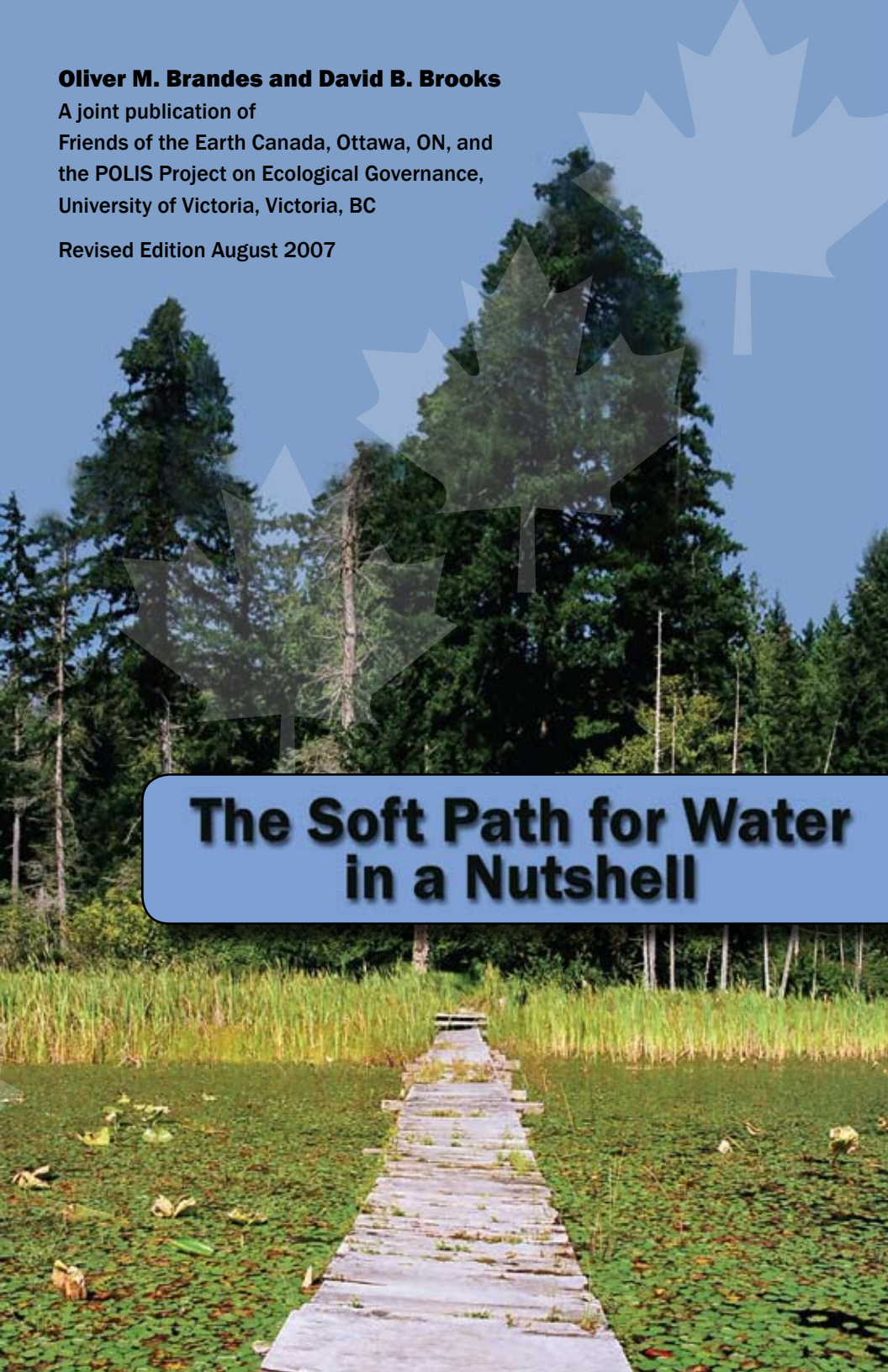
Oliver M. Brandes and David B. Brooks

A joint publication of
Friends of the Earth Canada, Ottawa, ON, and
the POLIS Project on Ecological Governance,
University of Victoria, Victoria, BC

Revised Edition August 2007



The Soft Path for Water in a Nutshell

CONTENTS

Acknowledgements

Many people have contributed to this publication. The authors wish to recognize the editorial and substantive contributions of Jill Austin, Toby Brooks, Susan Holtz, Tony Maas and Ellen Reynolds. Brad Hornick and Ellen Reynolds provided the creative flare for the design and layout. Thank you also to the Walter and Duncan Gordon Foundation for its generous financial support for both the POLIS Sustainable Water Project and Friends of the Earth Canada Soft Path Initiative.

Originally published in November 2005.
Revised to include research results in August 2007.
Cover photo: Brad Hornick.
Printed on 100% recycled paper.

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EXECUTIVE SUMMARY — THE SOFT PATH FOR WATER IN A (SMALL) NUTSHELL

Many Canadians believe that our fresh water resources are boundless. The truth is that only a small proportion of our water is renewable and located close to where most Canadians live. Continuing to take more and more water from nature while ignoring wasteful use at farms, factories and households will likely lead us to an arid future of our own making.

The best way to secure the future for fresh water is to develop a plan that draws all "new" water from better use of existing supplies and to change habits and attitudes.

The "soft path" is a planning approach for fresh water that differs fundamentally from conventional, supply-focussed water planning. It starts by changing the conception of water demand. Instead of viewing water as an end product, the soft path views water as the means to accomplish certain tasks. The role of water management changes from building and maintaining water supply infrastructure to providing water related services, such as new forms of sanitation, drought-resistant landscapes, urban redesign for conservation and rain-fed ways to grow crops.

Reducing water demand provides the cheapest source of "new" water. It can also be implemented more quickly and is less environmentally damaging than any supply alternative. Most current demands can be met with far less water—and with water of lower quality—than is currently used. High-efficiency toilets, for example, can reduce the amount of water used with each flush by 75 per cent. Further reduction is possible by using reclaimed wastewater rather than drinking water to flush toilets—further yet with dry sanitation systems that eliminate water use altogether.

The soft path is a planning approach that allows us to unleash the full potential of demand management by changing water-use habits, technologies, and practices. As a matter of principle, the soft path works within ecological limits and promotes local public participation to ensure sustainability of our water resources.

Soft path planning looks 20 to 50 years into the future and proposes major changes in our water infrastructure and institutions. The focus is on designing and implementing policies and strategies today that can reduce or even eliminate the need for further supply-side developments for the foreseeable future. Simply put, the soft path offers various routes to guide our current water management onto a sustainable path for long-term ecological and social prosperity.

"Desertification" is the result of inappropriate land use.

AVOIDING AN ARID FUTURE

Although Canada ranks high among the nations of the world in per capita fresh water availability, a host of factors conspire to make our abundance more apparent than real:

- **Geography**—most of our big rivers flow northward, while we live mainly in the south.
- **Hydrogeology**—less than 2 per cent of the water in the Great Lakes is renewable; the rest is a stock that, if withdrawn, will not be replaced.
- **A Tradition of Over Use**—we are second only to the United States in per capita water use.
- **Poor Management**—we waste more water than we use productively.
- **Wild Cards**—climate change (including diminishing glaciers and longer drought periods), ecosystem deterioration (including widespread loss of wetlands and aquifer subsidence), and new forms of pollution (including endocrine disrupters and pharmaceuticals) pose unknown future challenges.

Evidence of emerging problems is not hard to find. Box 1 outlines some of the current threats identified by Environment Canada. The Canadian belief that our water resources are boundless is deeply entrenched. We must be willing to rethink the ways our freshwater resources are supplied, distributed and, most importantly, used to avoid an arid future of our own making. Innovative water management and new consumption practices are critically needed.

The soft path offers just such an approach. It has great potential for changing the way we manage and use fresh water in Canada—a potential that leads to both prosperity and sustainability.

Box 1: Water Threats in Canada

- More than one quarter of Canadian municipalities have faced water shortages.
- Failure to protect water quality resulted in death in Walkerton, Ontario and illness in North Battleford, Saskatchewan (and elsewhere).
- About one third of Canadians depend on groundwater to supply our homes, but we know little about the extent or the nature of this resource.
- As a result of global warming, glaciers have lost half or more of their volume in the last 100 years, so river levels that are high today will likely be lower tomorrow.
- Falling water levels in the Great Lakes are causing significant economic losses and adverse effects on almost all uses.

Source: Environment Canada, 2004.

Many glacier volumes are 50 per cent of hat they were 100 years ago.

CHOOSING FROM THREE PATHS

The spectrum of approaches to water management ranges from supply management at one end through demand management in the middle, and soft path at the other end. As summarized in Box 2, these approaches differ in philosophy, process and outcome. However, together they represent incremental steps toward a more sustainable water management regime.

Supply Management — **Demand Management** — **Soft Path**

This spectrum of water management approaches refers to the more traditional definition of demand management. Some municipalities are beginning to apply a broader, more integrated demand management approach—one that, over time, may shift water management along such a continuum toward a soft path.

Wetlands and swamps are complex ecosystems critical for water storage and purification.

Box 2: A Spectrum of Water Management Approaches

Policy	Dominant Discipline	Range of Policy Choices	Fundamental Question	Planning Process	Outcome
Supply Management	Engineering	Policies based on presumed need for new infrastructure.	How can we meet projected water needs given current trends in water use and population growth?	Planners extrapolate from current consumption patterns to determine future "requirements" and then locate and develop new sources of supply to meet this projected demand.	Construction of dams, pipelines, canals, wells, desalination systems, and interbasin transfers, where necessary.
Demand Management	Economics	Policies based on short-term cost-benefit calculations.	How can we reduce needs for water to conserve the resource, save money and reduce environmental impacts?	Planners incorporate efficiency and information programs together with improved pricing patterns to maximize use of existing infrastructure. Increasing capacity is only one option among others in a least-cost approach.	Efficiency gains through technical fixes and consumer education.
Soft Path	Multidisciplinary	Policies based on stakeholder consultation and political review.	How can we deliver services currently provided by water in ways that recognize the need for economic, social and ecological sustainability?	Planners model a sustainable future state for water use with attention to long-term economic and social prosperity. They then "backcast" to devise a feasible and desirable path to reach that state. Ecological sustainability is fundamental to all economic, political and socio-cultural choices.	Options to reduce water use through innovation, conservation, water reallocation and changing patterns of use and re-use. More water is left in situ.

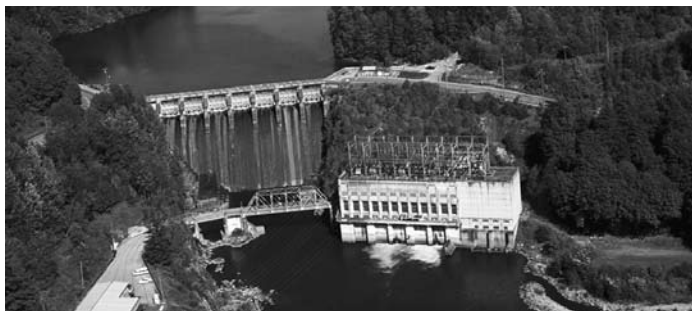
SUPPLY MANAGEMENT — BUILD IT AND THE WATER WILL FLOW

The traditional response to water scarcity is simply to develop more supply. In Roman times, and even earlier, centrally managed agencies built dams and dikes, or dug to groundwater, and then ran pipes, aqueducts and tunnels to farms, factories, and cities.

Supply management has produced huge benefits throughout history: potable water for almost everyone whenever and wherever it's wanted; irrigation for farmers to support growing markets; as much water as industry wants; and generally enough left over for swimming pools and gardens. The major uses for water in Canada are listed in Box 3.

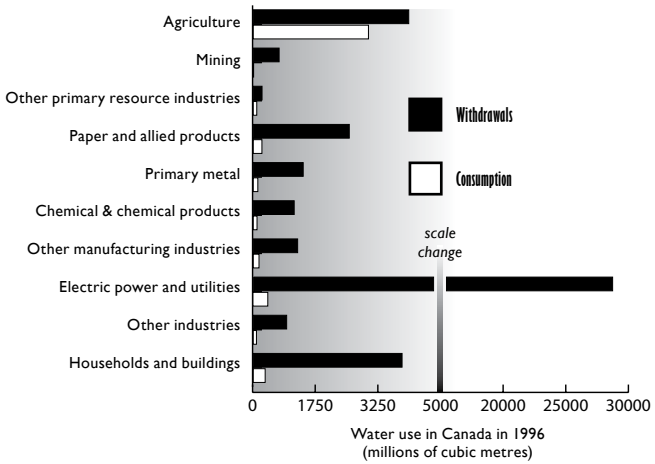
Roman aqueduct.

Unfortunately, supply-side management also has many adverse consequences for our environment. Rivers that used to run free are now sluggish; water tables are sinking; and, natural habitat is disappearing. The promise of a safe, abundant supply of fresh water can no longer be guaranteed. In most cases, the best and cheapest sources of water have already been tapped, and costs (per cubic metre) to develop new water supplies are doubling every decade or so.



Ruskin Dam and Powerhouse, BC. (Photo courtesy of BC Hydro.)

Box 3: Who Uses All That Water?



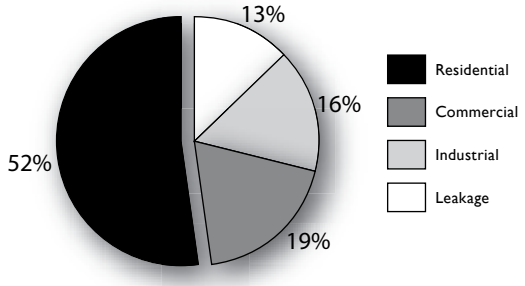
Water use in Canada in 1996
(millions of cubic metres)

Note 1: Withdrawals show the amount of water taken from surface or groundwater. Consumption shows the amount ***not*** returned to the same sources.

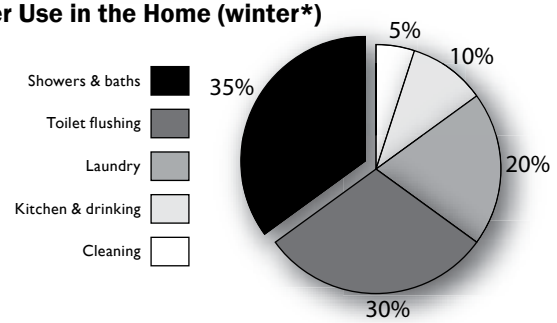
Note 2: No full data set for water use in Canada has been published since 1996.

Source: Human Activity and the Environment, Annual Statistics 2003, Statistics Canada.

Municipal Water Use by Sector, 1999



Water Use in the Home (winter*)



* In summer, 50% or more of water is used outside the home (e.g. water for lawns and gardens).

Source: Environment Canada web site www.ec.gc.ca/water accessed Oct. 2005.

DEMAND MANAGEMENT — THE BEST SOURCE OF 'NEW' WATER

Demand management[1] is a strategy that recognizes water limits and searches for cost-effective measures to cut water use. Greater efficiency ("more crop per drop" in the jargon of irrigation) can reduce the demand for water and save money. Common demand management measures include volume-based pricing, low-flow faucets and toilets, drip or sprinkler irrigation, and recycling and reuse. For example, low-flow toilets cut water use per flush by about 75 per cent—and those reductions can be increased even further if reclaimed wastewater, rather than drinking water, is used for flushing. Demand management has always been part of how water systems operate, although generally as a secondary or temporary option until additional supplies are secured. Demand management can no longer be viewed as a second best approach. It must become the priority for water management. In the face of current uncertainty and change, reducing the demand for water is our best "source" of "new" water.

Today's increasing water costs greatly expand the potential for demand management—so much so that experts believe that cost-effective water savings of 20-40 per cent are readily available. Box 4 describes a recent California study that demonstrates how comprehensive demand management can be the cornerstone for a 21st Century approach to water management that saves money, protects the environment and promotes long-term societal prosperity.

Box 4: Taking Demand Management Seriously in California

A recent study of water use in California by the Pacific Institute (*Waste Not Want Not*) shows that total urban (residential, commercial, institutional and most industrial) water use could be cut by 30 per cent using "off-the-shelf" technologies. Equally important, the additional water can be obtained at lower cost and more quickly than any new supply project can be brought into operation. As a result, even if California continues to grow at its current rapid pace, no new supply projects would be required for at least another several decades.

Source: Gleick, Peter H. et al. 2003. *Waste Not, Want Not: The Potential for Urban Water Conservation in California, Oakland, California*: Pacific Institute for Studies in Development, Environment, and Security. Available at www.pacinst.org.

[1]Also referred to as demand-side management, or DSM, when implemented by a utility.

THE SOFT PATH — SHIFTING THE APPROACH

As demand management programs become more comprehensive and longer term, they approach a holistic way of thinking about water—the **soft path**.[2] As with demand management, the soft path strives for efficiency in water use, but goes beyond efficiency by fundamentally challenging today's patterns of freshwater consumption.

Demand management focusses on "how"—how to do the same with less water. The soft path, in contrast, focusses on "why"—why use water to do this in the first place?

- Why, for example, do we use water to carry away our waste? Demand management would urge low-flow toilets, but waterless systems are available—perhaps not for homes (because of the need for regular maintenance), but certainly for larger buildings. On-site methods of waste treatment and reuse are also available, with total freshwater savings of 80 to 90 per cent possible.
- Why do we use half the potable water that is piped to a house in the summer for watering lawns and gardens—and sidewalks? Demand management would urge more efficient sprinklers with automatic shut-offs, maybe even watering restrictions. The soft path goes further: recycling water from bathtubs and washing machines or, better yet, drought-resistant greenery that requires little or no watering once it is established.

By focussing on "why" the soft path greatly increases the number of possible solutions. The approach is broadly applicable, not just to houses and gardens, but also large buildings, factories, and farms—indeed across sectors and to entire cities.

[2] The soft path for water concept is adapted from the energy field. Amory Lovins coined the term "soft energy path" in a 1976 *Foreign Affairs* article, and eventually developed a planning approach that carefully calculated requirements for energy services with great emphasis on economic efficiency, environmental protection, and democratic management. For more information, see: Amory B. Lovins, 1977. *Soft Energy Paths: Toward a Durable Peace*. Cambridge, Massachusetts: Ballinger/Friends of the Earth.

WHAT MAKES A SOFT PATH SOFT?

Four principles distinguish the soft path from conventional planning and management:

- Treat water as a service rather than an end in itself.
- Make ecological sustainability a fundamental criterion.
- Match the quality of water delivered to that needed by the end-use.
- Plan from the future back to the present.

Box 5: Why is This Approach Called a 'Soft Path'?

The approach is called a "soft path" partly because it requires less steel and concrete, which makes it gentler on the environment. But it gets its name mainly because it relies more on human ingenuity and innovation to "solve" society's water problems— working with nature rather than trying to overcome it.

Water As a Service

Except for a few relatively small human uses, such as drinking and washing (and much larger amounts used to support ecosystems), a soft path approach does not view water as a final product. Instead, water is viewed as a means to accomplish specific tasks, such as sanitation, attractive yards, or agricultural production. This change of perspective liberates water planners and managers from the constraints of merely supplying more water and permits them to innovate with alternatives to water-based services. The objective is not to flush toilets or to irrigate crops, but to remove wastes and to grow food. If we can achieve those goals with less supplied water, we have the potential to cut costs, protect the environment, and enhance local control.

Drought resistant planting at Abkhazi Garden, Victoria, BC

Water is valued for itself, not just as a commodity. (Photo courtesy of Brad Hornick)

When water is viewed as a service, managers don't focus exclusively on traditional technologies and infrastructure. They also promote education and social marketing, local reuse and recycling, urban re-design for conservation, and different modes of farm management. Changing practices and behaviour offers a range of ways to reduce water use while maintaining desired services.

Ensuring Ecological Sustainability

Soft paths recognize ecosystems as legitimate users of fresh water and as the foundation of much of our economy. Therefore, standard cost-benefit analysis is not sufficient to ensure basic ecological resilience and ecosystem health. Environmental constraints are built in from the start to limit the amount of water withdrawn from natural sources and to establish conditions on the quality of water returned to nature.

Of the many soft paths that exist (see below), each one must be tested for its affects, and any option—be it source or use—that puts environmental or social sustainability at risk must be rejected.

Conserving Quality As Well As Quantity

High quality water is critical to human health. However, water quality requirements vary with end-use. A contaminant that is toxic for one use may be benign or even beneficial for another. We don't want animal waste in our drinking water, for example, but we eagerly seek it for gardens and farms. Yet, in most of Canada, we irrigate with drinking water.

Green roofs in Sydney, Australia. (Photo courtesy of www.wsud.org.)

For both economic and physical reasons, it is almost as important to conserve the quality of water as to conserve its quantity. High quality water (think of it as drinking water) occurs much less frequently in nature—and is much more expensive to deliver to users—than low quality water. Fortunately, we only need small quantities of high quality water (mainly for household purposes and special industrial tasks), but huge quantities of lower quality water (mainly for irrigation on farms and cooling at generating stations and industrial plants).

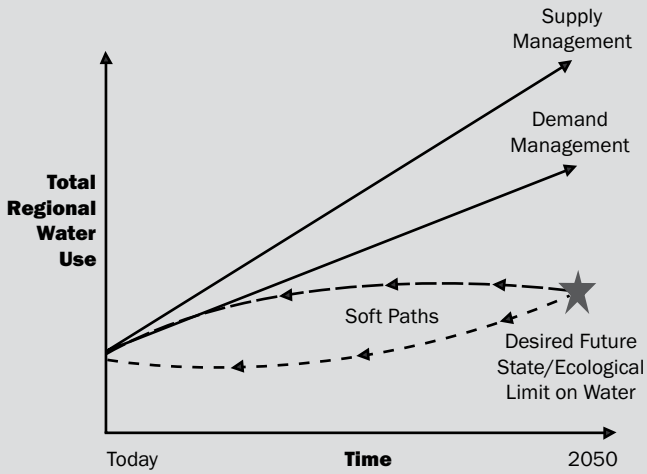
Soft path policies are designed from the start to match the quality of water supplied to the quality required by the end-use. The key is to cascade water systems, ensuring that wastewater from one use becomes input for another use—from a washing machine to a garden, or from a cooling system to water for other industrial uses.

Looking Ahead by Working Backwards

Soft paths require a set of policy changes and program plans that will, over time, move society toward water sustainability. How that route is built is another unique characteristic of the soft path approach.

Traditional planning starts from the present and projects forward to the future. Soft path planning does just the reverse. First it defines a sustainable and desirable future state for society, at least as water sources and uses are concerned. It then works backward to identify policies and programs that will connect the future to the present. This technique is called "backcasting"—in contrast to forecasting—and is the most important (and most difficult) part of soft path planning.

Box 6: Planning for the Future with a Soft Path Approach



Suppose a community decides that no new water sources will be developed before 2050. The desired condition in this case is that all future water needs for population and economic growth will be met through efficiency and conservation. This sets in motion the strategic thinking needed to implement policy and program alternatives to ensure this end result. Box 6 illustrates how a backcasting approach to planning might work for this community.

Given their long-term focus, soft path scenarios for water must allow for the possible impacts of climate change, such as changing precipitation patterns, longer drought periods, and greater evaporation. The process of developing scenarios by working back from the future allows potential impacts of climate change to be incorporated in water planning today.

Backcasting is not so strange an exercise as might first appear. Think of planning a holiday. You do not leave home and drive aimlessly. Rather, you first choose a destination and figure out how to get there. Backcasting is an iterative process. You do it over and over until reasonably satisfied that the goal can be achieved in the most cost-effective and agreeable way possible.

GETTING FROM THERE TO HERE

Water soft paths depend on changing patterns of water use, the adoption of conservation attitudes, and building different water institutions and infrastructure. These changes will not happen overnight; they require careful analysis, planning, public consultation, and strategic implementation. Demand management plans may project forward to the next decade. Water soft paths look a generation (20 to 50 years) into the future—similar to new water supply projects. The fundamental focus over that period is to try to provide for our needs without using additional water. As demonstrated in Box 7, there are many ways to reduce demand. Soft paths look for the right mix of measures to suit local needs, conditions, and preferences. Four guiding priorities can help develop a soft path approach. Look for measures that:

- **Have long-lasting effects:** For example, ensure that buildings are designed from the start to be highly water efficient and to recycle (and perhaps treat) wastewater internally. Or at least "future proof" them with additional piping to allow reuse and recycling to be added later. It is much more expensive to retrofit for water efficiency after the building is constructed.
- **Influence major water consumers:** In many situations, water consumption is more important than water withdrawals. Lakeside industrial cooling, for example, takes huge quantities of water but returns it to the lake almost unchanged. In contrast, irrigation also takes huge quantities but returns only a small part of it to the water body. A small change in farm practice can make a large difference in the amount of water lost to the watershed.
- **Will affect or be seen by many people:** Although the glasses of water placed routinely on restaurant tables do not amount to much in total, being asked whether you want that water is a regular reminder that supplies are limited. Public buildings should serve as demonstration sites for water conserving technologies. They will signal to citizens the potential of new technology and give evidence of government leadership.
- **Involve as many stakeholders as possible in decision making:** The objective is not to find the water system with the lowest accounting cost. It is to find the lowest total cost that is consistent with community desires for safe and reliable water service, environmental protection, and democratic control—values that can only be assessed through meaningful public participation in decision making.

Box 7: Common Water Demand Management Measures[3]

General Categories	Specific Examples
Socio-political strategies	• Information and education • Water policy • Water-use permits • Landscaping ordinances • Water restrictions • Plumbing codes for new structures • Appliance standards • Regulations and by-laws • Turf limitation by-laws • Once-through cooling system bans

Economic strategies	• Rebates for more efficient technologies (e.g. toilets, showers, faucets, appliances, drip irrigation)
	• Tax credits for reduced use
	• Full-cost recovery policies and life-cycle analysis
	• High-consumption fines and penalties
	• Pricing structures
	  • Seasonal rates
	  • Increasing block rates
	  • Marginal cost pricing
	  • Daily peak-hour rates
	  • Sewer and waste water charges

Structural and operational strategies	• Metering
	• Landscape efficiency
	• Soil moisture sensors
	• Watering timers
	• Micro and drip irrigation
	• Cisterns
	• Rain sensors
	• Efficient irrigation systems
	• Soaker hoses
	• Leak detection and repair in trunk lines
	• Repair teams to reduce leaks in buildings
	• Water audits
	• Pressure reduction
	• System rehabilitation
	• Efficient technology
	  • Dual flush toilets
	  • Low-flow faucets
	  • Efficient appliances (dishwashers/washing machines)
	• Recycling and Reuse – ranging from cooling and process water, to grey water for toilets or irrigation, to treating and reclaiming wastewater for reuse

[3] See also the POLIS publication *Thinking Beyond Pipes and Pumps* as an additional resource for developing a comprehensive approach to demand management. Available at www.waterdsm.org

MANY SOFT PATHS, NOT JUST ONE

The analysis underlying soft path planning does not generally yield a single, best path. Different policy and program combinations will lead us to the desired future. The Annex provides a technical breakdown of the steps involved in a soft path analysis.

Soft path analysis can: identify possible paths, describe the advantages and disadvantages (where quantifiable, the benefits and costs), and determine the likely social appeal and political feasibility. It is up to society as a whole, operating through democratic means, to choose the path most appropriate to its collective values.

Soft Paths and Values

The strategies that emerge from a soft path plan are explicitly value-laden. Supply-based policies are also value laden, but these values are less obvious because they are based on existing policies and status quo approaches. Soft path strategies pay attention to costs but also include ecological sustainability and societal engagement as fundamental criteria. Since the soft path defines a future sustainable society in value terms, it considers future changes to institutions and consumption patterns resulting from actions, policies and reforms instituted today. Demands for water and the institutional arrangements that drive them can be influenced.

As with any strategic plan, soft path planning is not a one-time event. Rather, it will have to be revisited regularly as new industries arrive, values shift, and climate changes.

In Canada, we often irrigate with drinking water.

Dockside Green sustainable development in Victoria, BC. (Illustration courtesy of Dockside Green Ltd.)

Periodic review (every five or so years) will identify new options and result in policy refinements. However, if the strategy and goals are clear from the start, the smaller adjustments, such as updating demand management technologies or population growth rates, will be relatively easy to accommodate.

A Water Future Different From the Past

It is not difficult to envision a better water future for Canada—one that is sustainable yet permits vigorous economic development and agreeable lifestyles for Canadians. However, conservation does not just happen. Our water past is not a good guide to our water future. It will take concerted action for Canada to move to sustainable use of fresh water. That is just what the soft path can provide—a process for defining where we want to go, and a plan to help us get there rather than continuing on today's unsustainable trajectory.

Canadians must take bold steps to change how we manage our limited fresh water in the future. This doesn't require immediate radical change, but it does require new thinking and getting an early start on implementing a step-by-step process that will, over the next 20 to 30 years, change the way water is managed in Canada.

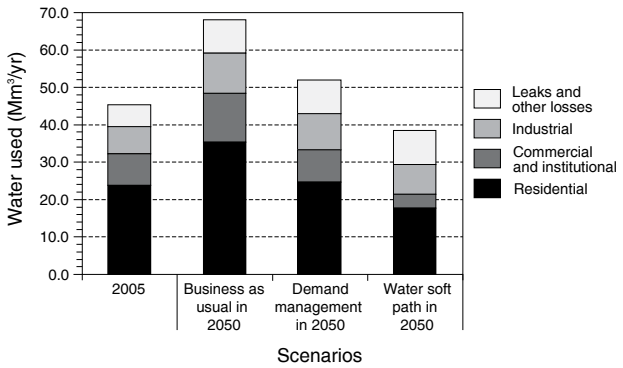
WATER SOFT PATH ANALYSIS IN CANADA

Friends of the Earth Canada has taken the lead in developing water soft path analysis for Canada over the past few years. One study explored the methodology of adapting soft path analysis from energy to water. Another study demonstrated that, although gaps in data are serious, they do not prevent detailed analysis. Concurrently, the POLIS Project on Ecological Governance at the University of Victoria completed research and analysis on the potential of new governance models to promote and enable a water soft path approach in Canada.

The Canadian water soft path study is the first test anywhere in the world of the application of water soft path concepts to specific political jurisdictions in specific ecological and geographic settings. The study was undertaken as collaborative effort among Friends of the Earth and included the Arthur Irving Institute at Acadia University, the Environment and Resource Studies Department at the University of Waterloo, and the POLIS Project. Water soft paths were investigated on three scales: 1) the municipal and community scale; 2) the watershed scale in Nova Scotia; and 3) the provincial scale in Ontario.

Urban Scale of Analysis

In most urban areas, over half of the water is used by the residential sector, followed by the commercial sector and then by institutions and light industrial users. In this study, results were calculated for a generic urban area with a base population of 200,000 in 2005 that was projected to grow to 300,000 by 2050. This urban case was developed by applying the soft path methodology to specific communities in British Columbia and southern Ontario.

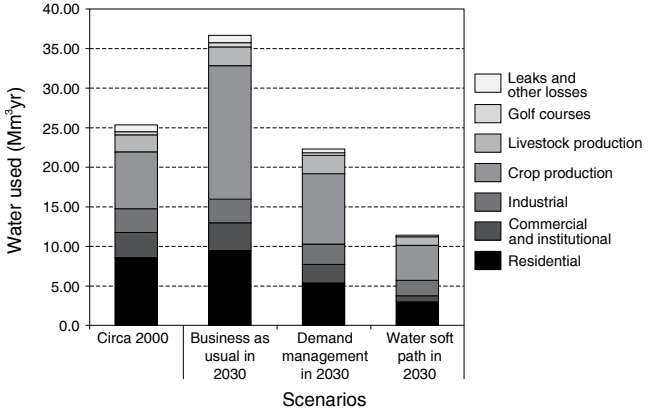


In this example, under a Business-as-Usual projection, water use grows in parallel with population growth and, by 2050, water use is 50 per cent higher than it is today. The Demand Management scenario emphasizes enhanced efficiency with

readily available technologies, such as dual flush toilets, high-efficiency washing machines, drip irrigation, reduced outdoor use through native drought resistant plants, education and modest pricing reform. However, demand management alone does not provide large enough water savings to offset increased use stemming from projected population growth. The Soft Path scenario adds cutting-edge technologies, such as dry sanitation, extensive Xeriscaping, widespread reuse and recycling, rainwater harvesting, and longer-term policies and programs to change behaviour. With these additions, the Water Soft Path scenario demonstrates that water use in 2050 could be below 2005 levels, thereby ensuring no "new" water is used despite a growing community.

Watershed Scale of Analysis

The Annapolis Valley of Nova Scotia has a humid maritime climate but only 10 per cent of the rain falls between June and August when about half of the total withdrawals occur. Golf courses and agricultural irrigation account for almost two-thirds of the total withdrawals during the summer. As a result, withdrawals in the Valley have exceeded what is believed to be sustainable limits in 12 of the last 40 summers.

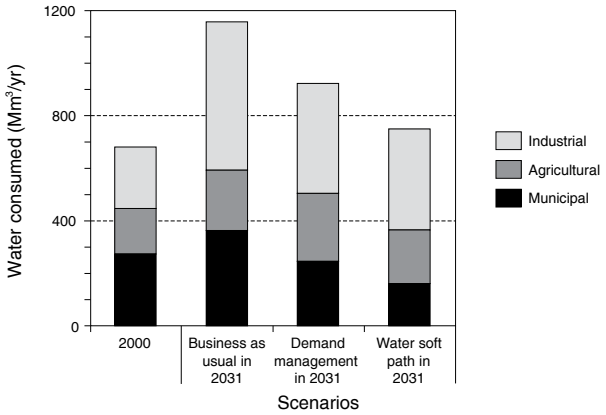


Under a Business-as-Usual projection, total annual water withdrawal by 2030 in the Annapolis Valley could be 45 per cent higher than the current level with summer withdrawals up to 80 per cent higher. Surface water withdrawals over the course of a year would exceed estimated sustainable withdrawals at least one in every 12 years, and nearly every second year in the summer; groundwater availability would be inadequate two out of every five years. A Demand Management scenario is not sufficient to avoid periods of unsustainable water use in the Annapolis Valley. However, a Water Soft Path scenario that adds high-efficiency irrigation, rainwater harvesting and wastewater recycling, as well as waterless technologies in the residential and commercial sectors, results in an annual water use that is only half of the current summer use. In this scenario, sustainable water use is almost assured.

Provincial Scale of Analysis

The Province of Ontario has a continental climate with wide extremes between summer and winter temperatures. With its highly urbanized and growing population, municipal water use under a Business-as-Usual projection would increase by nearly one third by 2031. In contrast, a Water Soft Path scenario can reduce municipal water use with conventional and more advanced technologies to a level that is little more than half of present water use.

Agriculture and manufacturing are the two other most important water use sectors. Agriculture in Ontario accounts for 20 per cent of the province's consumptive use of water. Rapid urban growth could increase the demand for irrigation as farmers attempt to raise productivity on a dwindling supply of agricultural land close to cities. Under the Water Soft Path scenario, which employs the best available efficiencies for irrigation without reducing the amount of land irrigated, total water use in agriculture would be 17 per cent above current levels by 2031. However, if land were taken out of production because of reduced tobacco production resulting from anti-smoking campaigns, and because there is less demand for sod as more people opt for multiple family dwellings, water use would remain at current levels.



In the Business-as-Usual projection, use of water for industry could double or triple depending on which industries grow the most. However, extension of current efficiency measures and greater recycling under a Demand Management scenario would result in water consumption that is only one-third greater than at present. Even under the Water Soft Path scenario, similar but additional enhancements result in water use rates 16 per cent above present levels. Cutting these rates of use would require investment in new plants to incorporate the best available technologies from the two biggest water using sub-sectors: transportation equipment and paper and allied products.

A future that uses no new water is daunting for an industrial province such as Ontario. Nevertheless, the analysis suggests that the province may achieve a reduction in total water consumption of approximately one third if it follows a water soft path.

Selected Results from Supplementary Studies

Pulp and Paper: Over the past 22 years, average water use per tonne of output across all processes has dropped by one third. The best available technologies include zero-effluent mills and closed-loop systems that can keep intake as low as two cubic metres per tonne to replace water lost to evaporation and water incorporated into product.

Diet and water use: A study of the effect of the human diet on water use for food production compared three diets standardized to include the same number of calories and the same protein content. Although water use for the three diets overlaps, in general vegetarian diets require only a third to half as much water for food production as a meat-based diet.

Water Reuse: At present most wastewater reuse projects in buildings across Canada are operated on a single-building scale. There are some unexpected benefits, among them less effluent discharge, longer life for leaching beds, and, in the case of new projects, a move from surface water discharge to smaller on-site disposal systems, which greatly reduce the cost and time of the approval process. The big gains will come only when reuse is scaled up from single buildings to block and even community scale.

Ice Rinks: A typical year-round ice rink needs 1100 to 1200 cubic metres of water each year to build and maintain the ice surface. Assuming 20 per cent of Ontario's rinks operate all year and 80 per cent operate for six months per year, total provincial water use is about 0.5 million cubic metres per year. This volume can be reduced by using purified water, which makes harder ice, by using melt water to flush toilets, or by forgoing ice-based recreation in the summer.

Study Summary

Our results indicate that water soft paths can go well beyond the savings available with demand management and also take direct account of such issues as ecological protection and climate change. All of the studies are available on a CD-ROM entitled *Lexicon of Water Soft Path Knowledge, Vol. 1*, available from Friends of the Earth Canada. Most are also available on the web sites of Friends of the Earth (www.foecanada.org) and POLIS's water project (www.waterdsm.org).

FROM RESEARCH TO ACTION

The Canadian water soft path study shows that a more sustainable future for fresh water is feasible with modest changes in water use practices and greater use of existing conservation-based technologies. Co-ordinated action is needed on many levels, ranging from senior governments to broader civil society.

Federal Government Priorities

- Ensure that detailed water use and consumption data are collected regularly and made publicly available.
- Lead the effort to understand the impacts of climate change on water resources and to determine the basic ecological in-stream flow needs of rivers.
- Set strict criteria for infrastructure funding and direct grants that require universal metering, volume-based pricing and conservation. And develop model conservation policies, programs and regulations.

Provincial Government Priorities

- Reform water allocation and licensing regimes to ensure that water withdrawals are below levels that endanger the health of watersheds and aquifers.
- Make all future water infrastructure investments contingent upon comprehensive conservation plans and provide funding for innovative water conservation pilot projects and programs.
- Amend building and plumbing codes so that effective water efficiency technologies are encouraged.

Municipal and Regional Government Priorities

- Adopt as a principle that all "new" water supplies must come from conservation and efficiency.
- Develop a comprehensive demand management program as a core element of local water management.
- Fund and promote local participation in setting direction and choosing options to achieve sustainable water management.

Civil Society Priorities

- Professional associations: Develop training programs and qualification standards to enhance capacity for water conservation and soft path analysis, planning and implementation.
- Universities and colleges: Enhance existing courses and programs to teach the concepts and practice of integrated water management to the next generation of water managers.
- Local stewardship and watershed groups: Engage with the broader community to develop a vision and establish expectations around a sustainable future for water.

FURTHER READING

Demand Management and Water Soft Paths

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Environment Canada. 2003. Fresh Water Resources, in *Human Activities and the Environment: Annual Statistics 2003*. (A compendium of recent information and statistics.)

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Pollution Probe. 2007. *Towards a Vision and Strategy for Water Management in Canada.* Final Report of the Water Policy in Canada National Workshop Series. Toronto.

Morris, T.J., D.R. Boyd, O.M. Brandes, J.P. Bruce, B. Lucas, T. Maas, L. Nowlan, R. Pentland, and M. Phare. 2007. *Changing the Flow: A Blueprint for Federal Action on Freshwater.* The Gordon Water Group of Concerned Scientists and Citizens.

ANNEX: HOW TO CREATE A SOFT PATH PLAN

These steps serve as a basic guideline for creating a soft path plan. This process can be undertaken at the community, regional, watershed and even provincial level.

1. Identify Water Services – List all services provided by water (e.g. grass watering, toilet flushing, clothes washing, etc.) and determine (using estimates where necessary) how much water is used by each service. Start thinking about the quality of water that is really needed to obtain a particular service. For example, do we need to use freshwater on our lawns? Or better yet, do we need to water our lawns at all?

2. Create a Business-as-Usual Scenario – Adopt an official water use projection to 2030 or later for your community, region or watershed based on applying current rates of water withdrawals and uses to the anticipated size of the population and the economy for that year.

3. Establish a Desired Future Scenario – Create a desired future scenario for sources and uses of water in the year of your projection. The scenario should be sustainable or moving toward sustainability.

4. Analyze Water Quantity and Quality – Establish the quantity of water required to provide the services identified (Step 3) by applying as many of the water conserving options that can be adopted by your target year. Determine which uses require high quality water (e.g. drinking, cooking and bathing) and which uses can proceed with lower quality water (toilet flushing, gardening, industrial applications).

5. Review Water Supply Options – Identify all current sources of water and determine whether any are being over-used or degraded. Be sure to include both surface water and groundwater, and both public and private supplies. Reduce withdrawals of freshwater or releases of wastewater that threaten long-term renewable use, and reject any new sources of supply that cross major watershed boundaries or that threaten ecological, cultural or social values. Adjust future supply for likely effects of climate change.

6. Backcast – Create various soft paths by designing incremental policies and programs to get from "there to here." In Step 3, you identified a desired future. In Step 4 you found ways to make that future work and in Step 5 you defined supply constraints. What do you need to do to get to that future, ensuring all options are economically feasible, socially acceptable and politically achievable? This iterative process is referred to as "backcasting" and it connects "there" to "here."

Almost all soft path backcasting includes at least two scenarios:

- In one scenario, adjustments are explored to the fullest extent possible within the limits of what is, or what is expected to be, cost effective. Suppose that a region has set a goal of no new water supply projects until 2050. Soft path analysis might suggest a policy mix including volume-based pricing, education and social marketing, rebates for low-flow toilets, and recycled water for parks and golf courses.

- In a second scenario, demand management is supplemented by changes in personal habits, growth rates and economic structure. If the same region wanted to preserve as much land as possible in a natural state, farmers could be urged to return to rain-fed agriculture, urban planning could be adjusted to reduce run-off, and water-intensive industries could be discouraged or prohibited.

How much backcasting is enough? It's enough when your water use projections are at least reasonably persuasive—not to you, the analyst, but to the officials, planners, journalists and others who will read your report without having gone through all the previous steps.

Step 7: Write, Talk and Promote – Now that you have developed a workable scenario, the next and very important step in soft path planning is to improve upon your conclusions by going to the public for their input. Then, after revision, you are ready to take your scenario to the public again and to people who influence and make key decisions about fresh water. Only your imagination and your energy should limit the effort put into promoting water soft path results.

Friends of the Earth Canada

Friends of the Earth (FOE) Canada is a charitable, non-profit environmental organization. Its mission is to serve as a national voice for the environment, working with others to inspire the renewal of our communities and the earth, through research, education and advocacy. FOE has grown from a small group of volunteers in 1978 to one of the country's most important voices speaking out on environmental issues. It is the Canadian voice for one of the largest international environmental networks —Friends of the Earth International—with over 70 sister organizations around the world working for healthy environments and environmental justice.

FRIENDS OF THE EARTH CANADA
SUSTAINABLE WATER PROJECT

Les Ami(e)s de la Terre Friends of the Earth

Friends of the Earth, 300 - 260 St. Patrick Street,
Ottawa, Ontario, Canada, K1N 5K5
Phone: 613-241-0085
foe@foecanada.org
www.foecanada.org

The POLIS Project on Ecological Governance

Created in 2000, the POLIS Project on Ecological Governance is a research-based non-profit organization based at the University of Victoria. "POLIS" takes its name from the ancient Greek word meaning "city state" but to Greek thinkers, the polis was more than just a place; it was seen to embody the highest purpose of our humanness. Researchers who are also community activists work together at POLIS to dismantle the notion of the environment as merely another sector, and to bring it into the mainstream where it belongs—as a core value in all aspects of our society. Among the many research centres investigating and promoting sustainability worldwide, POLIS represents a unique blend of multidisciplinary academic research and community action.

POLIS Project
on
Ecological Governance
University of Victoria

POLIS Project, University of Victoria
PO Box 3060, Victoria, BC, Canada, V8W 3R4
Phone: 250-721-6388
polis@uvic.ca
www.waterdsm.org