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## INTRODUCTION

All of us depend on air, land and water to exist. As New Brunswickers, we have also long relied on the bounty of our natural environment as well as appreciated its beauty and contributions to our enjoyment of the out-of-doors. As with other regions throughout the world, the social and economic growth of our province over centuries has also had, and continues to have an impact on the environment.

In the relatively short time (30 years) since New Brunswick has had a provincial department with responsibility for environmental protection, significant strides have been made to identify and address many of the factors that can threaten a healthy environment and the future well being of our province.

We have seen the adoption of laws and policies that provide a framework for environmental protection and planning, and the establishment of a broad array of scientific tools for measuring the quality of our air, land and water. Our province's capabilities in responding effectively to environmental incidents have been strengthened and there is more participation in environmental protection and enhancement by more New Brunswickers – both as individuals and among particular stakeholder groups – than at any time in our province's history. These factors have all contributed to New Brunswick's environmental progress to date and will continue to be the foundation for future protection efforts.

To report on this progress, the provincial Department of the Environment and Local Government has developed this document with three key goals in mind:

- To encourage an understanding of the impacts to New Brunswick's environment, and the relationship between air, land and water quality;
- To provide an account to New Brunswickers of the approaches the Department takes in responding to environmental impacts; and
- To report on the results of those protection efforts using 'environmental indicators', which demonstrate the progress that is being made in various areas of air, land and water protection, and also where more or continued action is needed.

It is anticipated that future editions of this report will be produced every two years. This time frame allows the Department to gather additional data through its various monitoring and auditing programs, to analyze information from that data and to then report on the findings. The content of the report may vary from edition to edition to include the many subjects that relate to environmental management and protection, as well as to report on progress or examine trends among the subjects presented in this first report.

Readers are encouraged to provide feedback on what might be included in future reports, both in terms of subject matter and how the information is presented (please see enclosed comment form). This participation is important, because with each opportunity to understand more about the environment as part of our everyday lives, we are also more likely to accept individual and collective responsibility for continued improvement, and to become more actively involved in achieving environmental progress in our province.

# SUMMARY OF ENVIRONMENTAL INDICATORS

Environmental Indicators are statistical measurements that demonstrate the status of a particular aspect of the environment. They present information about areas where progress has been made as well as areas where more effort may be needed.

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## AIR in our Environment

**B**eyond having air to breathe, which most of us take for granted, it is the quality of the air that can either support human and environmental health or detract from it.

In the area of environmental protection, air quality is determined by the amount of unwanted, potentially harmful components in our atmosphere.

Most of these components are part of what is commonly referred to as air pollution, and it comes in many different forms and from many different sources.

Nature itself plays a role: the carbon dioxide emitted by living things, smoke from forest fires, windblown dust and pollen, salt spray from the ocean, and even the ash from the eruption of a far-off volcano can affect the quality of air in New Brunswick.

Pollution caused by human activities, however, is of greater concern on a day-to-day basis. We have all heard the expression "what goes up must come down". The activities we carry out on land, such as burning garbage or using a wood stove improperly, release a range of harmful substances into the atmosphere. In turn, many of these substances, called air pollutants, return to the land and water through precipitation and run-off.

The largest single source of human-made air emissions is the burning of fossil fuels: for transportation, to heat our buildings, to generate electricity, and to operate industries.

Air pollution does not stop at our provincial borders of course, and so New Brunswick's air quality is also affected by "trans-boundary" or "long range transport" emissions.

This refers to the pollutants that originate in the more industrialized and heavily populated areas of central Canada and the eastern United States and that come to our region by way of weather systems. In fact, the majority of New Brunswick's acid rain and ground-level ozone come from sources outside our province's borders.

Reduced air quality can cause a wide range of health effects, particularly for our children, the elderly, and people with respiratory (breathing) or cardiovascular (heart) problems. It can decrease crop production, harm forests, fish and wildlife, and have an impact on the quality of our lakes, streams, rivers, and drinking water.

Some air pollutants can contribute to the corrosion of buildings and other human-made structures. Air pollutants can also reduce visibility and cause nuisance issues that affect our comfort and well being, such as excessive dust and odours. On a global level, a number of air pollutants are known to contribute to climate change.

Clearly, air quality affects people and other living things, making it a fundamental aspect of environmental health. The following pages present an overview of the approaches being taken to protect our air, as well as key air-related results that report on New Brunswick's current progress.

### Did You Know?

The New Brunswick Department of the Environment and Local Government oversees the quality of **outdoor** air. **Indoor** air quality in NB (in public buildings, offices, schools etc.) is governed by the Department of Health and Wellness under the *Health Act* and by the Department of Training and Employment Development under the *Occupational Health and Safety Act*.

## Approaches to Air Quality Protection - Air-related Legislation

Air quality protection in New Brunswick is legislated through the province's *Clean Air Act*. The Act's regulations provide, in detail, the requirements that must be followed within the province to achieve acceptable air quality, and features a set of principles to be considered by the Minister of the Environment and Local Government in making air-related decisions. The Minister also has authority under the Act to establish Air Quality Objectives for the province in conjunction with the Minister of Health and Wellness.

The primary tool for regulating air emissions created by individuals and other sources is a series of permits and air quality approvals. These sources of emissions in New Brunswick — from power generating plants to dry cleaners — must obtain an Air Quality Approval. The Department issues an average of 500 air quality approvals to industry each year. These approvals set conditions under which the facility may operate, including limits for emitting contaminants into the air which may be based on provincial standards or correspond with accepted Canada-wide Standards (see page 6) which are set nationally.

## ENVIRONMENTAL INDICATORS - AMBIENT\* AIR QUALITY

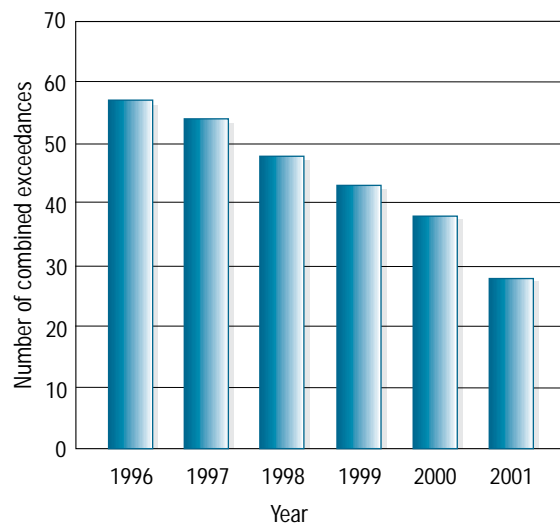
### INDICATOR 1 - Attainment of New Brunswick's Air Quality Objectives

As noted above, the *Clean Air Act* has a provision for the establishment of Air Quality Objectives, specific to New Brunswick.

In March 2002, the Province established the first such Objectives which set limits of allowable contaminants, previously outlined in the provincial Air Quality Regulation. The Objectives set limits for the amount of carbon monoxide, sulphur dioxide, hydrogen sulphide, nitrogen dioxide and total suspended particulate (fine particles) that can be released into the air, while still maintaining air quality that will support human and environmental health. Any measurement that is above these limits is considered an "exceedance".

Each of the bars on the chart opposite represents the combined total in a given year, of the exceedances for substances for which there is an Air Quality Objective. This information is provided from monitors in various locations in the province.

Exceedances of NB Air Quality Objectives



The total number of exceedances has declined by 50% over the five years shown, in part because of the stringent limits set in air quality approvals.

\*Note: "Ambient" refers to the outdoor air.

## INDICATOR 2 - Compliance with Canada-wide Standards for Particulate Matter (PM 2.5) and Ozone

Canada-wide Standards are guidelines for addressing environmental issues using a common approach across Canada. In June 2000, Canada-wide Standards were established for Particulate Matter 2.5 (PM 2.5) and ozone. New Brunswick joined other governments in committing to a significant reduction of PM 2.5 and ground-level ozone by the year 2010.

PM 2.5 is particulate matter such as dust or soot with particles smaller than 2.5 microns (so small they are invisible). These particles have a wide range of adverse effects on human health and can also degrade air quality by contributing to haze.

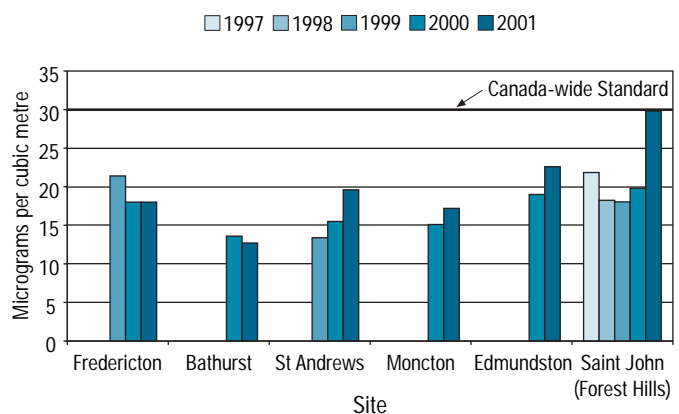
Ozone is a greenhouse gas that forms when there is a chemical reaction among particular pollutants. Ground level ozone has adverse effects on both human health, and the environment - especially crops and trees. PM 2.5 and ozone also have significant effects on climate.

The top chart shows that at the majority of New Brunswick's monitoring stations, the Canada-wide Standard for PM 2.5 is generally being met. The results for ozone (bottom chart) are influenced by summer weather conditions each year and by varying levels of transboundary emissions. Note: The charts reflect the length of time PM 2.5 and ozone have been monitored in the areas shown.

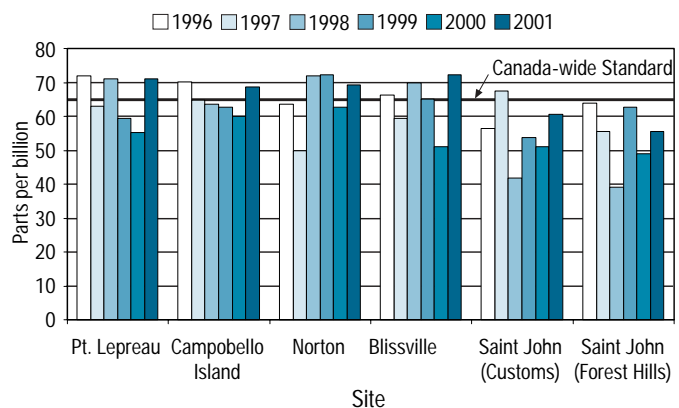
If past trends continue, stations in southern New Brunswick may show exceedances of ozone in about one year out of every three. Preliminary data from northern areas show lower levels.



Canada-wide Standard - PM2.5



Canada-wide Standard - Ozone



### Approaches to Air Quality Protection - Inter-jurisdictional Co-operation

While we can't control emissions in other jurisdictions, New Brunswick does work both individually and in co-operation with neighbouring provinces and states to improve air quality affected by pollution-generating regions. These efforts, which can include policy development, standard-setting, complementary monitoring programs and information sharing, recognize and seek to minimize 'cross-border' environmental impacts. For example, many of these kinds of measures are being carried out under Action Plans for Acid Rain and Mercury, developed under the Conference of New England Governors and Eastern Canadian Premiers.

## Did You Know?

Climate change is being caused by an increased concentration of greenhouse gases (such as carbon dioxide, methane, and nitrous oxide) in the earth's atmosphere. In the past 100 years, concentrations of these gases, mostly attributable to human activities, have been increasing at an unprecedented rate, trapping more heat and radiating it back to earth. As a result, global temperatures have begun to increase and climate trends are becoming more unpredictable. Among other effects, changes in climate can influence weather patterns and warmer temperatures can cause flooding in coastal areas and droughts further inland. Storms can become more frequent and severe.

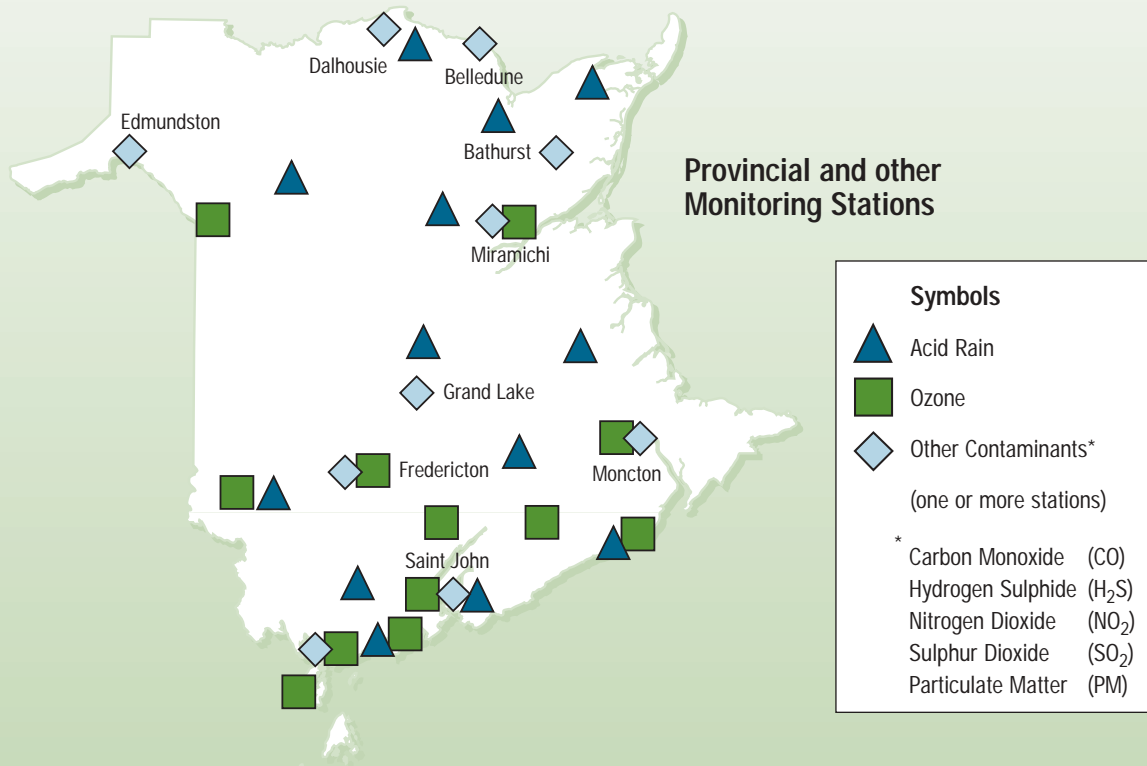
New Brunswick has a role to play in meeting the objectives of key national and international agreements such as the Kyoto Protocol and the UN Convention on Climate Change. The provincial Departments of Energy, and the Environment and Local Government are currently working with key stakeholders to develop a Climate Change Action Plan specific to our province.

## Approaches to Air Quality Protection - Air Quality Monitoring

Throughout New Brunswick, instruments are placed in strategic locations to gather information about the immediate and surrounding air quality. This ambient air monitoring activity takes place at over 50 stations, many of which are operated by the Province, with others operated by industry. Monitoring helps us to better understand the sources, movements and effects of various substances in the atmosphere, and where needed, to take action to protect air quality. It also helps the Province to determine when public health advisories should be issued, and to negotiate with other jurisdictions for controls on out-of-province air pollution affecting New Brunswick.

Emissions monitoring is the monitoring of emissions from within the stacks (chimneys) of industrial or other facilities. This monitoring indicates whether operators are complying with the conditions of their Air Quality Approvals and with any applicable provincial and national air quality standards.

While this scientific monitoring is a critical source of environmental information, citizens who have noticed a change in local air quality are also important "monitors". (See page 23 for list of materials that explain what citizens can do to protect the air.)



## Approaches to Air Quality Protection - Compliance and Enforcement

A key part of air quality management, and in ensuring public confidence, is working to achieve consistent and ongoing compliance with the requirements of the province's legislation and approvals respecting air. The measures undertaken to achieve compliance include site inspections, third-party audits of emissions and continuous emissions monitors, departmental audits of industry-operated ambient air quality monitors and where required, reductions in emissions through the appropriate use of control technology.

In instances where these measures do not achieve compliance, there are a number of enforcement options provided for under the *Clean Air Act* and its regulations. They range from issuing an Administrative Penalty for things such as failing to provide required air quality information, serving an Order to stop an adverse operational practice, or laying charges for offences such as the unlawful release of contaminants. Whatever the compliance and enforcement approach taken in a given situation, the Minister retains the authority to take direct action in instances where there is an immediate threat to human health or the environment.

*(Note: a summary of each year's compliance and enforcement statistics can be found in the Department's Annual Report.)*

## ENVIRONMENTAL INDICATORS - ACID RAIN

### INDICATOR 1 - Average Sulphate Concentration in Precipitation

The term 'acid rain' has been part of the environmental vocabulary in New Brunswick for some time and efforts to reduce its impacts have been underway for nearly 20 years.

Acid rain forms when gases such as sulphur dioxide and nitrogen oxides mix with water in the air and react, eventually forming acids. These return to the earth's surface in the form of precipitation (rain and snow), or as fine particles. The result can be long-term chemical changes in lakes, rivers and soils, which can have harmful effects on wildlife and plants.

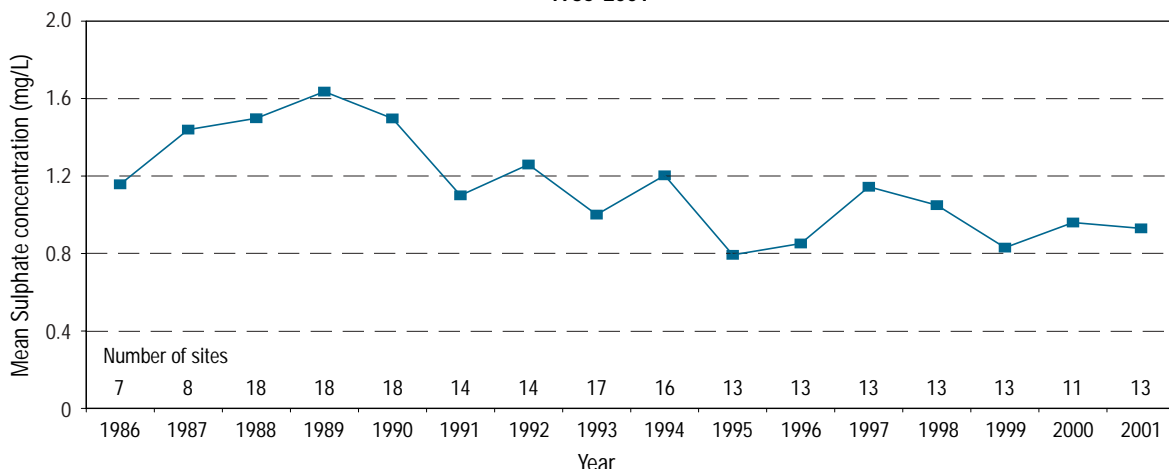
Fine particles can also have harmful effects on human health.

New Brunswick operates a monitoring network to track changes in the chemical makeup of precipitation.

This monitoring tells us what the acid rain situation is in relation to the control of air emissions. It also provides information about how precipitation chemistry varies across the province and through the year.

As illustrated in the chart below, there has been a general reduction of sulphate in precipitation in New Brunswick since the late 1980's, which is in keeping with the reductions in sulphur dioxide emissions across eastern North America during the same period.

Average Sulphate Concentration in Precipitation  
1986-2001





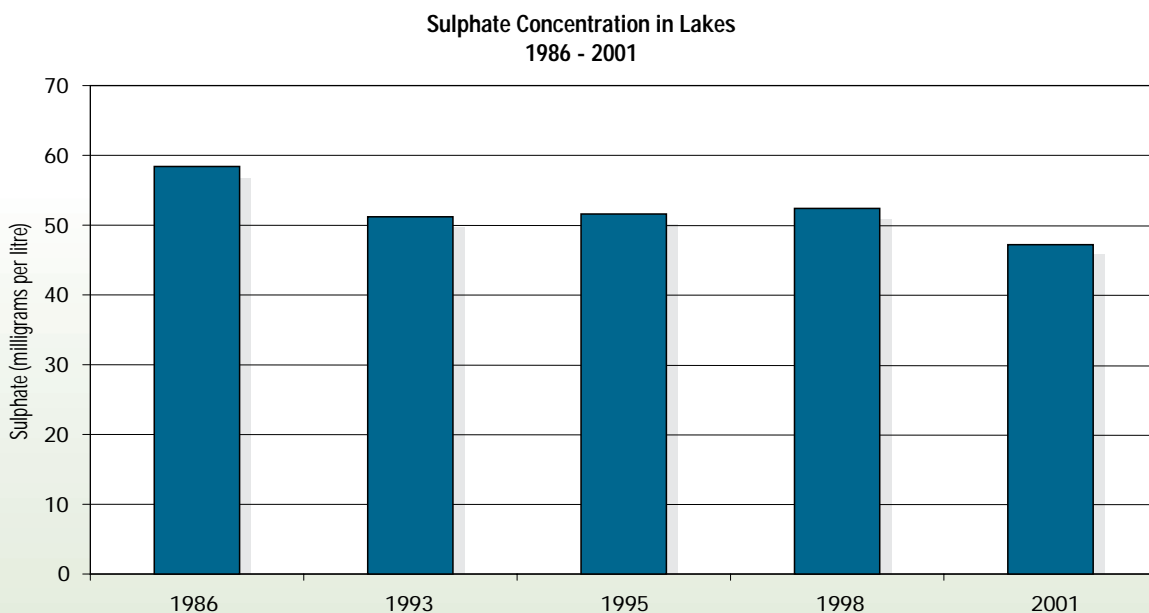
## INDICATOR 2 - Average Sulphate Concentration in Lakes

Acid rain can affect natural ecosystems in many ways. The basic chemical makeup of lakes and rivers can be changed, aquatic life can be disrupted and soils can be depleted of essential nutrients. Areas where there is granite bedrock, or other rocks low in alkaline minerals are especially sensitive to damage by acid precipitation. When surface water becomes more acidic it can also affect human-made structures such as culverts and bridges, accelerating corrosion and shortening their useful life.

New Brunswick has a lake monitoring program designed to examine the effects of

acid precipitation over time. Approximately 100 lakes are surveyed every two to five years. The lakes chosen for testing are remote, with little or no adjacent development. This makes it easier to examine changes in the acidity of a lake, which are not linked to local activity.

Surveys since 1986 have shown that sulphate concentrations (which are one measure of acid input) are generally declining. However, many lakes continue to be considered vulnerable to acid rain at present concentrations. Particular focus will be given to these lakes as monitoring programs continue to be carried out.



### Approaches to Air Quality Protection - Public Education and Involvement

The science and engineering processes that are part of air quality management can be very complex and are generally not part of most people's everyday knowledge. At the same time, citizens are increasingly interested in understanding the things that directly affect their lives, and in being involved in contributing to the decisions being made on their behalf. As such, public education resources and opportunities have and will continue to be a departmental focus in building knowledge and facilitating involvement.

The *Clean Air Act* recognizes the right of New Brunswickers to have access to information concerning air quality issues, and to weigh in on key air quality management decisions. This principle in the Act is underlined by the existence of the Public Participation Regulation which identifies guaranteed opportunities for public participation in the process of developing Air Quality Approvals for major sources of emissions (there are currently 29 facilities in this category) and in setting provincial Air Quality Objectives.



## LAND in our Environment

**O**f the qualities New Brunswickers value in our communities and the areas that surround them, many are linked to the environment.

We count on access to safe drinking water and efficient waste disposal services, adequate space in which to build, utilize resources, and enjoy recreational pursuits, and we appreciate the physical appeal of green spaces, fresh air and healthy waterways.

From early settlements to more recent development activity, it is easy to see the difference careful planning makes to community well being.

When more people share the same space or expand into new territory; when there is greater demand on resources; and when societal and economic expectations grow, it becomes that much more important to sustain what matters most to us as residents of the Province.

Land use planning and appropriate management of land-based activities are fundamental to ensuring that the things we as New Brunswickers value today continue to be in place for generations to come.

When land use plans are developed, whether provincial, municipal or rural, they guide the adoption of change while preserving the valuable social and environmental components of a given area.

Municipal and rural plans or planning statements focus particularly on zoning land for development, whether for residential, business, or other purposes, including protection for current users. In incorporated areas, a plan can often complement or build on municipal zoning bylaws.

Similarly, a municipal plan may adopt or build on provincial requirements for things such as drinking water protection.

Provincial laws and policies guide the management of land-based activities, helping to prevent negative environmental impacts from large-scale development, improperly managed work near watercourses, improper chemical storage, inadequate waste disposal and so on.

Historically, there has been interaction at the provincial level between those responsible for facilitating community planning and those responsible for environmental planning. With the establishment, in 2000, of the Department of the Environment and Local Government, these efforts have been combined under one umbrella, providing opportunities for enhanced planning at both provincial and local levels.

The following pages provide an overview of New Brunswick's approaches to environmental sustainability through land use planning and land-based environmental management as well as presenting some key results that report on current progress in the Province.

## Approaches to Sustainability - Land-related Legislation

In New Brunswick, when we dispose of our household garbage, obtain a building or watercourse/wetland alteration permit, store pesticides or seek a zoning change within our community, these are instances in which we become acquainted with the land management provisions in various Acts administered by the Minister of the Environment and Local Government.

These include the *Community Planning Act*, *Clean Environment Act* (Environmental Impact Assessment, watercourse/wetland alteration, and petroleum storage regulations as well as requirements for waste and pesticides management), and the *Unightly Premises Act*. Land use parameters also form a central part of regulations under the *Clean Water Act* (see Land Use Planning and Water Protection on page 12).

The Department provides assessment, as well as advisory and permitting services - many in conjunction with communities and District Planning Commissions.

## ENVIRONMENTAL INDICATORS - LAND USE PLANNING

### INDICATOR 1 - Percentage of NB Covered by Municipal or Rural Land Use Plans

Municipal and rural land use planning considers environmental, social and economic factors in the development of a well-defined vision, and accompanying guidelines for a particular area or community.

A land management plan covers a specific geographical area identified during the planning process and may border on other areas identified by provincial or federal land management mechanisms such as Crown Lands.

Land management plans provide a means of addressing planning issues relating to infrastructure such as streets, parks, and water and sewer systems, as well as how and where new or upgraded developments may be managed in an area.

At the local level, Municipal and Rural Plans are complemented by various bylaws and zoning provisions.

To date, approximately 20% of New Brunswick is covered by Municipal or Rural Plans (as shown below).

The Department of the Environment and Local Government is now working toward a more comprehensive approach to planning, which would see provincial objectives for long-term sustainability addressed through integrated and consistent rural, municipal and regional planning approaches.



## Approaches to Sustainability - Land Use Planning and Water Protection

How we manage land use can have a direct and lasting impact on the quality of both surface and ground water. For this reason, a variety of restrictions have been placed on activities often carried out adjacent to water ways, such as tree cutting, road building, livestock watering, and cottage building. Requirements have also been put in place to prevent petroleum products and chemicals such as pesticides from seeping into drinking water supply systems.

The Watershed and Wellfield Protected Area Designation Orders, under the *Clean Water Act*, define allowable land use activities within these respective drinking water supply areas. The protection of marshes and other sensitive environmental features, in turn, is one of the objectives of New Brunswick's Coastal Areas and Wetlands Protection policies. The Water Classification Regulation, while not defining which activities can occur next to watercourses, does set goals for water quality. Residents and other land users may select from a number of voluntary 'Best Management Practices' to help achieve goals that have been set for a particular lake or river or a local section of a watercourse. Best management practices are ways of carrying out an activity on the land or water that minimize the impact on water quality.

### INDICATOR 2 - Number of Designated Wellfields

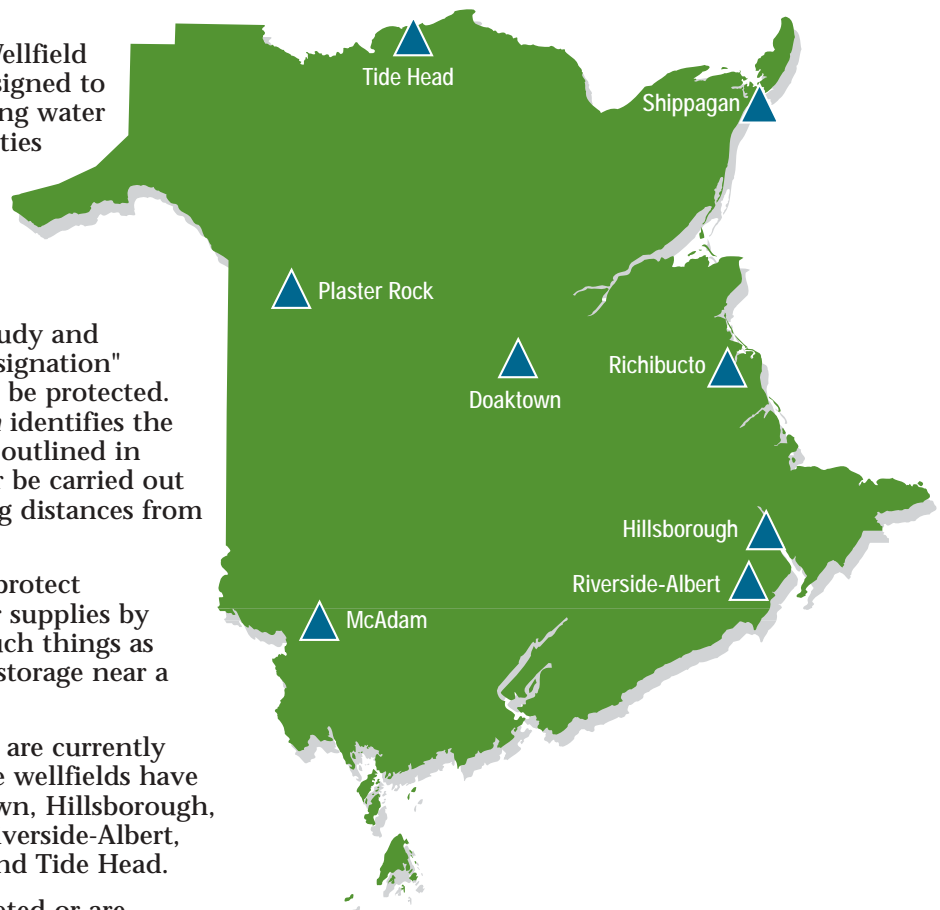
In New Brunswick, the Wellfield Protection program is designed to help safeguard the drinking water supplies in 56 municipalities serving a total of 150,000 people, who rely on groundwater as their primary source of drinking water.

This is done through a study and subsequent "Wellfield Designation" which defines the area to be protected. Each *Wellfield Designation* identifies the list of land use activities, outlined in legislation that can either be carried out or are restricted at varying distances from the production wells.

These requirements also protect municipal drinking water supplies by prohibiting or limiting such things as chemical and petroleum storage near a municipal well.

As shown opposite, there are currently eight communities whose wellfields have been designated: Doaktown, Hillsborough, McAdam, Plaster Rock, Riverside-Albert, Richibucto, Shippagan, and Tide Head.

Studies have been completed or are underway in 42 wellfield areas, and the aim is to complete a designation in each of the 48 remaining municipalities by 2008.



## Approaches to Sustainability - Compliance and Enforcement

As land-based activities are carried out by virtually everyone, from individuals through to industrial operators, there is also a range of approaches to achieving compliance with provincial requirements. Various approvals, permits, and licenses are issued to enterprises in the agriculture, forestry and mining sectors as well as to solid waste operations, commercial pesticides applicators, and operators of wastewater treatment systems. These approvals carry regular inspection and reporting requirements. Individuals may also be issued permits for such activities as building additions on a house, working near a watercourse or some recreational pursuits.

Through provincial legislation, District Planning Commissions have the authority to issue Orders to stop an activity that violates any zoning provisions in unincorporated areas. Throughout the province, the Department responds when monitoring programs detect noticeable changes in environmental quality as well as to reported infractions where there is the potential for risk to the environment or human health.

As a further means of achieving compliance, environmentally sound practices are encouraged by all New Brunswickers through education and local partnerships.

## ENVIRONMENTAL INDICATORS - LAND-BASED MANAGEMENT

### INDICATOR 1 - Proportion of Large Petroleum Storage Tanks Meeting Modern Installation Standards

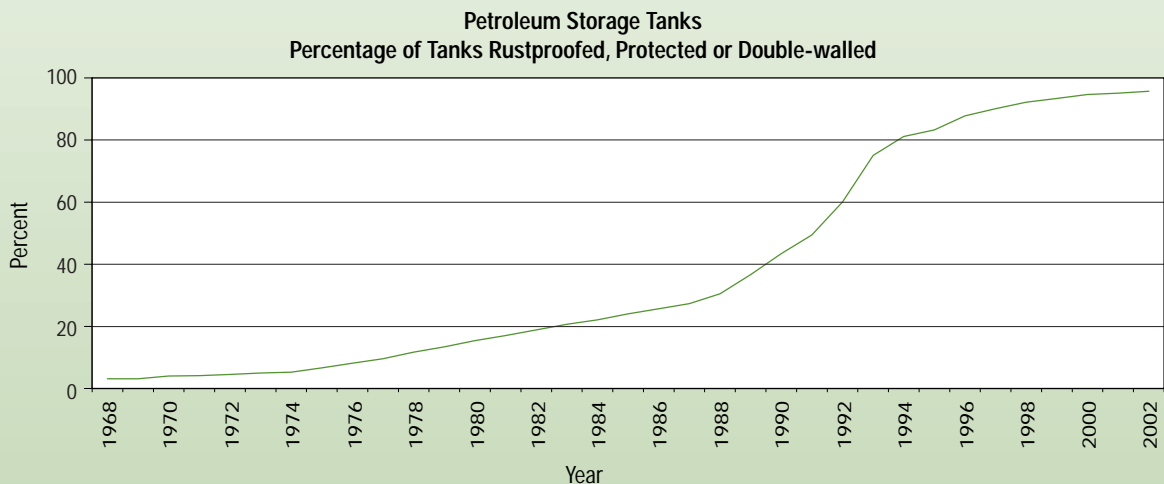
Even small amounts of oil or gasoline can contaminate the surrounding soil as well as substantial quantities of groundwater. As such, large petroleum storage systems, like those used at gas stations, can be major sources of contamination if they leak. The difficulties and costs associated with clean-ups have demanded a better approach to managing this land-based activity, involving both under and above ground tanks.

In 1987, New Brunswick introduced the Petroleum Product Storage and Handling

Regulation. The regulation requires that systems (tanks) for petroleum product storage with a capacity greater than 2000 litres be registered and insured in case of leaks. Single-walled tanks older than 20 years must be precision tested (for tightness) and if necessary, replaced using modern installation methods.

The illustration below demonstrates the increasing proportion of improved tanks since the regulation was put in place.

As a further preventive measure, guidelines were established in 2001 requiring that all new underground storage systems being installed at potentially sensitive sites feature double-walled tanks and lines.



## Approaches to Sustainability - Waste Reduction and Diversion

In New Brunswick, the closure of open disposal sites coupled with the establishment of modern sanitary landfills has significantly reduced impacts to the surrounding air, land, and water. It should be noted, for example, that New Brunswick's sanitary landfills all have a liner to collect liquid from the waste for proper treatment, and New Brunswick is one of the only jurisdictions in Canada that does not burn any of its municipal waste.

However, each New Brunswicker currently produces the equivalent of 500 kilograms of waste every year. As a result, a second phase to waste management, already underway in some areas of the province, involves increasing recycling and other measures aimed at reducing the volume of household and other wastes going to the landfills in an effort to extend their life spans and conserve resources. This objective is central to the Province's Waste Reduction and Diversion Action Plan, which outlines ten key waste reduction and diversion measures to be undertaken by government, Regional Solid Waste Commissions, communities, and the private sector over the next five years.

### INDICATOR 2 - Percentage of New Brunswick's Population with Access to Recycling

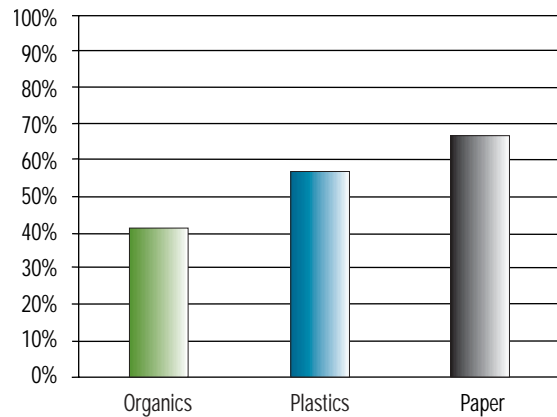
One of the key points in the 2001 provincial Waste Reduction and Diversion Action Plan is the establishment of province-wide standards for recycling, to be met within five years. This would ensure that no matter where New Brunswickers reside we would have access to comparable opportunities for recycling household commodities including corrugated cardboard, newsprint, various plastics, as well as organic (or compostable) wastes.

The chart (opposite) shows the percentage of the province's population with access to recycling for paper, plastic, and organics.

Between 1988 and 2001 the amount of waste being disposed of in New Brunswick's landfills decreased by 41%. This is attributable in part to legislated programs covering items such as beverage containers and tires as well as recycling and other diversion programs initiated by a number of the Regional Solid Waste Commissions.

Individual choices are also a factor, as New Brunswickers have become more mindful consumers, and active participants in practices such as backyard composting. The recycling standards under the Waste Reduction and Diversion Action Plan will further reduce the amount of waste going to landfills across the province.

Access to Recycling (2002-03)



### **Approaches to Sustainability - Public Education and Involvement**

Much of the land use activity occurring in the province that has the potential to adversely affect both rural and urban environments relates to our everyday undertakings as individuals, families, communities, businesses and other sectors. By becoming aware of the measures that will sustain our communities and enjoyment of the air, land and water around them, and of our responsibility in ensuring that those measures are met, our individual and collective investments - both financial and social - will be protected as well. To this end, the Department continues to develop a variety of educational materials and local awareness and consultative opportunities, delivered from both central and regional settings.

Each community has a sense of itself and how it may want to develop in the future. As such, local involvement is an essential ingredient in community and rural planning, in environmental assessment, and in establishing water quality goals. The Department of the Environment and Local Government recognizes that public participation, whether through locally elected bodies, established legislated processes, or voluntary interest, can contribute significantly to sound land use management.

### **Did You Know?**

In April 2003, the Government Response to the Final Report of the Select Committee on Local Governance and Regional Collaboration was issued. In this response, the Government committed to the establishment of a comprehensive and integrated provincial planning policy and a regional planning process to assist communities in adopting sustainable development approaches in rural and urban areas.

The Response also outlined organizational changes relating to district planning and regional solid waste commissions aimed at providing consistent access to services across the Province.

The public and other key stakeholders will be involved throughout the process of addressing the actions identified in the Government's Response.





## WATER in our Environment

When precipitation falls to earth, a percentage of the water will evaporate back into the atmosphere. Some will be taken up by soil and vegetation and a further portion will flow overland as runoff into streams, lakes and rivers. This is called surface water. Some of the precipitation makes its way down through the earth to be stored underground, within layers of sand and gravel, or along rock fractures. It is from these underground waters, commonly referred to as "aquifers" that we pump out groundwater from drilled wells.

Drinking water supplies come from one of these two main sources - either bodies of surface water, or from wells fed by groundwater. Nearly 300,000 people in New Brunswick municipalities depend on water from a surface watershed area. Another 150,000 rely on a municipal wellfield fed by groundwater, while the remaining 300,000 New Brunswickers depend on privately-owned domestic groundwater wells.

While there is a variety of naturally-occurring elements or substances that can affect water quality, such as arsenic and bacteria, it is our own activities as humans that have the greatest impact on water quality. Many land use activities have the potential to contaminate our drinking water supplies and the water resources on which aquatic life depends.

If we are to benefit from and enjoy safe and reliable water supplies for generations to come, we will need to continue to focus on correcting past practices and in strategically addressing future activities to ensure minimal impact to the environment.

The following pages provide an overview of approaches to water protection and sustainability, as well as some key water-related findings that report on New Brunswick's progress to date.

**W**ater is one of Earth's most precious resources and is as important to New Brunswickers as it is to people elsewhere.

A safe supply of drinking water is essential to our health, just as clean water sustains many other living things. For a broad variety of other uses, we also depend on a reliable supply of water in our households, institutions, businesses and industries. The recreational opportunities offered by our lakes and rivers are a traditional and valued part of the New Brunswick lifestyle as well as a significant benefit to tourism in the province.

We know water is important; so how do we protect it? From an environmental protection standpoint, water quality is determined by various chemical, biological and physical components. In order to understand these components it is important that we know how water behaves in the natural environment.



## Approaches to Water Quality Protection - Water-related Legislation

The *Clean Water Act* and its various regulations provide a framework for water protection in New Brunswick. The Potable Water Regulation governs drinking water and sets requirements established jointly by the departments of the Environment and Local Government, and Health and Wellness. This Regulation requires regular testing of public water supplies, and testing by domestic well owners when new wells are constructed or an existing well is reconstructed. The Well Water Regulation, in turn, outlines procedures that must be followed by both those who drill wells, and by domestic well owners.

An approval is required under the Water Quality Regulation to discharge 'used' water or any substance into a body of water as part of an industrial process. Approvals are also issued for the construction and operation of water and wastewater facilities.

The Watershed and Wellfield Protected Areas Designation Orders identify the allowable activities in designated drinking water supply areas. The Water Classification Regulation is a mechanism for applying water quality goals to the province's lakes and rivers.

## ENVIRONMENTAL INDICATORS - DRINKING WATER

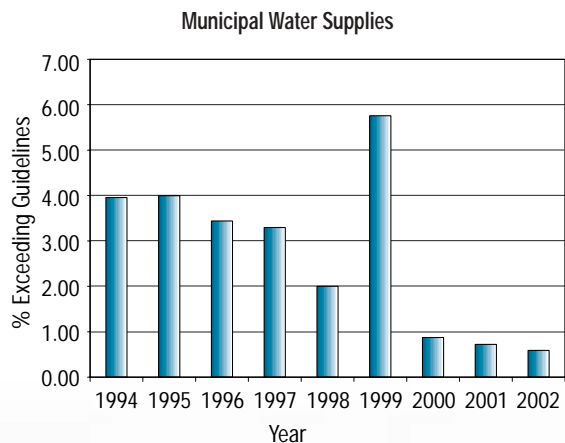
### INDICATOR 1 - Percentage of Post-Treatment Tests for Municipal Water Supplies Exceeding Guidelines for Canadian Drinking Water Quality

Municipal drinking water in New Brunswick is tested before and after treatment, as required by the Potable Water Regulation under the *Clean Water Act*. Mandatory reporting of test results to the Department of Health and Wellness since 1994 has ensured that all test results are reviewed from a health and safety perspective.

The Department of the Environment and Local Government laboratory tests approximately 60% of municipal water supplies in the Province. The remaining systems are tested by other laboratories. Of the tests analyzed by the department, the percentage of pre-treatment samples that exceed Canadian guidelines has ranged from 4 to 8% since 1994. The tests analyzed following water treatment, show a decrease in these exceedances to 1 to 4% with one exception. Higher numbers in 1999 were the result of intensive sampling in one municipality during an episode of poor water quality.

Most exceedances relate to manganese and pH that have 'aesthetic' guidelines, (appearance, smell etc.) rather than health guidelines.

The chart below shows the percentage of all at-the-tap post treatment exceedances from 1994-2002 of those tests analyzed by the Department. It does not reflect tests performed by other laboratories.



The percentage of samples exceeding key health-related guidelines (such as total coliforms and *E. coli*) has decreased significantly since 1994, when the Potable Water Regulation came into force.

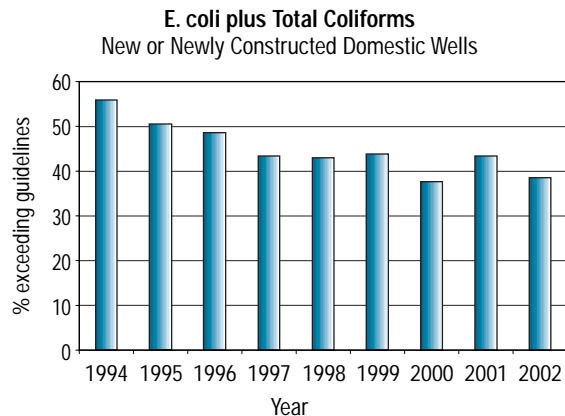
## INDICATOR 2 - Percentage of New Private Wells Exceeding Guidelines for Canadian Drinking Water Quality for Total Coliforms or E. coli.

In New Brunswick, when we construct or reconstruct a private well, the Potable Water Regulation requires that we take a water sample for testing. The sample is analyzed for the presence of about 30 chemical substances, and bacteria (both total coliforms and E. coli).

The presence of total coliforms or E. coli bacteria indicates the possible presence of more harmful bacteria that may cause illness. When guidelines for total coliform and E. coli bacteria are exceeded, the Department of Health and Wellness advises homeowners on ways to remedy the situation.

Of the monitoring carried out by the Provincial Government, results show that in a given year, as much as 40 % of new or newly-constructed private wells are contaminated with total coliform bacteria, and an average of 3% with E. coli. These combined exceedances are illustrated on the chart (at right).

It is important to note that it is common for a new well to show contamination in its first test. Many of these and other instances of contamination are quickly



corrected following disinfection using chlorine, and a second test generally shows improvement.

Testing shows similar percentages of exceedances among older wells. Reasons include well construction practices, proximity to bacterial sources (e.g. septic tanks), old or malfunctioning wells and distribution (piping) systems, as well as seasonal changes in groundwater levels.

Through educational efforts and advisory services, the department encourages proper well maintenance and regular testing by all private well owners.

### Did You Know?

There are various guidelines used in protecting the Province's water:

- The guidelines for drinking water (from the tap) are published by Health Canada, under the title "Guidelines for Canadian Drinking Water Quality".
- Guidelines for surface waters are set under the Canadian Council of Ministers of the Environment. There are separate guidelines according to use: recreational, aquatic life, and agricultural.
- The national guidelines for aquatic protection are called the "Canadian Water Quality Guidelines for the Protection of Aquatic Life".

### Approaches to Water Quality Protection - Water Quality Testing

The Provincial Laboratory, operated by the Department of the Environment and Local Government, tests samples from both drinking and non-drinking water sources. Where drinking water is concerned, the laboratory compiles water test results and transmits them to the Department of Health and Wellness, the agency with which it shares responsibility for overseeing the quality of New Brunswick's drinking water. All privately operated laboratories are also required to submit test results for public water supplies to the Department of Health and Wellness.

## Approaches to Water Quality Protection - Surface Water Quality Monitoring

In New Brunswick, both drinking water and non-drinking water sources are monitored. Drinking water supplied by a surface water supply such as a lake within a drinking water watershed is monitored, as well as water at a specific location such as the intake of a municipal water system. This monitoring is carried out to determine if there have been changes in water quality and if so, why, as well as to aid the Province in determining when public health advisories should be issued.

The monitoring of non-drinking water is aimed at evaluating the ability of a body of water to support aquatic life. To monitor a water body or watershed as a whole, many samples may be taken over a period of time and at a number of locations. Monitoring is a fundamental aspect of water planning, assessing the general health of an ecosystem, and in recognizing and understanding long-term trends in water quality. In more immediate circumstances, it also indicates when protective steps may be required to address a problem.

## ENVIRONMENTAL INDICATORS - OTHER WATER RESOURCES

### INDICATOR 1 - Quality of Major River Systems as Measured by Annual Average Dissolved Oxygen, Nitrates, and pH

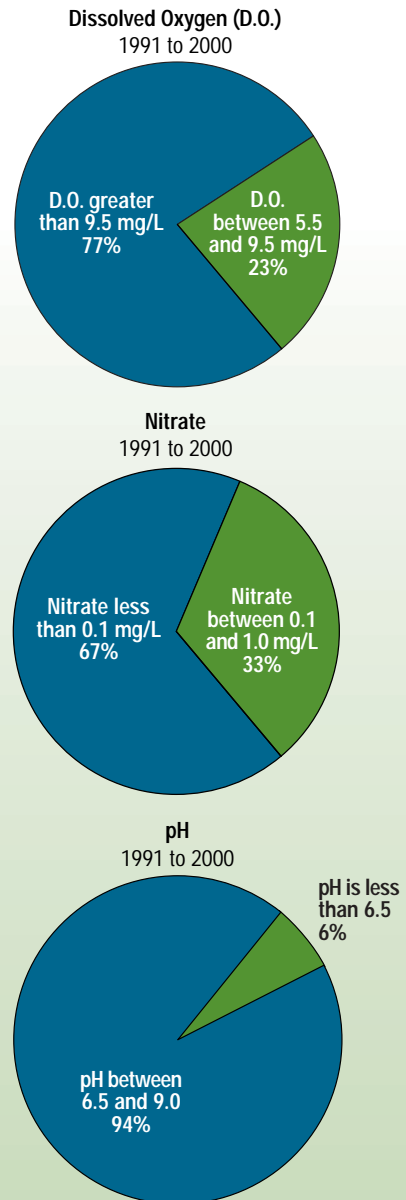
For many years, the Province has operated one primary monitoring station at strategic locations on major river systems\* in New Brunswick. These stations measure key components of water quality, including dissolved oxygen, nitrates and pH.

Dissolved oxygen (D.O.), which natural waters obtain from the air and aquatic plants, is crucial to water-dwelling life and therefore an important indicator of water quality. To protect aquatic life, D.O. concentrations should be at least 5.5 milligrams per litre, and to protect critical stages of development in some species, at least 9.5 milligrams per litre.

Nitrate is an important nutrient and can be a useful indicator in measuring human influences on a body of water. In New Brunswick, surface waters generally contain much less than 1 milligram of nitrate per litre, with 67% having values of less than 0.1 milligram per litre.

In common terms, pH is a measurement of acidity or alkalinity and is expressed using a scale of 0-14 pH units. In natural waters, the pH should be between 6.6 and 9.0 units in order to protect aquatic life. Note that pH values less than 6.5 are less desirable than higher values.

The chart opposite shows the levels of D.O., nitrates and pH from 1991-2000 in New Brunswick's major river systems. Over 90% of the tests for these components meet Canadian Water Quality Guidelines for the Protection of Aquatic Life.



\* Major River Systems: Bouctouche, Kennebecasis, Lepreau, Magaguadavic, Nepisiguit, North Branch Oromocto, Northwest and Southwest Miramichi, Petitcodiac, Restigouche, Saint John (two sites), St. Croix, Tabusintac, Upsalquitch.

## INDICATOR 2 - Proportion of Water Used by Major Sectors

New Brunswick's fresh water is used for many purposes, including drinking water, irrigation, and industrial processes. While it may seem that the province has an abundant supply of fresh water, there is ultimately a finite amount available for present and future use.

This, coupled with the relationship between water quantity and quality, makes tracking water usage important.

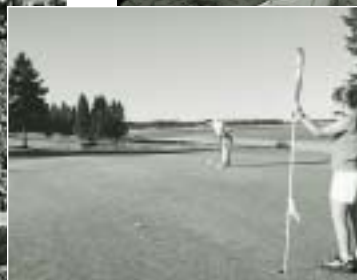
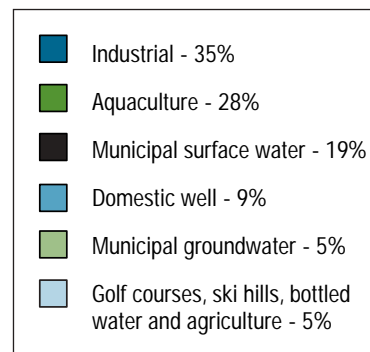
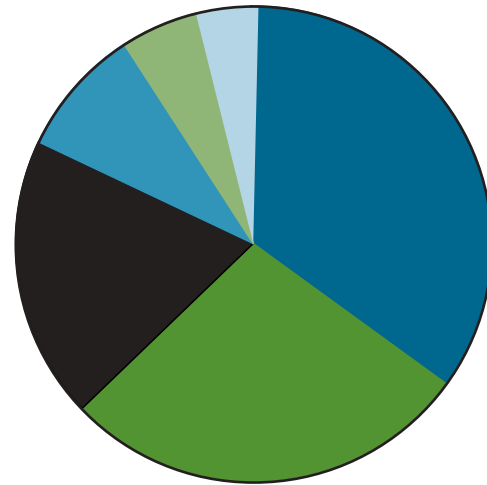
The Department of the Environment and Local Government requires many industrial operators to monitor the amounts of effluents being released from their facilities, which among other information, gives a sense of the amount of water being used given the high water content in effluent.

On a national level, New Brunswick has joined the Federal Government and a number of other provinces and territories in agreeing to prohibit the removal of bulk water from Canada's major drainage basins.

The Province has also begun work to initiate discussion on water quantity issues in New Brunswick.

The chart at right shows the proportion of water used by major sectors in 2001, by percentage, based on reported and other available data.

Water Use in New Brunswick



### **Approaches to Water Quality Protection - Compliance and Enforcement**

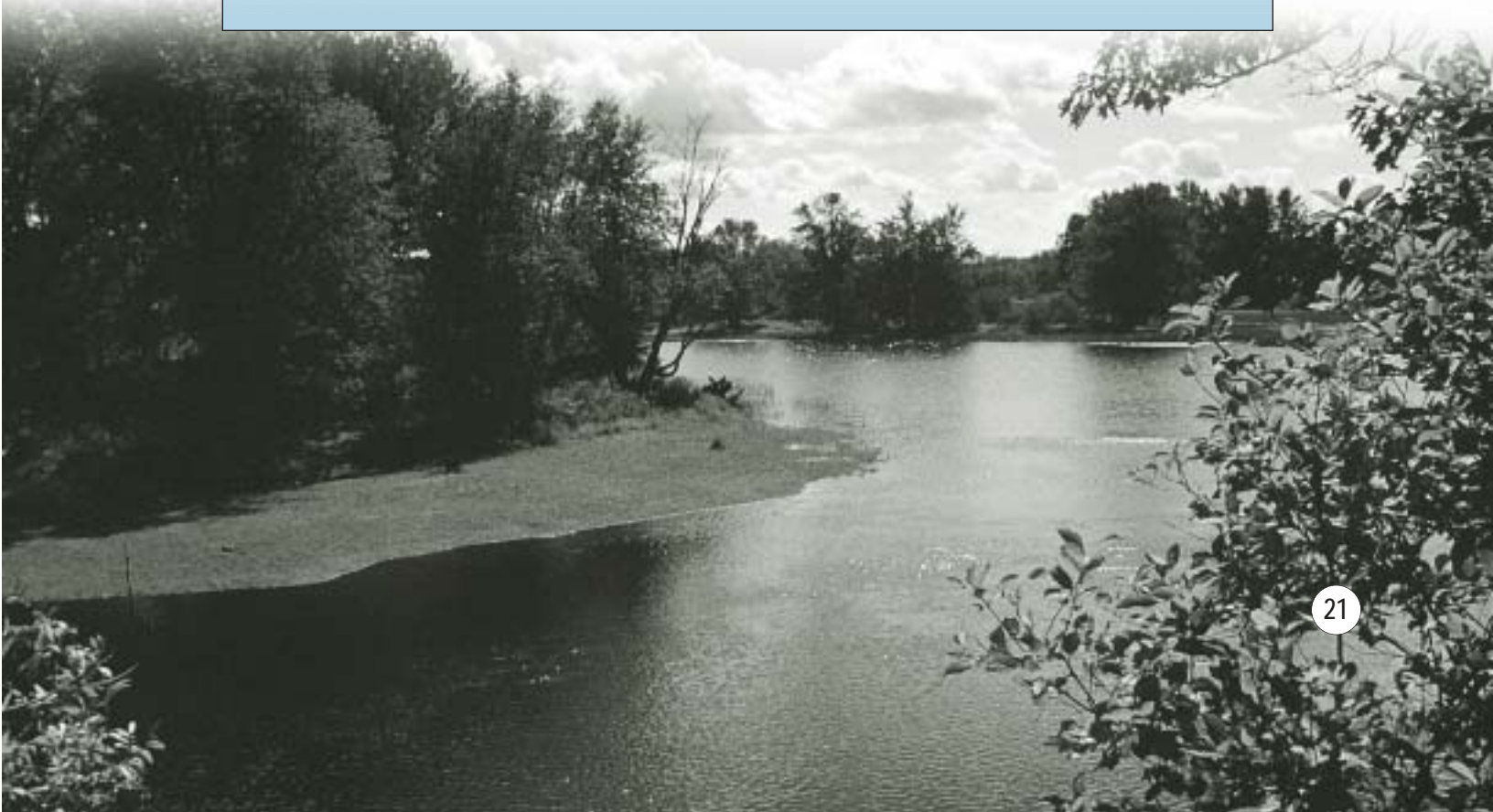
The Department of the Environment and Local Government's approach to issues of non-compliance tends to follow two distinct and complementary paths - direct response, and continuing response. If, for example, an activity taking place in a designated drinking water watershed were prohibited by the legislation, the Department's inspection staff would respond to determine the extent of the violation and to apply the appropriate remedy to bring the activity into compliance. The Department's water planning staff, in turn, develop opportunities to make users of that watershed aware of the restrictions on activities in the area both as a preventive measure, and as a follow-up to instances of non-compliance.

As a further means of achieving protection, the Department issues operating approvals for municipal water supply systems. In addition, a certification program has been established for those who are responsible for managing these municipal systems. By setting precise standards for operation in legislation, additional checks and balances have been added to the Department's compliance tool kit.

### **Approaches to Water Quality Protection - Public Education and Involvement**

As with other environmental subjects, public awareness and understanding of the threats to both drinking water and other water resources are important aspects of effective management and protection. The Department has identified the owners of private wells and other drinking water supplies as key audiences for enhanced education activities. The Department has developed education materials, web pages, and informational display programs specifically geared to well owners. This effort has been further enhanced by the addition of water planning staff in each of the department's six regions, whose responsibilities include community-based public awareness around water planning and protection.

Individuals and community-based groups have long been involved in the development of local water quality goals and the actions aimed at achieving them. For example, there are a number of active community watershed groups whose participation in provincial water classification and other environmental studies includes monitoring programs. This, coupled with interest from the business and industrial sectors, cottage owners' associations and environmental groups is encouraging greater local involvement in water management.



## CONCLUSION

**I**n New Brunswick, we know that we are more fortunate than many areas of the world by virtue of our access to a relatively unspoiled natural environment. We are still able to enjoy the panorama of clear sky across relatively unmarred stretches of land and waterways. It is because we appreciate this vision and all that it supports, that our goal should be to ensure that those who come after us have the same opportunity.

Over the past 30 years, the Province has made progress in protecting New Brunswick's environment. A solid legislative framework supports dozens of day-to-day decisions and activities on behalf of New Brunswickers. There are clear benchmarks for air emissions, waste management and water testing that have reduced or eliminated detrimental practices used in the past. Some of the most significant pollutants have been greatly reduced or corralled through environmentally sound management.

Communities have access to improved planning tools, and our land use management and approvals programs encompass everything from individual to industrial activity. A greater range of mechanisms is in place to encourage compliance, and measures for demonstrating accountability to the public have become part of policy and program development. The Department's staff is better trained and is making dedicated efforts to respond to a more informed and active public and to work with all stakeholders who share responsibility for environmental protection.

Still, while there has been progress, New Brunswick faces both existing and future environmental challenges.

We will need to work diligently within and outside our borders to further reduce air emissions that affect our air, land and water. We will need to continue to set and meet new national and provincial air objectives that support human and environmental health, and to contribute to the abatement of climate change.

We will need to adopt a more integrated approach to environmental planning and protection in recognition of both the relationships among all aspects of the ecosystem and the goal of local empowerment. We will need to continue to strive for significant reduction and diversion of waste so that our land and resources are conserved and best utilized.

We will need to continue as well as enhance our efforts to protect public and private drinking water supplies, and to take steps to ensure that New Brunswick has abundant clean water to support all living things in the future.

We will need to foster as well as build on positive relationships with individuals, communities, businesses, and groups, and encourage involvement by all New Brunswickers in environmental decision-making.

Together, we can protect New Brunswick's environment to ensure a prosperous future.

As a Department, our aims in achieving environmental progress are directly linked to our Mission Statement:

**Healthy Environment - Strong Communities.**



## Additional Resources

### AIR

#### Department of the Environment and Local Government (DELG) Contacts:

Canada-wide Standards	External Relations Branch	Tel: (506) 453-3703
Air-related Public Consultation	Educational Services Branch	Tel: (506) 453-3700
Air Quality Approvals	Approvals Branch	Tel: (506) 444-4599
Air Quality Monitoring	Sciences and Reporting Branch	Tel: (506) 457-4844

#### Compliance and Enforcement:

Contact your nearest DELG Regional Office: Bathurst (506) 547-2092, Miramichi (506) 778-6032, Moncton (506) 856-2374, Saint John (506) 658-2558, Fredericton (506) 444-5149, Grand Falls (506) 473-7744.

#### Key NB Air-related Education Materials:

Educational Services Branch Tel: (506) 453-3700 / E-mail: [Information-elg-egl@gnb.ca](mailto:Information-elg-egl@gnb.ca)  
- Air Emissions - Some Facts just for Kids - Mobile Air Quality Monitoring Fact Sheet  
- An Introduction to Air Quality in NB - A Summary of New Brunswick's Mercury Action Plan  
- Air Quality Monitoring in NB - NB Mercury Action Plan - Progress Report  
- Air Quality Monitoring Results Reports - Smog in NB

#### Key DELG Air-related Web Addresses:

Air Quality Programs and Information: <http://www.gnb.ca/0009/0355/0005/0004-e.html>  
Air-related Education Materials: <http://www.gnb.ca/0009/0010-e.asp>  
Index on the Quality of the Air: <http://www1.gnb.ca/0355/0003/0000.asp>  
Public Information Access Site: <http://www.gnb.ca/0009/0355/0005/index-e.html>

#### Other Air-related Web Addresses:

Environment Canada: [http://www.ec.gc.ca/air\\_e.html](http://www.ec.gc.ca/air_e.html)  
NB Department of Justice - Acts and Regulations: <http://www.gnb.ca/0062/acts/acts-e.asp>  
New England Governors/Eastern Canadian Premiers:  
[http://www.scics.gc.ca/pdf/850084012\\_e.pdf](http://www.scics.gc.ca/pdf/850084012_e.pdf)

### LAND

#### Department of the Environment and Local Government (DELG) Contacts:

Environmental Impact Assessment	Project Assessment Branch	Tel: (506) 444-5382
Land Use / Water Planning	Sustainable Planning Branch	Tel: (506) 453-2862
Local Governance & Regional Services	Local Governance Branch	Tel: (506) 453-2434
Petroleum Storage and Handling	Remediation Branch	Tel: (506) 444-5955
Waste Reduction / Pesticides Management	Stewardship Branch	Tel: (506) 453-7945
Watercourse Alterations	Regional Services Branch	Tel: (506) 453-2182

#### Compliance and Enforcement:

Contact your nearest DELG Regional Office: Bathurst (506) 547-2092, Miramichi (506) 778-6032, Moncton (506) 856-2374, Saint John (506) 658-2558, Fredericton (506) 444-5149, Grand Falls (506) 473-7744.

#### Key NB Land-related Education Materials:

Educational Services Branch Tel: (506) 453-3700 / E-mail: [Information-elg-egl@gnb.ca](mailto:Information-elg-egl@gnb.ca)  
- A Sense of Community - Backyard Magic - The Composting Handbook  
- A Coastal Areas Protection Policy for NB - Waste Reduction & Diversion - An Action Plan for NB  
- Facts on Organics - Municipal Biosolids - Watercourse Alterations (Technical Guidelines)  
- NB's Beverage Containers Program - Rural Planning - What is a Rural Plan?  
- NB's Used Oil Program

**Key DELG Land-related Web Addresses:**

Environmental Impact Assessment: <http://www.gnb.ca/0009/0377/0002/index-e.html>  
 Land Use Planning: <http://www.gnb.ca/0009/0136/0001/0010-e.html>  
 Technical Guidelines: <http://www.gnb.ca/0009/0009-e.asp>  
 Waste-related Education Materials: <http://www.gnb.ca/0009/0010-e.asp>

**Other Land-related Web Addresses:**

Atlantic Risk-Based Corrective Action: <http://www.atlanticrbca.com/eng/right.html>  
 District Planning Commissions: <http://www.gnb.ca/0009/0136/0001/0002-e.html>  
 Environment Canada: [http://www.ec.gc.ca/wastes\\_e.html](http://www.ec.gc.ca/wastes_e.html)  
 NB Department of Justice: Acts and Regulations: <http://www.gnb.ca/0062/acts/acts-e.asp>  
 NB Solid Waste Association: <http://www.nbsolidwaste.com/>

**WATER****Department of the Environment and Local Government (DELG) Contacts:**

Drinking Water Protection	Sustainable Planning Branch	Tel: (506) 453-2862
Municipal Water Treatment and Distribution	Stewardship Branch	Tel: (506) 453-7945
Regional Water Planning Officers	Regional Services Branch	Tel: (506) 453-2182
Water Classification	Sustainable Planning Branch	Tel: (506) 453-2862
Water Quantity (policy)	Policy and Planning Branch	Tel: (506) 457-7811
Water Quantity (science)	Sciences and Reporting Branch	Tel: (506) 457-4844
Water Testing	Analytical Services Branch	Tel: (506) 453-2477

**Compliance and Enforcement:**

Contact your nearest DELG Regional Office: Bathurst (506) 547-2092, Miramichi (506) 778-6032, Moncton (506) 856-2374, Saint John (506) 658-2558, Fredericton (506) 444-5149, Grand Falls (506) 473-7744.

**Key NB Water-related Education Materials:**

Educational Services Branch Tel: (506) 453-3700 / E-mail: [Information-elg-egl@gnb.ca](mailto:Information-elg-egl@gnb.ca)

- A Coastal Areas Protection Policy for NB	- A Guide to NB's Watershed Protected Area Designation Order
- Facts on Water	- A Guide to NB's Wellfield Protected Area Designation Order
- Healthy Riparian Areas	- Water Conservation
- How to Chlorinate Your Well Water	- An Overview of NB's Wellfield Protected Area Designation Order
- Hydrologic Cycle Poster	- Your Well Water - A Safety Checklist
- A Guide to NB's Water Classification Regulation	

**Key DELG Water-related Web Addresses:**

NB Water-related Programs and Information: <http://www.gnb.ca/0009/0003-e.asp>  
 Water-related Education Materials: <http://www.gnb.ca/0009/0010-e.asp>  
 New Brunswick's Watershed Protection Program: <http://www.gnb.ca/0009/0371/0004/index.htm>  
 New Brunswick's Wellfield Protection Program: <http://www.gnb.ca/0009/0371/0001/index.html>  
 Well Construction and Well Water Testing: <http://www.gnb.ca/0009/0373/0001/0009-e.html>

**Other Water-related Web Addresses:**

Atlantic Canada Water Works Association: <http://www.canfish.com/awwa/index.html>  
 Environment Canada: [http://www.ec.gc.ca/water\\_e.html](http://www.ec.gc.ca/water_e.html)  
 NB Department of Justice: Acts and Regulations: <http://www.gnb.ca/0062/acts/acts-e.asp>  
 NB Wetlands Conservation Policy: <http://www.gnb.ca/0078/reports/wetlands/index-e.asp>