funding from other agencies



“For many students, water is something that comes out of the tap. It’s something they don’t think about in the larger picture or in the ecosystem” says Josha MacNab of Eco Education BC. But she adds, “water is the main component of all of our ecosystems and the foundation of all life. We work towards having students [understand this].”

Water education is one of the newer components of the Eco Education package that also addresses air, habitat, species and sustainability. The Eco Education program has been running for more than ten years. In the past, the group used mall displays and delivered the programs in gymnasiums to entire schools. Reaching young British Columbians class by class is their new approach. “We reach fewer students, but in a more effective way” said MacNab.

The group travels to classrooms across the province to teach students about the plenitude of water on earth, but the relative scarcity of freshwater. And the students learn about how we use freshwater. They discover that they use water not only for bathing and drinking, but also by using power, eating bread and reading books.

The water team focuses on teaching students about how to protect and conserve water. Students are shown simple ways to protect the environment, like using environmentally safe cleaners. The students are asked to tally the





Eco Education BC

Eco Education BC, Vancouver



hazardous products in their homes and their classmates homes, and consider what would happen if these wastes were disposed of improperly. The students can add food colouring to a groundwater model to track the flow of these contaminants from soil waters and into lakes and streams.

Students are also taught how to put a bottle in a toilet tank to reduce the amount of water they flush, and they calculate how much water they can save, and their whole class can save with this simple change.

Feedback from teachers is remarkable. One hundred percent felt that their students were engaged and involved for the entire day, and 100% would recommend the program to colleagues. The program continues to evolve. The group is trying to maintain better connections with the classes and teachers once the day is over. In the past, says MacNab “we’d go to the schools, and the kids were really excited and have all these great ideas, but we really didn’t know what happened once we left.” With a greater effort to stay in touch MacNab has been pleased with the results. “We’ve found out that a lot of teachers have initiated follow-up programs in the classroom,” said MacNab.

The program is making a difference to children’s education and the British Columbia environment. “If you don’t have information, you can’t make choices,” says MacNab. “Students really need this information so they can make sustainable choices for the rest of their lives” says MacNab. So far Eco Education BC has given the information to make sustainable choices about water to almost 10,500 students at 400 schools.

Contact Information

Josha MacNab
Programs Supervisor
Eco Education British Columbia
Suite 1101 - 207 West Hastings St
Vancouver BC V6B 1H7
Phone: (604) 683-0127
Fax: (604) 683-0190
Email: info@ecoeducation.bc.ca





Education

Honourable Mentions

Farm Radio Network

In developing nations the best way to reach people is via the radio. In 1979 that is exactly what the Farm Radio Network started to do. The group began distributing radio scripts to encourage the use of sustainable farming practices, and hasn't looked back. Scripts are about technologies and practices for small-scale farmers like using terracing and plant barriers to stop erosion, planting drought resistant crops, water conservation, water pollution, and reducing pesticide and fertilizer use. Staff of the Farm Radio Network hope that by teaching people about wise use of resources and environmental protection local people will be able to build better, healthier lives, and sustain the natural environments that they depend upon. The network now reaches millions of listeners in the developing world through its 1100 members in 100 nations. Scripts are distributed free of charge in Spanish, French and English and are translated into local languages by radio partners.



Contact Information:

Developing Countries Farm Radio Network
416 Moore Ave., Suite101
Toronto ON M4G 1C9
Email: info@farmradio.org
www.farmradio.org

Yellow Fish Road™

If you follow the yellow fish road, you'll probably end up swimming down a stream or splashing into a lake. That's what the volunteers for Trout Unlimited want you to know. The yellow fish that the volunteers paint beside storm drains are a reminder that wastes poured into storm sewers flow directly into local waters, and affect the animals that live in these waters and the people that drink from them. Once the volunteers grab people's attention with yellow fish, they distribute flyers telling them about ways to reduce the number of hazardous wastes like paints, solvents and cleaners they use, and how to safely dispose of them — taking them to hazardous waste facilities, rather than sending them down the drain to the fish at the end of the line. Volunteers get involved with the program through community groups and conservation authorities.

Contact Information:

Yellow Fish Road™
c/o Trout Unlimited Canada
Calgary AB T2P 2C8
www.yellowfishroad.org
Email: tuc@tucanada.org





Conservation



Introduction

Canada is the one of the world's most fortunate countries in terms of its natural endowment of water. It is also one of the world's most wasteful nations. Our per capita water consumption ranks a shameful second in the world — only the United States uses more per capita. On average we use more than twice as much water as the residents of many European countries. However, water conservation initiatives like those implemented in Waterloo and Iqaluit will make a difference.

Simple changes like installing low-flow fixtures and using less water in the garden will significantly reduce the amount of water you use around your home. Initiatives to encourage re-use of treated wastewater to flush toilets or manufacture cars, and projects that optimize industrial processes to demand less water can also drastically reduce consumption. And, all of these initiatives can save money.

A major barrier to water conservation is public perception. Because of our nation's wealth of water, many Canadians don't recognize that water is a limited resource. So to encourage people to use less water, we need to show them how and tell them why. The following resources and success stories will tell you more about water conservation programs, and about the importance of water conservation in the home and in business.

Resources

Canada Mortgage and Housing Corporation Toll-free: 1-800-668-2642

Fax: 1-800-245-9274

www.cmhc-schl.gc.ca

Canadian Water and Wastewater Association

2nd Floor, Unit 20

5330 Canotek Rd.

Ottawa ON K1J 9C3

Phone: (613)747-0524

Fax: (613)747-0523

www.cwwa.ca

Water Wiser, American Water Works Association

6666 West Quincy Ave.

Denver, Colorado 80235

Toll-free: 1-800-926-7337

Fax: (303)347-0804

www.waterwiser.org





Conservation

Publications:

Canada Mortgage and Housing Corporation. 2000. *Household Guide to Water Efficiency*. Information on this publication is available at www.cmhc-schl.gc.ca

O'Keefe, J. 1992. *Water-Conserving Gardens and Landscapes*. Capitol City Press: Vermont.





Water Efficiency Program

Regional Municipality of Waterloo, Kitchener

**Goal of Project:**

Encourage water conservation

Number of People-hours Involved:

Four full-time staff

Length of the Project:

1970's-present

Budget:

In 2001 budget was \$570,000

Partnerships Involved:

Numerous community environmental groups

Major Funders:

Funding is from water charges within the community

Waterloo's future depends on using its water more efficiently. The regional municipality actively encourages water conservation in homes and businesses in the area.

The regional municipality of Waterloo, which includes the cities of Cambridge, Kitchener and Waterloo and several townships, is promoting a number of conservation measures including low-flow toilets, rain barrels and industrial grey-water recycling. And, the region is dedicated to education. By encouraging children, their parents and other members of the community to conserve water the region hopes it can save enough water to delay construction of a planned pipeline to the Great Lakes.

The most successful aspect of the program according to water manager Steve Gombos, has been the toilet replacement program. If homeowners are willing to replace an old, water-guzzling toilet with a new, low-flow model, the regional municipality will chip in part of the cost. So far, Gombos estimates that at least 10% of the old water hog toilets that use 13 litres or more per flush have been removed and replaced by 6-litre flush models. Overall this saves more than 160 million litres of water per year in the region.

The region has made the project a priority in the Village of Ayr. The region estimates that they can save \$1 million simply by installing 1500 low-flow toilets, and reducing water use enough to defer plans to expand the water supply and wastewater treatment plants. And, the cost-savings aren't restricted to the municipality. A family of four can save \$65 in a single year by switching to a low-flow toilet.





Water Efficiency Program Regional Municipality of Waterloo, Kitchener

Gombos also sees reducing peak summer demand as an important part of the conservation strategy. Last year the municipality distributed 6,000 rain barrels to residents. But this wasn't enough. "It was such an overwhelming success, we had to turn away thousands of people who didn't come early enough," said Gombos. This year the regional municipality will distribute 6,000 more barrels for people to collect rainwater that falls on their roofs for use in their gardens. And, rain barrels provide a conversation piece for neighbours, to get them talking about water conservation.



Encouraging residents to switch from water guzzling grass to landscaping requiring less water is also vital to reducing water demand. "There are an increasing number of homeowners who are tired of mowing grass, watering lawns and grubs, and are replacing grass with alternatives that are low maintenance, demand little water and don't require pesticides and fertilizers." The municipality's xeriscape project in a local park helps provide people with tips, as well as an oasis within the urban landscape.

The final part of the strategy is working with industry. One of Waterloo region's successes has been through cooperation with Toyota. A two million dollar upgrade to the Toyota facility to add a water reuse program has led to 50% savings in water and means the company will be able to recoup the costs of the system within seven years. Gombos thinks highly of his partners at Toyota, "... they're doing it because they're good corporate environmental citizens." He hopes to expand the program to work with more businesses to help them reduce water consumption.

The major challenge for the program, says Gombos, has been convincing people they need to save water. "Canadians think that it is an unlimited resource, but it is limited." With the region's broad-based approach and commitment to education, Waterloo residents will realize that water is limited and will continue to work to conserve it.

Contact Information:

Steve Gombos
Manager, Water Efficiency
Regional Municipality of Waterloo
Water Services Department
150 Frederick St., 7th Floor
Kitchener ON N2G 4J3
Phone: (519) 575-4503
Fax: (519) 575-4452
Email: gsteve@region.waterloo.on.ca
www.region.waterloo.on.ca
www.trentu.ca/rarebreedscanada





Conservation Honourable Mentions



Grey water re-use system, Iqaluit, Nunavut

Reusing wastewater not only makes environmental sense but it makes economic sense as well — particularly in northern communities like Iqaluit. Providing water and sewer services in the arctic can cost more than one hundred times the price in the south. In Iqaluit not all homes are attached to the municipal water and sewage systems, meaning that water has to be trucked in and sewage must be trucked out at a high cost. But, a project is underway to dramatically reduce water use and wastewater production, and in doing so reduce demands for trucked water. In a cluster of homes in that aren't currently attached to the sewer and water grid, wastewater will be treated to produce grey water. This grey water isn't safe for drinking or bathing, but can be used to flush toilets and wash clothes. Water demand is expected to decline in homes with grey water systems by as much as one half. Although the pilot project will only serve a part of the community, municipal officials hope that the system will one day service all of Iqaluit, conserving water, reducing waste, and saving money.

Contact Information:

City of Iqaluit
P.O. Box 460
Iqaluit, Nunavut XOA OHO
Phone: (867) 979-5600
Fax: (867) 979-5922

Creative Communities Research Inc.

152 Sparkhall Ave.
Toronto ON M4K 1G8
Phone: (416) 466-5172
Fax: (416) 466-5173





Pollution Prevention

Introduction

If an ounce of prevention is worth a pound of cure, then practices to protect water quality are worth their weight in gold. Pesticides, toxic metals, and nutrients flowing into our waters can make them unsafe for swimming and drinking water. The effects of some contaminants can persist for generations.

So instead of trying to clean up existing problems, many groups are focusing on preventing future problems, limiting the effects that we have on the environment today. They may lobby municipalities for better wastewater treatment, encourage industries to clean up their acts, or offer advice on how each of us can clean up our own acts by reducing our use of hazardous chemicals like pesticides and household cleaners.

The Lake Ontario Keeper is working to make Lake Ontario cleaner by finding polluters and pressuring them to change their ways. The municipality of Hudson, Quebec has been leading the way in pesticide reduction initiatives by banning the non-essential use of pesticides, and the program “Getting a little lead out” is keeping lead fishing gear out of Ontario waterways and preventing lead poisoning in one of the emblems of the Canadian wilderness, the loon.

On a local scale groups are working to reduce mercury emissions from coal burning power plants and discarded thermometers, to reduce the effects of acid rain on Canadian waters, and to encourage companies to use and discharge fewer chemicals. Globally there is progress, including a treaty to ban many of our most dangerous chemicals, and international agreements to curb acid rain. However, with tens of thousands of chemicals in use — many of them dangerous — there is much work yet to do.

There are many projects you may undertake to protect water quality. You may want to clean up your local stream, lobby for stronger laws or encourage neighbours to safely dispose of household chemical wastes. The resources listed below should give you the information you need to get started.

Resources

Canadian Centre for Pollution Prevention

100 Charlotte St.

Sarnia ON N7T 4R2

Phone: (519) 337-3423

Toll-free: 1-800-667-9790

Fax: (519) 337-3486

Email: info@c2p2online.com

www.c2p2online.com





Pollution Prevention



International Joint Commission
Canadian Section
234 Laurier Ave. W., 22nd Floor
Ottawa ON K1P 6K6
Fax: (613) 993-5583
www.ijc.org

Pollution Probe Foundation
625 Church St., Suite 402
Toronto ON M4Y 2G1
Phone: 416-926-1907
Fax: 416-926-1601
Email: pprobe@pollutionprobe.org
www.pollutionprobe.org

Waterkeeper Alliance
Main Offices
78 North Broadway, Bldg. E
White Plains, New York 10603
Phone: (914) 422-4410
Fax: (914) 422-4437
Email: info@waterkeeper.org
www.waterkeeper.org

Publications:

Dadd, D.L., S. Lett and J. Collins. 1990. *Nontoxic, Natural & Earthwise*. Los Angeles: Tarcher, Inc.

Schultz, W. 1989. *The Chemical-free lawn : the newest varieties and techniques to grow lush, hardy grass*. Emmaus, PA. : Rodale Press.

Kenworthy, L. and E. Schaeffer. 1990. *A Citizen's guide to promoting toxic waste reduction*. New York: Inform Inc.





Lake Ontario Keeper Energy Probe Research Federation, Toronto

Goal of Project:

To serve as a pollution watchdog for Lake Ontario, protecting water quality while promoting the enforcement of environmental laws.

Number of People-hours Involved:

Estimated at 7,000 hours of staff and volunteer time. There are three full-time staff members, and numerous volunteers.

Length of the Project:

Started in 2001

Budget:

Budget for 2002 is \$150,000

Partnerships Involved:

Environment Hamilton, the Waterkeeper Alliance and others. The Lake Ontario Keeper works with local environmental groups around the lake.

Major Funders:

Grants from the Great Lakes Aquatic Habitat Network and Fund, Margaret Laurence Fund, Phelan Foundation, Percy Gardiner Foundation and individual donors.



Lake Ontario may be in better shape today than at any time in the past 50 years. If Mark Mattson can do anything about it, it's only going to get better. Mark Mattson is Lake Ontario's first lakekeeper. He's one of a group of environmental watchdogs watching out for water bodies across North America. Although the health of the lake is improving, Mark still has lots of work to do. Lake Ontario is probably the most contaminated of the five Great Lakes, and as Mark and his colleagues have discovered the lake still has many polluters along its shores.

The idea for the Lake Ontario Keeper flowed from the Hudson River, New York, in the 1980s. The Hudson was being used as an open sewer. It changed colour, and even caught fire. Dead animals floating down river regularly punctuated its flow. A group of fishermen wanted the pollution to stop. The fishermen adapted a British idea, the riverkeeper, to the American problem. In England, a riverkeeper is a game warden who protects a private river from salmon poachers. In the United States, a riverkeeper has become a person who protects waters from pollution. There are now more than 70 riverkeepers in the United States.

Mattson is new to the job of lakekeeper. The Lake Ontario keeper program has only been running since 2001, but it is already making a tangible difference. Through the work of Mattson and his colleagues polluters in the lake are getting caught and awareness is growing.





Lake Ontario Keeper

Energy Probe Research Federation, Toronto



The crew aboard the Angus Bruce, the lakekeeper's boat, has documented raw sewage flowing into the lake, and exposed contaminant-laden globules of coal tar, PCBs, ammonia and other toxic slurries. They have found leaks of radioactive materials, and most importantly, they have caused change.

Their approach is to name and shame. When the Angus Bruce and her crew cruise across contamination, they write a report. They send it to Environment Canada, but they also call the media, and local community and environmental groups. And, they've seen good results. Although the project has only been running for a year, the work of the lakekeeper has led to several government investigations.

The waterkeepers aren't afraid of legal challenges. The Hudson River group has won over 150 legal actions against polluters. The Lake Ontario keeper's group has stayed out of the courtroom so far. This group prefers using public pressure along with the threat of legal action to deter polluters, but will enter the courtroom if that's what is necessary to protect the lake.

The other job of the lakekeeper is education. Mattson and his group hope to get others to protect Lake Ontario's waters by teaching community groups about environmental investigation; instructing them on the basics, from water sampling to how to approach the courtroom. That way, the 'aquatic neighbourhood watch' won't just be based from the boat, but will involve people all along the shorelines of Lake Ontario, and the streams and rivers that flow into it. "Our role is not just to cheerlead, but to share techniques and methods, and ensure that the people using the water have the resources they need to protect it," said Krystyn Tully, Programs Director for the Lake Ontario Keeper.

In 2003 with the help of Environment Hamilton, they plan to add a second boat to patrol a pollution hotspot, Hamilton Harbour. They also plan to start patrolling the American side of the border.

The group's primary challenge has been finding the money to make the project run. But, through a number of grants and individual donors, they are keeping themselves on the water and on the lookout.

Contact Information:

Krystyn Tully, Programs Director
225 Brunswick Ave.
Toronto ON M5S 2M6
E-mail: Keeper@e-p-r-f.org
KrystynTully@nextcity.com
Web page: www.lakeontariokeeper.org





Pollution Prevention Honourable Mentions

Take a Little Lead Out

The sight of a dead loon would sadden any of us. A group of concerned citizens around Rondeau Bay are doing something to reduce preventable loon deaths with their program “Take a Little Lead Out.” After a loon swallows a lead jig or sinker, the lead enters its bloodstream, and can poison the bird so that it can no longer walk, fly or care for its young. The Rondeau Bay group has a simple solution to reduce the amount of lead entering the environment. They’re offering free sinkers and jigs made of non-toxic materials to fishers who turn in their lead. Since 1997 the group has collected 250 kilograms of lead that might have entered the environment. This is only a small portion of hundreds of kilograms of lead jigs and sinkers that are lost in Canadian waters each year, but with the help of other groups running similar programs on the Bay of Quinte, Hamilton Harbour and the Wye Marsh there will be less lead in the water, and more loons to remind us of our part in nature.

Contact Information:

Rondeau Watershed Coalition
Ridgetown ON N0P 2L0
www.ciaccess.com/~rbwrp



Cosmetic Pesticide Ban

When town councillors in Hudson, Quebec decided to ban the use of cosmetic pesticides in 1991 they probably didn’t know what kind of a fight they were in for. But, according to Hudson councillor Madeleine Hodgson, they were “willing to fight — if it [took] ten years, we’d fight ten years,” because they were concerned about the health effects of pesticide exposure, and the fate of these chemicals in the environment. Well, ten years after they passed the bylaw, the fight is over, and the pesticide companies lost. Chemlawn and Spraytech, two companies that were charged with spraying under the bylaw appealed the law right to the Supreme Court of Canada, arguing that Hudson had overextended its powers. In 2001 the Supreme Court ruled that the bylaw is legal. And now Ottawa, Halifax and many other municipalities are following Hudson’s lead, restricting the use of pesticides on lawns and in gardens within their boundaries to protect the health of their residents and the local environment.

Contact Information:

Hudson Town Hall
Hudson, Quebec





Industry



Introduction

A large proportion of Canadian water is used in industry. Manufacturing consumes 16%, mining uses 1% and thermal power generation accounts for 63% of water withdrawals in Canada. Industrial emissions of toxicants, nutrients and heated effluents also affect many of our waters. So, by working with industries to reduce their water use and emissions of hazardous chemicals, we can make a real difference in the quality of water and the quantity removed from the natural environment. As individuals and communities we can encourage industries to adopt environmentally sound practices by supporting green companies, and by pushing government for strict regulations and strong enforcement. Although many businesses and industries have environmental work to do to meet acceptable standards, we should applaud the efforts of organizations like the Greater Toronto Airport Authority and Millar Western Pulp who have worked hard to reduce their impacts on the environment and are leading the way towards greener businesses in Canada.

Resources

Business for Social Responsibility

609 Mission St., 2nd Floor
San Francisco, California 94109
Phone: (415) 537-0890
Fax: (415) 537-0889
Email: info@bsr.org
www.bsr.org/index.cfm

Canadian Council for Human Resources in the Environment Industry

Suite 1450, 700 - 4th Ave. SW
Calgary AB 2P 3J4
Phone: (403) 233-0748
Fax: (403) 269-9544
Email: info@cchrei.ca
www.cchrei.ca

Coalition for Environmentally Responsible Economies

11 Arlington St., 6th Fl.
Boston, Massachusetts 02116-3411
Phone: (617) 247-0700
Fax: (617) 267-5400
www.ceres.org/





Industry

The Gallon Environment Letter

506 Victoria Ave.
Montreal PQ H3Y 2R5
Phone: (514) 369-0230
Fax: (514) 369-3282
Email: cibe@web.net



Industry Canada

Communications Branch
Attention: Enquiry Services
235 Queen St.
Second Floor, West Tower
Ottawa ON K1A 0H5
www.ic.gc.ca

World Business Council for Sustainable Development

4 chemin de Conches
1231 Conches-Geneva
Switzerland
Phone: (41 22) 839 3100
Fax: (41 22) 839 3131
Email: info@wbcsd.org
www.wbcsd.org

Publications:

Natross, B. and M. Altomare. 1998. *The Natural Step for Business*. Gabriola Island: New Society Publishers.





Environmentally Friendlier Pulp

Millar Western Forest Products Ltd, Edmonton



Goal of Project:

Reduce water use and eliminate mill effluents by reusing wastewater in the world's first zero liquid effluent pulp mill.

Number of People-hours Involved:

Numerous staff dedicated to the design and construction of the mill.

Length of the Project:

Construction on the mill started in 1990, and it started running in 1992.

Budget:

Building the water recovery system cost \$70 million

Partnerships Involved:

Crown Investments Corporation of Saskatchewan, NLK Consultants Inc.

Major Funders:

Funding came from within the company

Millar Western's decision to build a zero-liquid effluent pulp mill was motivated by environmental responsibility as well as necessity. Meadow Lake, a shallow lake near the proposed facility simply wasn't big enough to provide the amount of water Millar Western needed for a conventional pulp mill, and the Beaver River wasn't big enough to receive the wastes the mill would produce without impacting the pristine system. Although the site lacked some things that were on the company's wish list, it had good supply of tree fibre and provided access to excellent human resources.

So the company went back to the drawing board. Using technologies from other plants and industries it came up with something radical, the world's first successful pulp mill with no liquid effluent. This meant the company could use the good fibre supply and employ local staff, while still protecting the Beaver River.

Instead of producing kraft pulp by using strong chemicals to break down wood chips to the desired fibres, the Meadow Lake Plant of Millar Western produces pulp using heat, mechanical action, and milder chemicals. BCTMP pulp, or bleached chemi-thermo-mechanical pulp is also environmentally friendlier because it produces 60-100% more usable pulp per tree than kraft processes, and uses hydrogen peroxide rather than chlorine to bleach the pulp, eliminating hazardous chlorine by-products like chlorinated dioxins and furans.

But the real breakthrough is the absence of effluent. Traditional pulp mills can be severe polluters. The water-recycling system of the Meadow Lake Plant means the Beaver River remains free of hazardous effluents. After pulp





Environmentally Friendlier Pulp Millar Western Forest Products Ltd, Edmonton

is treated and produced, the effluent is treated to remove suspended solids, evaporated then condensed to purify it, then sent to a distillation pond for biological treatment to remove organic chemicals. The water is then stored and reused in the mill. As a result of this process the mill uses only about 10% of the water used by conventional BCTMP mills and only 3% of the water used in kraft mills. And, although other mills haven't adopted the design, Millar says she thinks it is "the way of the future in the long run." The products of the mill compare favourably with products of conventional mills, and the environmentally friendly production is an important selling point in the European market.



The only drawback of the plant is cost. Building the water recovery system cost \$70 million, and operating the system is also more expensive. It uses more power, more labour and requires more maintenance. However, cost savings from reduced water demand mean that the mill is still able to keep costs competitive. Despite all of the new technology used in this project, the system worked perfectly from the outset. It was one of the quickest start-ups of any pulp mill, and there have never been any shutdowns or problems related to product quality as a result of the water recovery system.

Janet Millar is proud of the mill, and the environmental record of Millar Western, "we have a stake in ensuring environmental health, for the long-term health of the company, ourselves and our families." "We don't just talk about doing the right thing environmentally, but we're doing it," says Millar.

Contact Information:

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www.millarwestern.com





Industry Honourable Mentions



Greater Toronto Airport Authority

The chemical used to de-ice airplanes, glycol, is toxic to aquatic flora and fauna. So, it is no surprise that when people living near Pearson International Airport realized that some glycol was making it from the tarmac into local streams, they were concerned. The Greater Toronto Airport Authority (GTAA) has responded to their concerns, working to prevent glycol and other contaminants from entering local waterways. To solve the problem of glycol in local waterways, the airport built a central de-icing facility that allows them to do a better job of collecting and disposing of the de-icing chemicals. They also switched to environmentally friendlier de-icing fluids. The airport went one step further, building storm water treatment facilities to make sure that the other chemicals used at the airport, like jet fuel, hydraulic fluids and lavatory fluids weren't making it into downstream waters. The project has been so successful that airports across North America are adopting some of the technology developed in Toronto, and the Toronto and Region Conservation Authority which monitors water quality in the area nominated the airport for a Remedial Action Plan award.

Contact Information:

Randy McGill
Manager, Environment
Greater Toronto Airports Authority
3111 Convair Drive
P.O. Box 6031
Toronto ON L5P 1B2
Phone: (905) 676-5091





Agriculture

Introduction

Annually thousands of tonnes of fertilizers and pesticides are used on Canadian farms. According to Environment Canada, farmers use 10% of the water used in Canada. Around the world this figure is much higher, with agriculture demanding nearly 70% of water used.



With the recent drought in the prairies and in other areas of Canada, it is now particularly important to ensure that irrigation and livestock watering practices limit water wastage. And, concerns about the environmental and health effects of agricultural chemicals make it critical that farmers limit their application and use them in a safe manner. Widespread nitrate contamination in groundwater and nutrient pollution of streams and lakes illustrate the importance of ensuring that fertilizers are not over applied and that they stay on the fields rather than seeping into groundwater or being washed into lakes and rivers. The tragic events in Walkerton show that the consequences of agricultural runoff reaching drinking water sources can be severe.

The Prairie Farm Rehabilitation Institution and the Crowfoot Creek Watershed Group work directly with local operators to educate them about water issues and encourage them to make changes in their practices that can contribute to big improvements in the environment.

Resources

Agriculture and Agri-Food Canada

www.agr.gc.ca/

Canadian Organic Growers Inc.

P.O. Box 6408, Station J

Ottawa ON K2A 3Y6

Phone: (613) 231-9047

Email: info@cog.ca

www.cog.ca

Organic Crop Improvement Association

1001 Y St., Suite B

Lincoln, Nebraska 68508-1172

Phone: (402) 477-2323

Fax: (402) 477-4325

www.ocia.org





Agriculture



Prairie Farm Rehabilitation Association
(Offices across Canada, see website for list)
www.agr.gc.ca/pfra/

International Federation of Organic Agriculture Movements (IFOAM)
(The worldwide network of organic agriculture movements)
Head Office: Tholey-Theley, Germany
www.ifoam.org

Canadian Organic Growers
(National membership-based education and networking organization representing farmers, gardeners and consumers)
Head Office: Ottawa, Ontario
www.cog.ca





Nitrate Reduction Program

Prairie Farm Rehabilitation Institution, Beausejour, MB

Goal of Project:

Reduce nitrate leaching into groundwater by encouraging farmers to change their management practices.

Number of People-hours Involved:

400-500

Length of the Project:

1998-present

Budget:

Approximately \$10,000 per year

Partnerships Involved:

South East Soil Conservation Association, Agassiz Soil and Crop Improvement Association, South Interface Land Management Association, Stuartburn Piney Agricultural Development Association

Major Funders:

National Soil and Water Conservation Program, Covering New Ground, Rural Water Development Program, Canada-Manitoba Agreement on Agricultural Sustainability



Officials in the Eastern and Interlake regions of Manitoba suspected local farming practices might be causing nitrate contamination. But at the start of this project when they measured high levels in more than half of the sites they sampled, they grew even more concerned.

“Nitrates in drinking water are a health concern,” explains Steve Sager, a soil conservationist with Agriculture and Agri-Food Canada. Above certain concentrations “there may be health problems, particularly for babies...and for pregnant women.” The health concern Sager refers to is called blue-baby syndrome or methemoglobinemia, a condition that causes lack of oxygen in the blood.

Nitrate contamination “occurs when excess nitrate-nitrogen, the water soluble, plant available form of nitrogen, is moved down through the soil profile by infiltrating water such as from heavy rain or snowmelt. If more nitrogen is applied to the crop than it needs for plant growth, this nitrogen is susceptible to leaching,” said Sager.

Sager’s solution is to ensure farmers don’t apply more fertilizer than the crops can use. He and his colleagues conduct soil tests annually at local farms to measure nutrient concentrations. The team measures the nutrient concentrations in manure to help farmers determine how much manure to apply. They present the results to farmers, along with a number of options to modify fertilizer application





Nitrate Reduction Program

Prairie Farm Rehabilitation Institution, Beausejour, MB



and management. Farmers are encouraged to only add enough fertilizer to meet the crop requirements, and to reduce application on sandy soils where nitrogen is more likely to leach through the soil profile. They're also encouraged to apply the nitrogen in the spring when the crops are growing quickly, rather than in the fall when nitrate is more likely simply to leach into the groundwater.

If nitrate contamination is a problem because of past over application, the farmers may still have some solutions. Sunflowers, alfalfa and other deep-rooted crops reach down into the soil profile and pull the nitrogen out before it contaminates deeper groundwater.

Sager is pleased with the success of the project. Many producers who had high nitrate levels have switched to crops that demand more nitrogen and can clean up the problem. And, many more farmers are sampling their soil and manure each year to make sure they know how much nitrogen is needed and to avoid applying too much. Possibly the most important change has been increased awareness. Increasingly farmers know the issues, and that a little bit of extra nitrogen just "to be on the safe side" isn't an environmentally safe decision.

"These changes have both an economic and environmental benefit. They make better use of the nutrients applied in manure and commercial fertilizers and reduce the risk of nutrients entering surface or groundwater sources," says Sager.

Contact Information:

Steve Sager
District Soil Conservationist
Agriculture and Agri-Food Canada,
Prairie Farm Rehabilitation Association
Bag 2000
Beausejour MB R0E 0C0
Phone: (204) 268-3233
Fax: (204) 268-3609
Email: sagers@em.agr.ca





Agriculture Honourable Mentions

Crowfoot Creek Watershed Group

The Crowfoot Creek Watershed Group has a simple goal — to make sure that the water leaving the area is as clean or cleaner than it was when it entered. The group is encouraging the use of beneficial management practices — such as limiting livestock access to the creek, replanting natural streamside vegetation, and practices that prevent soil erosion and minimize runoff of agricultural chemicals into the creek. The group conducts on-farm visits and holds local meetings to inform stakeholders of water quality trends in the watershed and how they can make simple changes that will contribute to a healthier watershed and creek. The group also takes farmers and residents on tours, showing them operations where producers have made changes that mitigate their impacts on the creek and offers information on how they can improve their own operations.



Contact Information:

Crowfoot Creek Watershed Group
Attention: Phil Boehme, Watershed Coordinator
Highway 1, R.R. 1
Strathmore AB T1P 1J6
Phone: (403) 934-3321
Fax: (403) 934-4889
Email: pboehme@telusplanet.net





Rehabilitation



Introduction

Water quality and aquatic habitats have degraded in many areas of Canada and throughout the world. Some problems, like contamination from toxic chemicals, are difficult to solve. But many problems can be solved and groups like the Musqueam Fisheries Department and the Trout River Environmental Committee are working hard to return local waterways to more natural, healthier conditions.

Replanting streamside and lakeside vegetation not only improves the habitat within a waterway, but also improves the quality of water flowing into the water body. Strengthening the banks of streams and lakes, removing garbage, and removing culverts can also aid the organisms within the waters.

Rehabilitating a local waterway requires knowledge and hard work but the results are rewarding. Resources in this section will help you determine what to do, and the profiles in this section will tell you how the Musqueam Fisheries Department and the Trout River Environmental Committee have worked to bring their local waterways back to a more natural state.

Resources

David Suzuki Foundation

Suite 219, 2211 West 4th Ave.
Vancouver BC V6K 4S2
www.davidsuzuki.org

Department of Fisheries and Oceans

200 Kent St.
13th Floor, Station 13228
Ottawa ON K1A 0E6

Environment Canada

National Water Issues Branch
351 St. Joseph Blvd., 4-PVM
Hull PQ K1A 0H3
www.ec.gc.ca/water/

Trout Unlimited

c/o Trout Unlimited Canada
Box 6270, Station D
Calgary AB T2P 2C8
www.tucanada.org
Email: tuc@tucanada.org





Restoring Vancouver's Last Wild Salmon Run

Musqueam Fisheries Department, Vancouver

Goal of Project:

Restoration of Vancouver's last wild salmon run

Number of People-hours Involved:

More than 12,000

Length of the Project:

1996-present

Budget:

No fixed budget; the department seeks funding for individual projects as needed.

Partnerships Involved:

Numerous groups including the David Suzuki Foundation, City of Vancouver, University of British Columbia Museum of Anthropology, World Fisheries Trust, and B.C. Hydro.

Major Funders:

Van City, Mountain Equipment Co-op, David Suzuki Foundation members, B.C. Hydro, Department of Fisheries and Oceans, Human Resources Development Canada, Canada Trust, Golder and Associates and many others provide funding and in-kind support.



Salmon have been a central part of the culture of the Musqueam people of British Columbia for thousands of years. But, salmon populations have been in decline due to development in the Musqueam creek watershed. In 1996 when only 12 salmon made their way up Musqueam Creek to spawn, the Musqueam people decided it was time to act.

Development in the watershed has disrupted stream habitat and impeded the salmon on their way into the creek — the last stream in Vancouver with a natural salmon run. Musqueam Creek and its tributary, Cutthroat Creek, flow through golf courses where natural streamside vegetation is absent and through subdivisions where stream water quality and flow are affected. The problems for salmon are compounded by a culvert that creates a barrier to their upstream passage from the Fraser River into Musqueam Creek.

Because of the work of the Musqueam Fisheries Department and countless other organizations, the salmon are returning. In 1997-1998 forty-three salmon made the journey. And in 2000, more than 70 Chum, Coho or Cutthroat made there way home to spawn. Though the results are rewarding, the work is often difficult. Volunteers with the project have collected more than 3800 pounds of garbage. They've helped stabilize stream banks, and they've planted more than ten thousand shrubs and trees along the banks of the Musqueam and Cutthroat to help restore these streams to natural conditions.





Restoring Vancouver's Last Wild Salmon Run

Musqueam Fisheries Department, Vancouver



The restoration efforts still have a long way to go. The oral history of the Musqueam people indicates that salmon were once much more abundant. In the past the people could actually hear the large runs of salmon splashing their way upstream.

But the fisheries' department is optimistic. With the cooperation of the City of Vancouver, the culvert at the mouth of Musqueam Creek is being removed. Salmon can currently only enter the stream at high tide when the water levels of the Fraser River reach the culvert. Waiting for the high tide can be costly. Predators at the mouth of the stream, as well as high water temperatures restrict the number of salmon surviving for the trip upstream.

One barrier to the progress of the rehabilitation project has been funding. But Mathison says they can usually find the money they need for their work. Because of the status as Vancouver's last wild salmon run, the project has a high conservation priority.

Much of the work is only possible with the help of volunteers. The Suzuki Foundation organizes many of the people who help plant trees and clean up trash. University students and the Musqueam people also have dedicated a great deal of time to the project. So far, a staggering 12,000 volunteer hours have been devoted to the project. Partnerships with local businesses mean that other work needed in the watershed is done on a volunteer basis, or at low cost.

Mathison is optimistic about the future of Musqueam creek. "What we want to do is re-establish the creek, and the wild salmon run. We want to return it to its original glory." With the work of the fisheries department and its countless volunteers, Mathison's people hope to hear the abundant salmon runs splashing up Musqueam Creek once again.

Contact Information:

Ryan Mathison
Aboriginal Fishery Officer
Fisheries Department
6820 Salish Dr.
Vancouver BC V6N 4C4
Phone: (604) 263-4649
Fax: (604) 263-4842





Rehabilitation Honourable Mention

Trout River Environmental Committee

Silt-laden runoff from farms and roads in the Stanley Creek Watershed has destroyed spawning habitat for fish, and habitat for invertebrates in creeks within this watershed. With the help of the Trout River Environmental Committee, the creeks are on their way to recovery. Clay roads in the area are a major source of silt. Water pools on the roads collect silt and then run into the stream, dumping the load of silt in its waters. The group encouraged the department of transportation to improve the situation by building diversion ditches and silt traps to keep the silt from the sensitive waterways. And, they've worked with local farmers to encourage them to keep their cattle out of the streams, and allow bank-side vegetation to recover and perform its natural function of filtering out silt. The group has also planted hundreds of streamside trees and shrubs to slow the flow of water from fields into the creek, and to filter out the silt along the way.

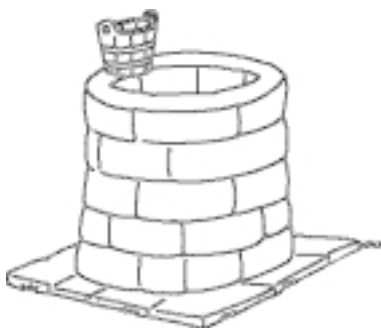
Contact Information:

Trout River Environmental Committee
c/o Terry Perry
R.R. 1
Hunter River PEI C0A 1N0
Phone: (902) 621-0637





Improving Access



Introduction

Access to clean water and sanitation is something that we may take for granted. But, one fifth of the world's people don't have access to clean drinking water, and adequate sanitation is only accessible to one half of the global population. Without clean water and adequate sanitation, millions of people die each year of preventable diseases. Access to water and sanitation are largely problems for the developing world, but people in the developed world can help.

Projects like the ones we've profiled can make a real difference by working with local people, ensuring that they have an adequate supply of safe drinking water, access to sanitary systems like latrines, and that local people know about the quality of their water and how to protect it. You can contribute to a solution by supporting organizations that improve access to water and sanitation, encouraging government spending on development projects, or going to work overseas. The following resources will help you find out more about ways to provide drinking water and sanitation to people in developing nations, and how you can get involved.

Resources

Canadian International Development Agency
www.acdi-cida.gc.ca/

International Development Research Centre
250 Albert St.
P.O. Box 8500
Ottawa ON K1G 3H9
www.idrc.ca
Email: info@idrc.ca

Sustainable Development Research Institute
2nd Floor, 1924 West Mall,
University of British Columbia
Vancouver BC V6T 1Z2
Email: sdri@sdri.ubc.ca

UNICEF
Canada Square
2200 Yonge St., Suite 1100
Toronto ON M4S 2C6
Phone: (416) 482-4444
Fax: (416) 482-8035
www.unicef.org/programme/wes/





Water Supply for Maharashtra , India

BAIF, University of Windsor Earth Sciences, Windsor

Goal of Project:

Develop a year round drinking water supply

Number of People-hours Involved:

Seven full-time staff and numerous part-time contributors

Length of the Project:

1992-1997

Budget:

\$497,000

Partnerships Involved:

Tribal and rural people of Akole Taluka, Ahmednagar District, Maharashtra State, India

Major Funders:

International Development Research Centre (IDRC)



Half a million dollars is not a high price for hope. And that is what this project provides through water.

Life in the villages of Ambevangan, Manhere, and Titvi in rural India had always been difficult due to the scarcity of water. The communities depended on monsoon waters that flowed in abundance from June to September. Then, in the months that followed the waters dwindled, and often disappeared from local water supplies. Women and children had to walk further and further in search of water to meet their basic household needs.

The shortage of water contributed to health problems among the local people. Gastrointestinal illness and skin disorders were common. Food was also scarce. Without adequate moisture in the soil, crop yields were low and nutrition was poor. And according to Frank Simpson, a professor at the University of Windsor who was involved in the project, “young people left the villages as soon as they were able.”

Although life is still difficult in Ambevangan, Manhere and Titvi, people have hope, along with water and food to sustain them.

From the outset of this project Simpson and his colleagues were committed to involving local people. Public meetings respected community residents and traditional practices. They worked hard to integrate local religious beliefs, traditional knowledge and local land management practices into the project. They recognized that for the project to be sustainable it would have to have the support of the local people, and would need to build upon existing knowledge within the communities. Simpson notes that gaining the





Water Supply for Maharashtra, India

BAIF, University of Windsor Earth Sciences, Windsor



trust of the local people was instrumental, and the BAIF field staff were invaluable in this regard.

Once Simpson and his colleagues understood the hydrology and geology of the area they identified suitable water conservation technologies. Then they went to the local people and asked them to help select technologies that were compatible with local knowledge and land-use practices.

With the assistance of local people, the groups built ridges, trenches and terraces that trap and divert monsoon waters underground. Dams and springs improved water access. Existing wells were deepened or repaired to tap the increased groundwater supply, and create a year-round supply for local use. Increases in soil moisture as a result of these changes led to increases in crop yields and local people were able to increase the area of cropland under cultivation.

The health and economic well being of the entire community has benefited from the project. People were taught to use latrines, wash their hands, and boil drinking water. These simple measures have contributed to the disappearance of many water-related diseases. Financially, not only do people now have sufficient and healthier foods, but they often have produce to sell at local markets.

Social changes also have resulted. Freeing women from the onerous task of water gathering, the project has allowed them to adopt new roles in the community. One group of women “has installed and now operates a flour mill, to replace the stone grinders that took so much of their energy and time. Another group manages the sale of grain and is active in the operation of a nursery. Freed from the drudgery of traditional water-related hardships, women are able to work for longer periods in the fields and are seen as full partners by the men,” says Simpson.

Young people are starting to stay in the villages. Simpson says young people “no longer automatically migrate to towns”, because they “regard staying home in their villages as a worthwhile option.”

People have not only embraced the new technologies, but have taken responsibility for maintaining them. This means that the people of Ambevangan, Manhere, and Titvi will have food and water to sustain them well into the future. “Empowerment through knowledge” — a dictum of the International Development Research Centre was illustrated in this project that built hope by improving the lives and skills of local residents.

Contact Information:

Frank Simpson, Professor of Geology
Earth Sciences, University of Windsor
Windsor ON N9B 3P4
Email: franks@uwindsor.ca





Improving Access Honourable Mentions

Aquatox

By getting students involved in testing water, the International Development Research Centre hopes to give people around the world access to information about water quality and to give students a sense of the importance of protecting local water supplies. As a part of the Aquatox program students of more than 78 schools in 26 countries have learned to perform simple tests to determine whether their water is contaminated with chemicals or bacteria. Students germinate plants in water to try to determine whether water quality has affected their growth. They can also watch Hydra, a freshwater organism, for telltale changes in shape that indicate toxic contaminants are present. Finally students can use indicator strips to test for evidence of faecal contamination.

Contact Information:

Aquatox Coordinator
Ecosystem Approaches to Human Health Program Initiative
International Development Research Centre
P.O. Box 8500
Ottawa ON K1G 3H9
Fax: (613) 567-7748
www.idrc.ca/aquatox





Additional References

British Columbia Conservation Foundation

Head Office

#206 - 17564 56A Ave.

Surrey BC V3S 1G3

Phone: (604) 576-1433

Fax: (604) 576-1482

Email: systems@bccf.com

<http://bccf.com>

Dedicated to conservation and stewardship of British Columbia ecosystems and species

Canadian Environmental Law Association

517 College St. Suite 401

Toronto ON M6G 4A2

Phone: (416) 960-2284

Fax: (416) 960-9392

www.cela.ca

Uses existing laws to protect the environment and advocate environmental law reform

Canadian Environmental Network

300-945 Wellington St.

Ottawa ON K1Y 2X5

Phone: (613) 728-9810

Fax: (613) 728-2963

Email: info@cen-rce.org

www.cen-rce.org

Network of hundreds of environmental non-governmental organizations

Conservation Council of New Brunswick

180 St. John St.

Fredericton NB E3B 4A9

Phone: (506) 458-8747

Fax: (506) 458-1047

Email: ccnb@nb.aibn.com

www.web.net/~ccnb/

Promotes solutions to pollution and resource destruction and acts as a citizen's watchdog in New Brunswick

Environment Canada

National Water Issues Branch

351 St. Joseph Blvd., 4-PVM

Hull PQ K1A 0H3

Phone: (819) 953-6161

Fax: (819) 994-0237

www.ec.gc.ca/water/

Branch of Environment Canada that handles water issues





Additional References

Food and Agriculture Organization of the United Nations

FAO Liaison Office for North America

275 K St. N.W. Suite 300

Washington DC 20437

Phone: (202) 653-2400

Email: FAO-LOWA@fao.org

www.fao.org

Look at the AQUASTAT section for information on water and agriculture

Green Communities Association

Box 928

Peterborough ON K9J 7A5

Phone: (705) 745-7479

www.gca.ca

Building sustainable communities

Nature Conservancy

110 Eglinton Ave. W., Suite 400

Toronto ON M4R 1A3

Phone: (416) 932-3202

Toll-free: 1-800-465-0029

Fax: (416) 932-3208

www.natureconservancy.ca

Preserving ecologically significant areas through land purchase, donations and conservation easements.

Pacific Institute

Colorado Office

948 North St., Suite 7

Boulder, Colorado 80304

Phone: (720) 564-0651

Email: co_office@pacinst.org

www.pacinst.org

Conducts research and policy analysis in areas of environment, sustainable development and international security. Look at the biennial report on Fresh Water Resources of the World by Peter Gleick

The Pembina Institute

Box 7558

Drayton Valley AB T7A 1S7

Phone: (780) 542-6272

Email: piad@pembina.org

www.pembina.org

Work focuses on three themes: energy and the environment, environmental economics and sustainable resource management





Additional References

Pollution Probe Foundation

625 Church St. Suite 402

Toronto ON M4Y 2G1

Phone: (416) 926-1907

Fax: (416) 926-1607

www.pollutionprobe.org

*Group works on issues related to air, water, energy and indoor environmental issues.
The water program currently focuses on ensuring clean, safe drinking water in Ontario.*

Sierra Legal Defence Fund

Vancouver Head Office

#214 131 Water St.

Vancouver BC V6B 4M3

Phone: (604) 685-5618

Toll-free: 1-800-926-7744

Fax: (604) 685-7813

Email: sldf@sierralegal.org

www.sierralegal.org/

Protects the environment by upholding and enforcing the law; provides free legal advice to environmental groups and concerned citizens

Toxics Watch Society of Alberta

10511 Saskatchewan Dr.

Edmonton AB T6E 4S1

Environmental and public health issues related to toxic substances and pollution

United Nations Environment Programme

United Nations Ave., Gigiri

P.O. Box 30552

Nairobi, Kenya

Email: eisinfo@unep.org

www.unep.org

Encourage sustainable development through sound environmental practices

WaterAid

Prince Consort House

27 - 29 Albert Embankment

London SE1 7UB

England

Email: campaigns@wateraid.org.uk

www.wateraid.org.uk

Provision of safe water and sanitation to the world's poor people





Additional References

Water Environment Federation

601 Wythe St.

Alexandria, Virginia 22314-1994

Toll-free: 1-800-666-0206

Fax: (703) 684-2492

www.wef.org

Preservation and enhancement of the global water environment

Worldwatch Institute

1776 Massachusetts Ave., N.W.

Washington, D.C. 20036-1904

Phone: (202) 452-1999

Fax: (202) 296-7365

Email: worldwatch@worldwatch.org

www.worldwatch.org

Informing policymakers and public about global problems and links between the environment and economy







Water: Fast Facts

Purpose

The following “Fast Facts” provide a snapshot of water: its vital importance for life and what we need to do to protect it. The information is presented in graphic form and in points for quick reference. Some of the information you’ll have seen in the Water Overview, but the Fast Facts provide additional facts and figures that drive home the reality of biodiversity loss.

If you are using *Troubled Water: Profile for Community Action* in conjunction with our *Community Action Workshop Manual*, Fast Facts is an excellent handout to provide participants in Module 2, Activity 2: Analysing Our Issue. Consider it a part of the Participant’s Workbook that you distribute to participants in advance of the Workshop.

TABLE 1: SHARE OF THE WORLD’S RENEWABLE FRESHWATER SUPPLY

Brazil	18%
Canada	9%
China	9%
United States	8%

(Environment Canada, 2001a)





Water: Fast Facts

WHAT ARE THE ISSUES?

- We are using too much water. Our current rate of water consumption is excessive and not sustainable.
- We are polluting our waters with toxic chemicals such as PCB's, DDT and dioxins that bioaccumulate in the food chain leading to health problems for people who drink water and eat contaminated fish (EPA, 2001).
- All species need an adequate supply of clean water to live. Each person requires 2.4 litres of water each day, which we get in our food and from drinking water.
- As humans, we depend on water not only for drinking, but also for countless other purposes including food production, transportation, energy production, manufacturing and recreation. The average Canadian uses 343 litres/day.
- There is a danger that international trade agreements like the North American Free Trade Agreement may limit the ability of governments to control the export of water, which would reduce water levels in Canada.

HOW DO WE USE WATER?

- In Canada water is chiefly used in generating power, manufacturing, municipal water use, agriculture and mining using the balance. (Environment Canada, 2002)
- In our homes the majority of water is used to flush toilets and for baths and showers. (Figure 2 is Environment Canada, 2002)
But in the summertime, water use can increase by 80% largely to keep our grass green. (City of Toronto, 1998)
- Globally water is allocated quite differently. About 67% of water is used in agriculture, and most of this water is spent on irrigation. (Intergovernmental Panel on Climate Change, 2001)

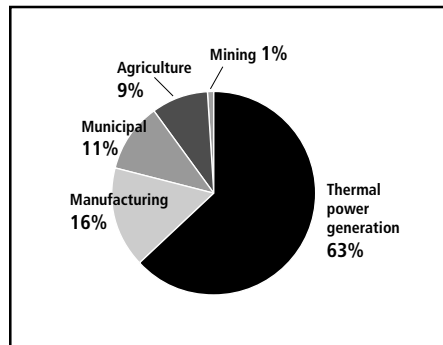


FIGURE 1: USES OF WATER IN CANADA

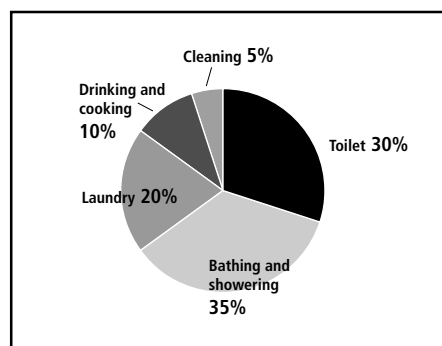


FIGURE 2: USES OF WATER IN THE CANADIAN HOME





Water: Fast Facts

WHY SHOULD WE CONSERVE IT?

- The Canadian Prairies and American Plains, major food production areas, are struggling through a long-term drought.
- Lower levels of the Great-Lakes are affecting shipping and navigation.
- In some areas of Canada, water is too contaminated to use for drinking or in agriculture without expensive treatment.
- By pulling too much water from the ground, and from lakes and streams, we are draining our freshwater ecosystems and causing many problems.
- By conserving water, we not only protect these ecosystems, but we can save money since water treatment of polluted water is costly.
- Canadians are the second greediest water users in the world (Figure 3), using about 343 litres of water per day.
- Our water supply is limited. Most of Canada's fresh water drains north, away from the 84% of Canadians who live within 300km of the American border (Environment Canada, 2002).

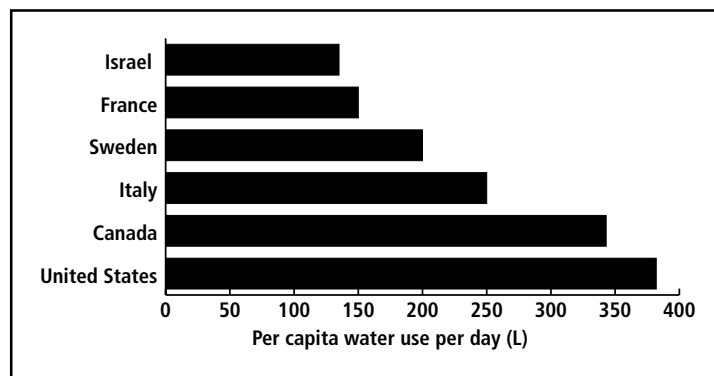


FIGURE 3: DAILY PER CAPITA WATER USE BY COUNTRY

HOW CAN WE CONSERVE IT?

Encouraging water conservation in businesses and industry is vitally important but there are also simpler ways to conserve water in your home.

- Switching to a low flow toilet can cut the amount of water you flush by more than two-thirds.
- Fixing leaking taps, using low-flow aerators and showerheads can also make a difference.
- Using a rain barrel to collect rainwater for your garden.
- Landscaping with drought tolerant plants, rather than high-water demand grasses and plants.
- Save water by buying less:

TABLE 2: WATER USE BY PRODUCT

Product	Amount of Water Used
1L gasoline	10L
1kg paper	300L
1kg steel	195L
1 car	120,000L

(Postel 1992; Environment Canada, 2002)





Water: Fast Facts

ARE WATER SUPPLIES KEEPING UP WITH DEMAND AROUND THE WORLD?

- Agriculture using unsustainable water supplies provides 10% of the world's food (Postel, 2000).
- According to the International Water Management Institute, groundwater depletion is the "single most serious problem in the entire field of water resources management" (Leslie, 2000).
- Population growth is increasing demands for decreasing water supplies.
- Pressure is growing for bulk water export and opponents fear the loss of Canadian control.
- So much water is removed from the Nile and Colorado Rivers that they do not reach the sea for days at a time (Postel, 2000).

WATER: A TRADEABLE GOOD?

- The Ontario government has licensed the withdrawal of 18 billion litres of water a year for bottling (Shrybman, 2002).
- Existing trade agreements may stop the Canadian government from imposing a preventative ban on water export.
- Policies need to be developed to deal with humanitarian requests for water exports.

WHAT IS THE STATE OF OUR WATERS?

- Water quality is declining
- In Canada each year 12,000 tonnes of phosphorus and 304,000 tonnes of nitrogen are added to Canadian waters. These nutrients cause overgrowth of aquatic plants. When the plants decay, oxygen depletion can result, killing many aquatic organisms (Chambers et al., 2001).
- Acid rain is a continuing problem in Canada, and it is a growing problem in the developing world, harming both water and food supplies.
- Each year in the U.S. it is estimated that 34 billion litres of dangerous chemicals are released into the ground (Sampat, 2000).

WHAT IS THE STATE OF DRINKING WATER?

- In the United States there are an estimated 900,000 cases of waterborne illness every year that result in 900 deaths
- If the above statistic is extrapolated to Canada, 90,000 Canadians become ill and 90 die from drinking Canadian water (Schindler, 2001b).
- Nitrate contamination and bacteria affect 20-40% of rural wells in Canada (Government of Canada, 1996).
- In May 2001 there were 250 boil-water orders in Newfoundland and 220 in British Columbia.
- Drinking water in Canada is protected by a patchwork of provincial legislations. Some jurisdictions still do not require sampling, while others do not require treatment or watershed protection.

DRINKING WATER IN THE DEVELOPING WORLD

- Approximately 1/5 of the world's people don't have access to clean drinking water (Leslie, 2000).
- Almost 1/2 of the world's people don't have access to basic sanitation (Leslie, 2000).
- More than 250 million cases of water-related diseases occur each year (Gleick, 2001a).
- 5-10 million people die each year of water-related diseases (Gleick, 2001a).

THE FLOW OF HUMANITARIAN AID

- Canada and other water-wealthy nations need to develop humanitarian aid policies for water-deprived nations. Canada has 9% of fresh water in the world and .5% of the world's population. Canadians use 150 times the amount of water per day required for personal survival.





Personal Action Checklist

Purpose

If you're serious about protecting the water on life on this planet, there are some very tangible actions you can commit to today. The following "Personal Action Checklist" gives you an excellent starting point for living lightly on the earth. Look over the ideas and decide what changes you can make in your own behaviour. Never underestimate the difference that one person can make!





Personal Action Checklist

In your home:

Safely dispose of household hazardous wastes like left over paints, varnish, pesticides, medications, and cosmetics. Medications should be returned to your pharmacist. Hazardous materials should be taken to a hazardous waste disposal site. Chemicals should never be allowed to enter storm drains.

- Conserve water: Use low-flow showerheads, faucets and low-flow toilets or toilet dams. Turn off the tap when you are brushing your teeth and take short showers instead of baths. Consider a front-loading washer when you buy your next washing machine. Repair leaking faucets and toilets.
- Choose non-toxic or, at least, less-toxic chemicals for cleaning around the home. Baking soda, lemon juice, ammonia, and vinegar are all safe, economical cleaners. Use low-phosphate or phosphate-free detergents.
- Conserve water: Use low-flow showerheads, faucets and low-flow toilets or toilet dams. Turn off the tap when you are brushing your teeth and take short showers instead of baths. Consider a front-loading washer when you buy your next washing machine. Repair leaking faucets and toilets.
- If you use a septic system make sure it is functioning properly. Reducing your water use will also help prevent the system from overloading.
- Buy organic food.

In your garden:

- Limit the amount of water you use on your lawn and in your garden, and water only in the morning and evening to limit water losses to evaporation. Use slow watering techniques.
- Use a rain barrel to supply water for plants.
- Restrict your use of pesticides and fertilizers, or better yet, stop using them. If you use chemicals, make sure you buy them only in the amount you expect to use, and apply them as directed.
- Garden with native and other plants that require little water, and little or no fertilizers or pesticides.
- Landscape your property to prevent erosion.
- Avoid creating large areas of concrete or pavement as water runs off into the storm sewers. Instead, maintain trees and shrubs that encourage infiltration of rainwater.

In your community:

- Drive only when necessary. Cars emit acid gases that contribute to acid rain, as well as toxic metals like mercury. SUV's produce 70 times the emissions of an automobile.
- Encourage community leaders to ban or restrict pesticide use on city property and private property.
- Make sure your community has a good groundwater protection program in place.
- Participate in clean up efforts for local waterways.
- Keep tabs on changes in local planning and zoning to make sure development in your watershed is sustainable.

With your government representatives:

- Promote stronger groundwater protection programs and better drinking water regulations, testing and enforcement.
- Push for the adoption of precautionary approach to licensing chemicals.
- Fight for stronger environmental laws and enforcement of existing laws.





Once while the sage Choni was walking along a road, he saw a man planting a (carob) tree. Choni asked him, "How many years will it require for this tree to give fruit?" The man answered, "It will require 70 years." Choni asked, "Are you so healthy a man that you expect to live that length of time and eat its fruit?" The man answered, "I found a fruitful world because my ancestors planted for me. So will I do for generations to come."

Harmony Foundation of Canada is a charitable organization dedicated to achieving environmental progress through cooperation and education. Harmony's education activities provide the knowledge and skills needed to help people and organizations achieve their environmental goals and improve their practices.

Harmony's innovative programs have been recognized with a **Global 500 Award** (1992) from the United Nations Environment Programme, a **Commonwealth Foundation Fellowship** (1994), and an **Ethics in Action Award** (1998).

Since 1985, Harmony Foundation has:

- Established the *Institute for Environmental Values Education*, which creates educational publications and provides training for educators and community leaders from around the world.
- Developed *Building Sustainable Societies* to encourage, support and promote cooperative community action for the environment. Combining leadership training, the *Community Action Workshop Manual* and a series of issue specific profiles, the program offers the process and content needed to create practical community and school projects.
- Created a series of *Youth Vision* projects providing young people with life and work skills through community service.
- Developed *Green Works*, a ground-breaking training program to assist organizations and communities to develop workplace environmental programs.
- Designed *ECOMmunity*, a multi-stakeholder training program to assist communities in the development of a sustainable community plan.
- Provided many learning resources for schools, workplaces, community groups and individuals to encourage improved environmental practices.



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