
Canada vs. The OECD: An Environmental Comparison

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Design by Brad Hornick Communications

Executive Summary

This study compares Canada's environmental record to the other industrialized nations and tracks Canada's progress (or lack thereof) on environmental issues over the past two decades. Twenty-five environmental indicators in ten categories – air, water, energy, biodiversity, waste, climate change, ozone depletion, agriculture, transportation and miscellaneous – are examined.

The study provides accurate, independent information about Canada's track record in protecting the environment. All of the statistical information comes from data verified and published by the Organization for Economic Cooperation and Development (OECD).

The results prove that Canada has one of the poorest environmental records of the industrialized countries. The primary finding is that for the twenty-five environmental indicators examined, Canada's overall ranking among OECD nations is a dismal 28th out of 29.

Other major findings of the study are:

- Canada is among the three best countries on zero indicators;
- Canada is among the three worst countries on nine indicators (per capita greenhouse gas emissions, sulphur dioxide emissions, carbon monoxide emissions, volatile organic compound emissions, water consumption, energy consumption, energy efficiency, volume of timber logged and generation of nuclear waste);
- Canada's economy is inefficient, in that we use much more energy and generate much more pollution to produce a given amount of goods and services relative to our industrial competitors, including 33% more energy than the United States per unit of GDP; and

- Canada's performance on most environmental indicators continues to worsen, including: increasing water consumption, increasing energy consumption, increases in nuclear and hazardous waste, higher greenhouse gas emissions, higher numbers of endangered species, declining fish populations, higher commercial fertilizer use, more livestock, more timber logged, more motor vehicles, more kilometres traveled by road, higher population and lower official development assistance.

On the other hand, it is important to note that there are several positive findings provided by this study:

- Canada's performance is improving on ten indicators, including reduced air pollution (lower per capita emissions of sulphur dioxide, nitrogen oxides, carbon monoxide and volatile organic compounds), improved sewage treatment, reduced municipal waste, increased recycling, improved energy efficiency, decreased production of ozone-depleting substances and an increase in parks and protected areas; and
- The superior progress by other industrialized nations, particularly the northern European countries, demonstrates that there are practical, effective solutions to the environmental problems facing Canada.

Air Pollution

Canada has made progress in reducing air pollution. Emissions of sulphur dioxide, the main ingredient in acid rain, are down 15.3% since 1985. Emissions of nitrogen oxides, a component of both acid rain and smog, are down 1.6% since 1980. Emissions of carbon monoxide and volatile organic compounds, two other air pollutants that harm human health and the environment, are also down. However, Canada fares very poorly when our record on air pollution is compared with other

industrialized nations. For sulphur dioxide and carbon monoxide emissions, Canada ranks 27th out of 28 OECD nations and 26th out of 27 respectively (meaning Canada has the second highest per capita emissions). For volatile organic compounds, Canada stands 25th out of 26 OECD countries. For nitrogen oxides, Canada ranks 25th out of 28 OECD nations. These facts indicate that despite making progress, Canada is one of the worst air polluters among industrialized nations.

Climate Change

Canada fares very poorly on this important indicator, ranking 27th out of 29 OECD nations in per capita greenhouse gas emissions. Only the United States and Luxembourg produce higher per capita levels of greenhouse gases. Canadians pump out 48% more greenhouse gas emissions per capita than the OECD average. To make matters worse, Canadian emissions are up approximately 13.5% since 1990, in violation of our international commitments to stabilize and reduce emissions, embodied in the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol.

Water

Canada's record on water issues is mixed. Canadians rank a dismal 28th out of 29 OECD nations in water consumption per capita, with only Americans consuming more water. The amount of water consumed in Canada has increased by 25.7% since 1980, causing greater ecological stress on aquatic ecosystems and raising the costs of maintaining adequate water infrastructure.

On the other hand, Canada has made strides in improving municipal sewage treatment. Canada ranks ninth among the 28 OECD nations as seventy-eight percent of Canadians are served by public sewage treatment, up from 64% in 1980. However, there are still over 90 Canadian municipalities,

including three provincial capitals (Victoria, Halifax and St. John's) that dump their sewage raw and untreated into water bodies.

Energy

Canada's record on energy issues is abysmal. In terms of energy use per capita, Canadians rank 27th out of 29 OECD nations, ahead of only Iceland and Luxembourg. In terms of total energy use, Canada stands 26th out of 29.

With respect to energy efficiency, meaning the amount of energy required to produce a fixed amount of GDP, Canada ranks 28th out of 29 OECD nations. Although Canada's energy efficiency has increased by 21% since 1980, this gain was more than offset by our increasing population and economic growth so that total energy consumption continued to climb, rising 20.3% between 1980 and 1997.

Waste

Canadians produce an average of 490 kilograms of municipal waste per person annually, which puts Canada 18th out of 27 OECD nations. This is a 3.9% decrease in garbage per person between 1980 and 1997. Canadians recycle 33% of paper and cardboard and 17% of glass. These figures represent significant progress since 1980, but still place Canada 24th out of 25 OECD nations for glass recycling and 21st out of 28 countries for paper and cardboard.

Canada produces more nuclear waste every year, per capita, than any other OECD nation. In terms of total nuclear waste, only the United States produces more (although Canada is projected to surpass the U.S. by 2010). The annual volume of nuclear waste produced in Canada has grown by 76% since 1982. As well, Canadians are 24th out of 27 nations in per capita hazardous waste.

Ozone Depleting Substances

Canada has made major progress in reducing the production, consumption and release of ozone-depleting substances. Production of chlorofluorocarbons (CFCs), the most problematic ozone-depleting substance, has been completely eliminated in Canada since 1995.

However Canada still ranks 13th out of 16 OECD nations in terms of per capita consumption of ozone-depleting substances, largely because of a 76% increase in the production and use of HCFCs, an interim substitute for CFCs.

Agriculture

Canada has a poor record on environmental issues related to agriculture. Canada ranks 22nd out of 28 OECD nations on pesticide use, 25th out of 28 on commercial fertilizer use and 16th out of 28 in terms of livestock (cattle, pigs, sheep and goats). Pesticide use may be declining¹ while commercial fertilizer use increased by 42% between 1980 and 1997. The number of livestock in Canada rose, with cattle up 8.5%, pigs up 17.4% and sheep up 30.8% between 1980 and 1998.

Biodiversity

Among OECD nations, Canada ranks 7th out of 29 for the number of species at risk², 20th out of 28 in volume of wild fish caught per capita, 27th out of 29 in volume of timber logged per capita and 13th out of 29 in percentage of land designated as parks, ecological reserves and other protected areas.

The number of endangered species on Canada's national list increased from 178 species in 1988 to 364 in 2000. The volume of timber removed from Canadian forests increased 14.6% between 1980 and 1997. The volume of fish caught dropped 73% since 1990, reflecting the ecological disasters in the east coast cod and west coast salmon fisheries. On

the other hand, major strides have been made in Canada in creating new protected areas. The percentage of land protected has increased 42% since 1983. A troubling caveat is that less than half of the area protected in Canada meets international standards for strict protection.

Transportation

Canada is 25th out of 29 OECD nations in motor vehicles per capita and 26th out of 29 in road distance traveled. Both the number of motor vehicles in Canada and the road distance traveled have more than doubled since 1970.

Miscellaneous

Canada places 26th out of 29 OECD nations in population growth because of a 24.4% increase between 1980 and 1998. Only Turkey, Mexico and Australia experienced faster population growth. Seventeen OECD nations have smaller populations than Canada, placing Canada 18th out of 29 countries in terms of total population.

Despite Canada's international reputation as a generous and compassionate country, Canada ranks only 11th out of 20 OECD nations in official development assistance, also known as foreign aid. This is an important environmental indicator because a significant proportion of foreign aid is intended to alleviate environmental problems in the developing world. Canada dedicated 0.29% of its GDP to official development assistance in 1998, down 33% since 1980.

The Eco-Research Chair of Environmental Law and Policy at the University of Victoria is currently undertaking a comprehensive assessment of Canadian environmental law and policy to determine the reasons behind Canada's relatively poor environmental record. The Eco-Research Chair's assessment will be published in 2002.

Summary of Canada's OECD Ranking

AIR POLLUTION

Sulphur Oxides (kg/capita)	27th out of 28
Nitrogen Oxides (kg/capita)	25th out of 28
Volatile Organic Compounds (kg/capita)	25th out of 26
Carbon Monoxide (kg/capita)	26th out of 27

CLIMATE CHANGE

Greenhouse Gas Emissions (tonnes of CO ₂ /capita)	27th out of 29
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WATER

Water Consumption (cubic metres/capita)	28th out of 29
Municipal Sewage Treatment (% of population served)	9th out of 28

ENERGY USE

Energy Consumption (tonnes of oil equivalent/capita)	27th out of 29
Energy Efficiency (tonnes of oil equivalent /\$1000 U.S. GDP)	28th out of 29

WASTE

Municipal Waste (kg/capita)	18th out of 29
Recycling (% of glass and paper recycled)	23rd out of 27
Hazardous Waste (kg/capita)	24th out of 27
Nuclear Waste (kg/capita)	28th out of 28

OZONE DEPLETING SUBSTANCES

Consumption of Ozone-depleting Substances (kg/capita)	13th out of 16
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AGRICULTURE

Pesticide Use (tonnes of active ingredients/capita)	22nd out of 28
Fertilizer Use (tonnes/capita)	25th out of 28
Livestock (number of cattle, sheep, goats and pigs/capita)	16th out of 28

BIODIVERSITY

Species at Risk (number of species designated as at risk)	7th out of 29
Protected Areas (% of land designated as protected)	13th out of 29
Fisheries (kg per capita)	20th out of 28
Forests (volume of forest logged, in cubic metres per capita)	27th out of 29

TRANSPORTATION

Road Vehicles (number of road vehicles per capita)	25th out of 29
Distance Traveled (road distance traveled per vehicle)	26th out of 29

MISCELLANEOUS

Population (% growth in number of people)	26th out of 29
Official Development Assistance (% of GDP)	11th out of 20

*Although there are 29 countries in the OECD, reliable data are not available for all countries for all indicators, which is why the rankings are not always out of 29.

Introduction

Ten years ago, when Lucien Bouchard was Canada's Environment Minister, he announced that by the year 2000 Canada would be "the industrialized world's most environmentally friendly country".³ At the same time, noted Canadian scientist David Suzuki warned that:

*"More than any other time in history, the 1990s will be a turning point for human civilization. Not only are we facing ecological disasters that could affect our ability to survive, but the crisis is forcing us to reexamine the value system that has governed our lives for at least the last 2000 years."*⁴

Today, Canada's environmental track record continues to be the subject of heated public debate and wildly divergent opinions. Is it true, as the Fraser Institute claims, that "Canadians can be proud of all we have accomplished to reduce pollution and protect our environment"?⁵ Or is it true, as the Globe and Mail recently claimed, that Canada is an "environmental bad boy"?⁶

In light of the divided discourse, it is difficult to find a reliable independent assessment of the current state of environmental protection in Canada. Critical questions are going unanswered. How do we compare to other industrialized nations? Are we making progress towards a sustainable future or are we moving backwards? Reports from government, environmental groups, the media and rightwing organizations like the Fraser Institute tend to obfuscate, exaggerate, or omit information that does not further their objectives.⁷

The goal of this study is to provide accurate, independent information about Canada's environmental track record. The study compares Canada's current environmental performance with the other 28 member nations of the Organization for Economic Cooperation and Development (OECD). Twenty-five environmental indicators in ten categories – air, water, energy, biodiversity, waste, climate change, ozone depletion, agriculture, transportation and miscellaneous – are examined. The study also looks at the change in Canada's environmental performance over a span of two decades, from 1980 to 1999, to give an indication of our progress, or lack thereof, towards sustainability. Canada's progress over the past two decades is also compared with the rest of the OECD.

The OECD has twenty-nine members including Canada, the United States, Mexico, Australia, Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

The twenty-five environmental indicators selected for this study were chosen to represent the major areas of environmental concern. Where appropriate, information is presented in per capita terms as well as overall environmental performance. Otherwise, the single factor of population would overwhelm all other factors (meaning that the United States, with the largest population among OECD nations, would almost invariably be at the bottom of every category).



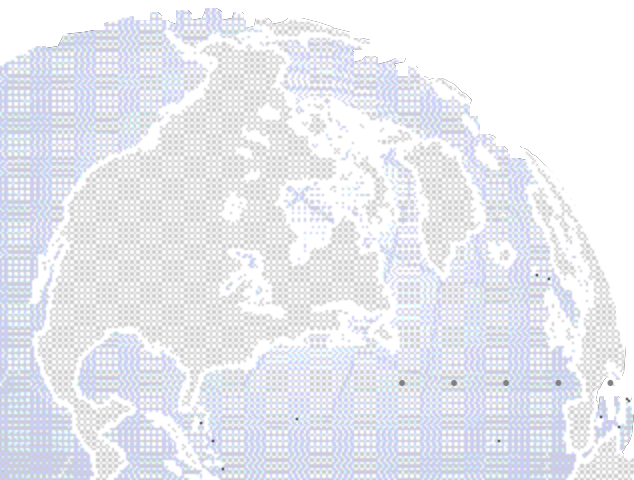
Source of Information

Most of the statistical data in this study comes from the Organization for Economic Cooperation and Development’s Environmental Data Compendium, 1999. The OECD publishes this compendium of environmental statistics every two years for the purpose of providing “the best internationally available data on the environment and related areas.”⁸ Although the OECD relies largely on information provided by member governments, it ensures quality by verifying this information before it is published.

The OECD’s Environmental Data Compendium simply provides the data, without any ranking of nations or other commentary. As the Environmental Data Compendium states:

*No attempt has been made to suggest interpretations in presenting the data. This is a deliberate choice. The data take on their full meaning only when interpreted by readers familiar with the subject.*⁹

“Canada vs. The OECD: An Environmental Comparison” takes the data provided by the OECD and ranks the twenty-nine nations according to their environmental performance. Throughout the report the rankings have been compiled so that the country with the best performance on a given indicator from an environmental perspective is ranked 1st. Larger numbers reflect poorer performance, with 29th being the worst ranking possible in the 29 nation OECD.



Air Pollution

Sulphur Oxides

Sulphur oxides are hazardous to both human health and the environment. The health impacts of sulphur dioxide include asthma attacks, eye irritation, coughing and chest pain. Children and people with chronic respiratory disorders and cardiopulmonary disease are particularly vulnerable. Sulphur dioxide is one of the ingredients of acid deposition (which includes acid rain and other forms of acid precipitation). Acid rain harms aquatic ecosystems such as rivers, lakes and wetlands, affecting fish and amphibians. Acid rain also harms forests and crops, by removing nutrients from the soil.

Sulphur dioxide is primarily produced at stationary sites, such as power plants, pulp mills, smelters, petroleum refineries and factories. Canadian gasoline has high levels of sulphur although new regulations will reduce sulphur emissions from this source in the next few years.

Canada's OECD Ranking

Canada ranks a dismal 27th out of 28 OECD nations in both per capita sulphur dioxide emissions and total sulphur dioxide emissions. Canada produces 88.9 kg of sulphur dioxide per capita, more than two times the OECD average of 39.2 kg of sulphur dioxide per capita. Only Australians produce more per capita emissions than Canada, while only the United States produces a higher total amount of emissions.

Efficiency

An efficient economy produces the greatest amount of goods and services with a minimum of pollution. Canada produces 4.4 kilograms of sulphur dioxide emissions per \$1000 US of GDP, which is nearly twice the OECD average of 2.3 kilograms of sulphur dioxide emissions per \$1000

US of GDP. The only countries with a worse efficiency record than Canada are Poland, the Czech Republic, Hungary, Turkey, Greece and Australia. In other words, Canada's economy is much more pollution intensive and, consequently, less efficient than almost all of our major industrial competitors, including the United States.

The Trend

There is a glimmer of good news here, in that Canada's performance is improving. Since 1985, Canada's emissions of sulphur dioxide have decreased by 15.3%. However, sixteen of the twenty other OECD nations for whom trend data are available achieved larger reductions in sulphur dioxide emissions during this period than Canada.

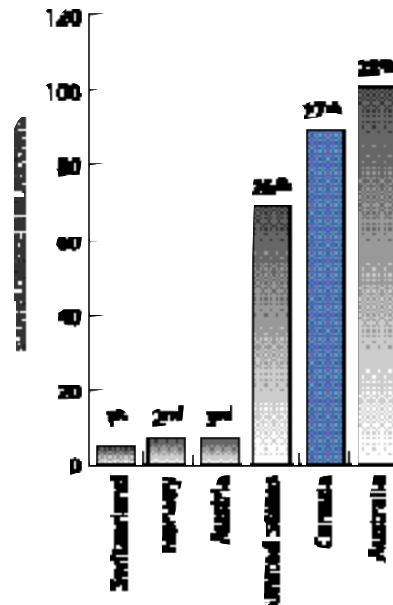


FIGURE 4. EMISSIONS OF Sulphur Dioxide In kg per capita

Source: OECD Environmental Data, 1999

Air Pollution

Nitrogen oxides

Nitrogen oxide emissions result from the combustion of fossil fuels, contributing to both smog and acid precipitation. Again, nitrogen oxides are hazardous to human health and the environment. Acid rain harms aquatic ecosystems (rivers, lakes and wetlands) as well as forests and crops.



Nitrogen oxides are a component of smog and ground level ozone primarily produced by the combustion of fossil fuels – mainly by vehicles, electricity generation and industrial processes.

The health impacts of exposure to smog include impaired lung function in the short term as well as accelerated deterioration in lung function over the long term. Children and individuals with respiratory problems are at greater risk.

Canada's OECD Ranking

Canada ranks a dismal 25th out of 28 OECD nations in both nitrogen dioxide emissions per capita and total nitrogen dioxide emissions. Canada produces 67.1 kg of nitrogen dioxide per capita, almost 40% higher than the OECD average of 40.6 kg of nitrogen dioxide per capita.

Only Australians, Icelanders and Americans produce higher per capita emissions of nitrogen dioxide than Canadians. Only the United States, Australia and the United Kingdom produce higher total emissions of nitrogen dioxide.

Efficiency

Canada produces 3.4 kilograms of nitrogen dioxide emissions per \$1000 US of GDP, roughly 42% higher than the OECD average of 2.4 kilograms of nitrogen dioxide emissions per \$1000 US of GDP. The only countries with a worse record than Canada are Iceland, Poland, Australia and the Czech Republic. In other words, Canada's economy is much more pollution intensive and, consequently, less efficient than the majority of our industrialized competitors.

The Trend

There is modestly good news here, in that Canada's performance is improving. Since 1980, Canada's emissions of nitrogen dioxide have decreased by 1.6%. However, eleven of the twenty other OECD nations for whom trend data are available achieved larger reductions in nitrogen dioxide emissions during this period than Canada.

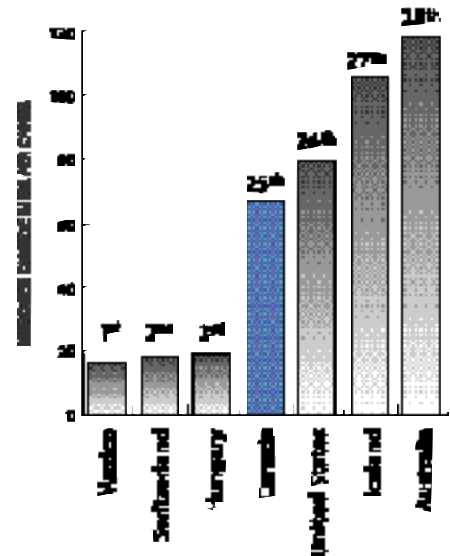
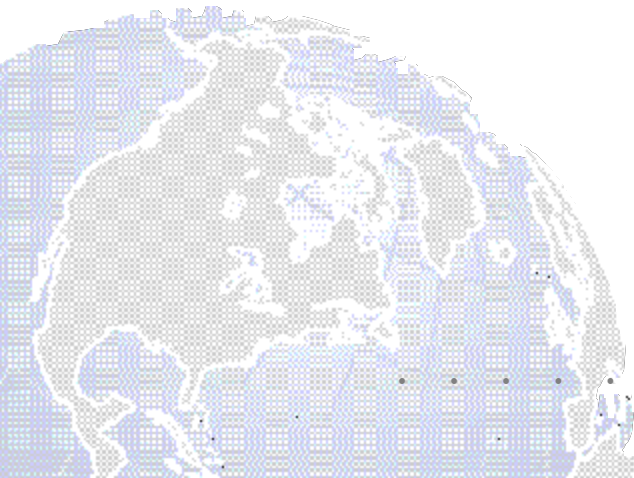


FIGURE 2. Emissions of Nitrogen Dioxide in kg. per capita

SOURCE: OECD ENVIRONMENTAL DATA 1998



Air Pollution

Volatile Organic Compounds

Volatile organic compounds, in combination with nitrogen oxides, are responsible for ground level ozone and smog. Smog has both health and environmental impacts. Although healthy individuals suffer eye irritation and a decrease in lung function when exposed to smog, people with asthma or other respiratory problems suffer disproportionately. Decreased lung function may be accompanied by coughing, nausea, chest pain and pulmonary congestion. Children are particularly susceptible to these problems. As well, crops such as wheat, corn, soybeans and tomatoes are sensitive to ground level ozone.

Volatile organic compounds are produced by vehicle emissions, chemical manufacturing, and the evaporation of automotive fuels, other petroleum based products and chemical solvents.

Canada's OECD Ranking

Canada ranks a dismal 25th out of 26 OECD nations in both volatile organic compound emissions per capita and total emissions of volatile organic compounds. Canada produces 88.1 kg of volatile organic compounds per capita.

Only Australians have a worse record of per capita volatile organic compound emissions than Canadians. Only the United States produces more total emissions than Canada.

Efficiency

Canada produces 4.3 kilograms of volatile organic compound emissions per \$1000 US of GDP, more than any other OECD nation except Greece or Australia. Again, Canada's economy is much more pollution intensive and, consequently, less efficient than the majority of our industrialized competitors.

The Trend

There is a silver lining here, in that Canada's performance is improving. Since 1980, Canada's emissions of volatile organic compounds have decreased by 4.1%. However, according to Environment Canada, "concentrations of ozone still rise periodically to unacceptably high levels in many localities."¹⁰

Eleven of the fifteen other OECD nations for whom trend data are available achieved larger reductions in volatile organic compound emissions during this period than Canada.

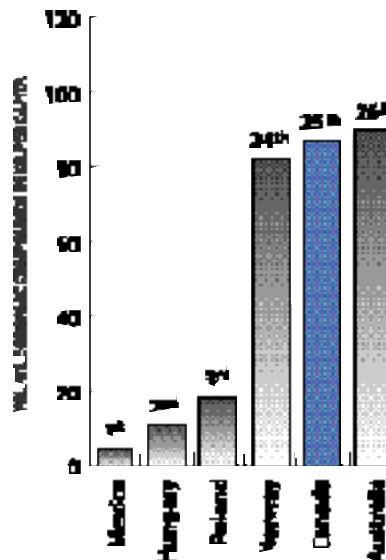


FIGURE 2. Emissions of Volatile Organic Compound In kg. per capita

SOURCE: ENVIRONMENT CANADA, 2000

Air Pollution

Carbon Monoxide

Carbon monoxide is a health hazard. Although the colourless gas causes no irritation and has no detectable taste or smell, it can interfere with the body's ability to absorb oxygen. The health impacts of carbon monoxide occur because it impairs the ability of red blood cells to transport oxygen to body tissues. Poisoning can be fatal.

Carbon monoxide is produced by the combustion of fossil fuels. Most carbon monoxide emissions come from vehicles.

Canada's OECD Ranking

Canada ranks a dismal 26th out of 27 OECD nations in carbon monoxide emissions per capita and 25th out of 27 in total carbon monoxide emissions. Only Australians produce more per capita carbon monoxide emissions than Canadians, while only Australia and the United States produce higher total emissions.

Canada produces 334.9 kg of carbon monoxide per capita, almost two and a half times the OECD average of 136.8 kg of carbon monoxide per capita.

Efficiency

Canada produces 16.4 kilograms of carbon monoxide emissions per \$1000 US of GDP, more than twice the OECD average of 7.9 kilograms of carbon monoxide emissions per \$1000 US of GDP. Canada's efficiency record is worse than any other OECD nation except Australia. Again, this indicates that Canada's economy is much more pollution

intensive and, consequently, less efficient than the vast majority of our industrialized competitors.

The Trend

There is some good news here, in that Canada's performance is improving. Since 1985, Canada's emissions of carbon monoxide have decreased by 12.1%. The progress can largely be credited to regulations requiring the installation of catalytic converters in motor vehicles.

However, thirteen of the seventeen other OECD nations for whom trend data are available achieved larger reductions in carbon monoxide emissions during this period than Canada.

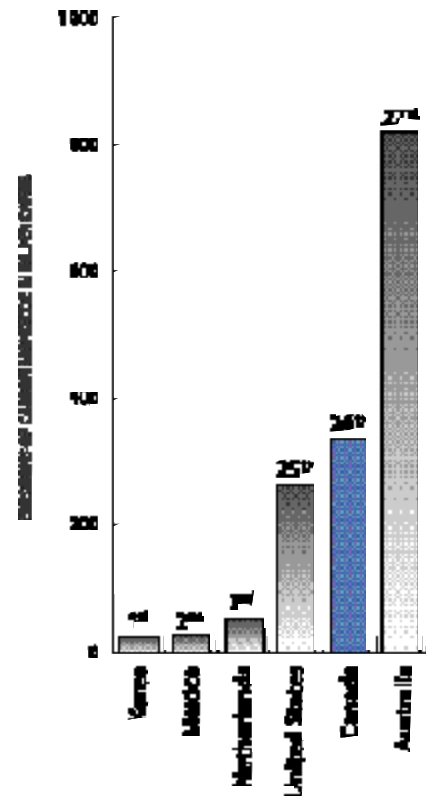
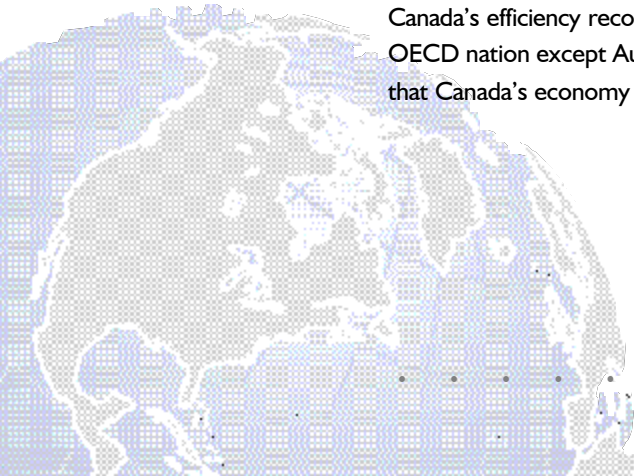


FIGURE 4. Emissions of Carbon Monoxide in kg per capita

SOURCE: ENVIRONMENTAL CANADA, 1998



Climate Change

Greenhouse Gas Emissions

It is widely acknowledged that emissions of greenhouse gases by human society are causing climate change on a global scale.¹¹ Most greenhouse gas emissions are caused by the burning of fossil fuels for energy and by industrial processes such as petroleum refining and cement manufacturing. The dominant greenhouse gas is carbon dioxide.

Although the precise impacts are not known, it is expected that climate change will cause rising sea levels (threatening millions of people), changing precipitation patterns, thinning of polar ice caps, heat waves, floods, droughts, water shortages and disruptions of forests and agriculture. Northern regions are expected to be particularly hard hit. The Canadian Arctic is already experiencing warmer weather, shorter winters, melting permafrost, wildlife impacts and disruptions of traditional Inuit lifestyles.

Canada signed the United Nations Framework Convention on Climate Change in 1992, and pledged to stabilize greenhouse gas emissions at 1990 levels by the year 2000. In 1997, Canada signed the Kyoto Protocol, formally committing to reduce greenhouse gas emissions by 6% below 1990 levels by 2010. However these international efforts to stabilize greenhouse gas emissions have failed to bear fruit, as countries have been unable to agree on means to calculate reductions. Canada, along with the United States, Australia and Japan, has been criticized for blocking these international efforts.

Canada's OECD Ranking

Canada is a dismal 27th out of 29 OECD nations when greenhouse gas emissions are measured on a per capita basis. Canadians produce 16.84 tonnes of carbon dioxide, per person, per year, 48%

above the OECD average of 11.41 tonnes and more than four times the global average.

Canada's total carbon dioxide emissions were 515,375,000 tonnes, placing Canada 25th out of 29 OECD nations. Only the United States, Japan, Germany and the United Kingdom produce more total carbon dioxide emissions than Canada.

Trend

Canadian greenhouse gas emissions continue to rise, despite a series of government initiatives that have relied largely on education and voluntary measures. Canadian greenhouse gas emissions are up by more than 15% since 1990, despite government commitments to stabilize emissions at 1990 levels by the year 2000.

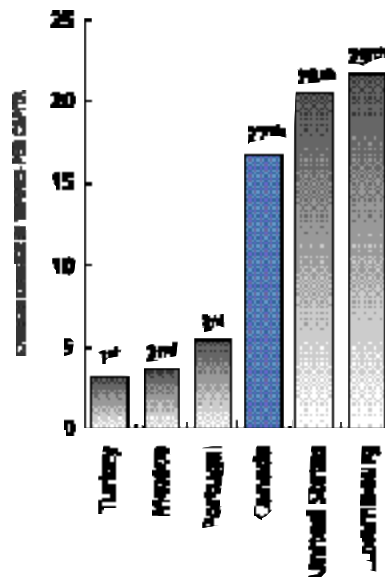


FIGURE 1. Emissions of Carbon Dioxide in tonnes per capita

Source: OECD Environmental Data Compendium

Water

Water Consumption

High levels of water use cause both environmental and economic problems. On the environmental side, high consumption places stress on rivers, lakes and groundwater aquifers and may require dams and flooding with serious ecological impacts. As well, the discharge of polluted water once it has been used damages aquatic ecosystems.

On the economic side, high levels of water use require ever-increasing and expensive investments in water system infrastructure needed to gather, deliver and dispose of water (dams, reservoirs, water treatment facilities, distribution networks and sewage treatment).

Canadians obtain the majority of their water from surface sources such as lakes, rivers and reservoirs. However pressure on groundwater (water drawn from aquifers by wells) is increasing rapidly in Canada.

Canada's OECD Ranking

Canada ranks a dismal 28th among the 29 nations of the OECD in terms of per capita water consumption. Only Americans use more water than Canadians.

Canada uses 1,600 cubic metres of water per person per year. This is more than twice as much water as the average person from France, three times as much as the average German, almost four times as much as the average Swede and more than eight times as much as the average Dane. Canada's per capita water consumption is 65% above the OECD average.

In terms of total water consumption, Canada is 26th out of 29 OECD nations, with the United States, Japan and Mexico using more water, in total, than Canada.

Canada has been criticized repeatedly by the OECD for our excessive use of water.¹²

Trend

Since 1980, overall water use in Canada has increased by 25.7%. This is five times higher than the overall OECD increase of 4.5%. In contrast, nine OECD nations were able to decrease their overall water use since 1980 (Sweden, the Netherlands, the United States, the United Kingdom, the Czech Republic, Luxembourg, Poland, Finland and Denmark).

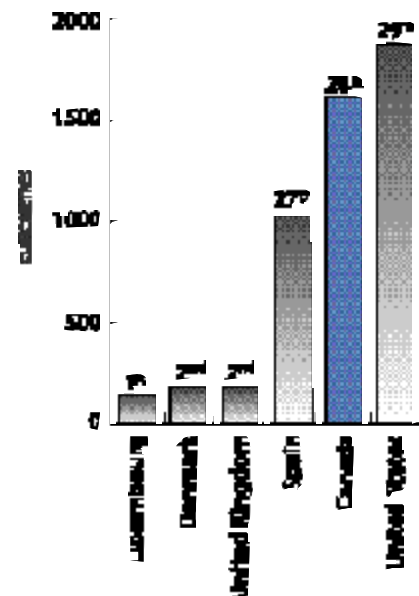
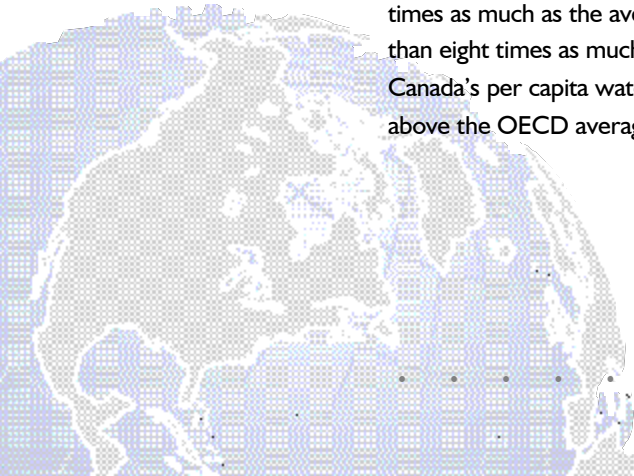


FIGURE 4. Freshwater Abstractions per capita in cubic metres

Source: OECD Environmental Data Compendium, 2002-2003



Water

Municipal Sewage Treatment

Municipal sewage is a major source of water pollution, posing a threat to both human health and aquatic environments. In addition to human excrement, sewage contains hundreds of chemicals and other toxic pollutants from households, businesses and industrial operations. Both untreated (raw) and inadequately treated sewage cause water pollution. Coastal areas in both eastern and western Canada are closed for fishing, swimming and shellfish harvesting because of unsafe levels of faecal coliform bacteria.

Canada's OECD Ranking

The percentage of the population served by public sewage treatment in Canada is 78%, placing Canada 9th out of 28 OECD countries. The OECD average is 60%. The nations with a higher percentage of their population served by public sewage treatment than Canada include the Netherlands, Switzerland, Sweden, Germany, Luxembourg, Denmark, the United Kingdom and New Zealand.

Another 12% of Canadians are connected to public sewage networks but are not served by any form of sewage treatment. In other words, their sewage enters a pipe, but is never treated before being returned to the environment. A further 9% of Canadians are not served by public sewage treatment, but may have private treatment services, such as septic tanks.

When the figures are looked at more closely to examine the quality of sewage treatment being provided, Canada's performance is less impressive. There are three levels of sewage treatment – primary, secondary and tertiary – which provide progressively more effective treatment. In Canada, only 33% of the population is served by tertiary treatment, the best available treatment, while 19%

still have access to only crude primary treatment, the least effective form of sewage treatment. In contrast, in countries like Germany, Denmark, Finland, Sweden and Switzerland, over 70% of the population is served by tertiary treatment.

Environment Canada cautions that “Statistics on the population served by treatment facilities may not provide the entire picture, however. In most Canadian cities, wastewater bypasses sewage treatment during heavy rainfalls, combining with storm water in sewer outflows.”¹³

The Trend

The percentage of Canadians served by sewage treatment has been steadily rising, from 64% in 1980 to 78% in 1997. Much remains to be done, as over 90 Canadian municipalities still discharge raw, untreated sewage, including three provincial capitals (Victoria, Halifax and St. John's).¹⁴ Raw sewage from these three large cities still goes straight into the ocean.

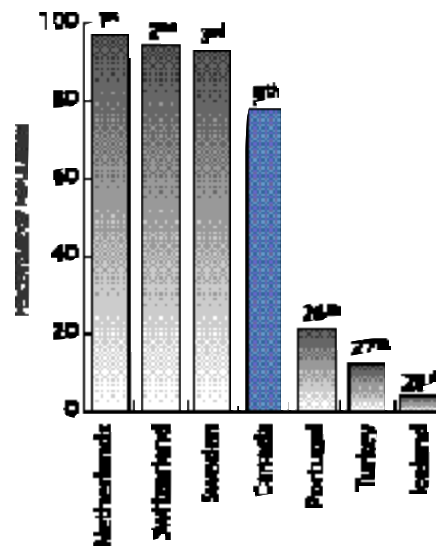
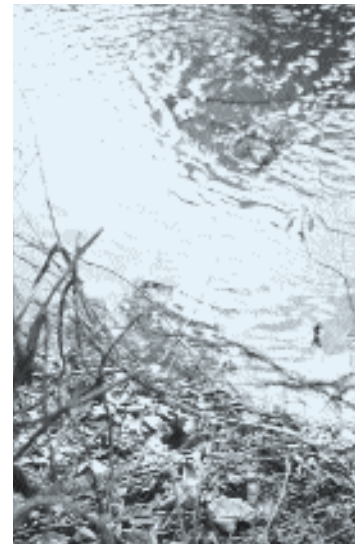


FIGURE 7. Percentage of population served by public sewage treatment

Source: OECD, Environment Canada, 1998

Energy Use

Energy Consumption

Consuming energy causes a wide range of health and environmental impacts, from the habitat loss associated with exploration for fossil fuels and the construction of hydroelectric facilities to the pollution resulting from the burning of fossil fuels. Environmental impacts are caused by the actions required to produce energy, including oil and gas exploration and development, coal mining, and the construction of nuclear reactors, hydroelectric dams and reservoirs. Environmental impacts also include the pollution generated by burning oil, gas and coal or disposing of nuclear waste and the impacts of dams on aquatic ecosystems.

Fossil fuel combustion is the main source of three major air pollution problems – climate change, acid deposition and urban smog. According to Environment Canada, energy use produces 90% of Canada’s carbon dioxide emissions, 55% of sulphur dioxide emissions, 90% of nitrogen oxide emissions and 55% of volatile organic compound emissions.

Hydroelectric projects flood large tracts of land, have major impacts on river systems and cause the release of both methane (a greenhouse gas) and mercury (a toxic heavy metal). Nuclear power facilities require uranium mining and produce nuclear waste for which no safe disposal system currently exists.



Canada’s OECD Ranking

Canada ranks an embarrassing 27th out of 29 OECD nations in terms of energy use per capita. Canadians annually consume 6.19 tonnes of oil equivalent per capita. This is almost double the OECD average of 3.18 tonnes of oil equivalent per capita, and more than five times the world average. Only residents of Iceland and Luxembourg use more energy per capita than Canadians.

In 1997, in total, Canada used 187.5 million tonnes of oil equivalent. Canada ranks 26th out of 29 OECD nations for total energy use, with only the United States, Germany and Japan using more energy.

Trend

Between 1980 and 1997, total Canadian energy consumption grew by 20.3%, slightly higher than the average OECD increase of 18%.

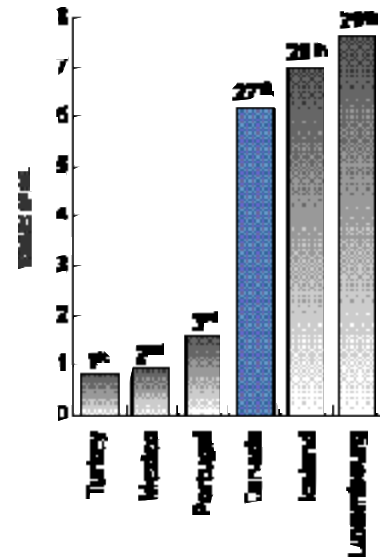
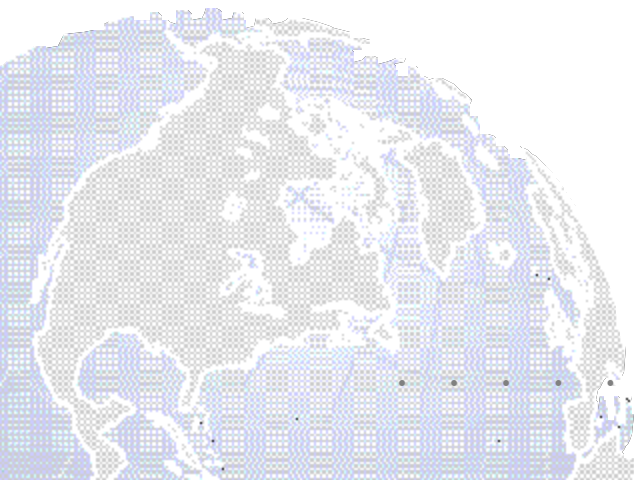


FIGURE 2. Tonnes of oil equivalent consumed per capita

Source: OECD Environmental Data 1998



Energy Use

Energy Efficiency

Energy efficiency measures the amount of energy required to produce a certain amount of Gross Domestic Product (GDP). The more energy efficient a country becomes, the lower the environmental impacts of both producing and using energy, unless economic growth and population growth out-pace increases in energy efficiency.

Energy efficiency not only has environmental implications but also economic consequences. Weak energy efficiency undermines a country's international competitiveness because using more energy generally means goods and services are produced at a higher cost.

Canada's OECD Ranking

Canada ranks a dismal 28th out of 29 OECD countries in terms of energy efficiency, behind countries like Mexico, Turkey, Poland and Portugal that are not noted for their energy efficiency. Canada is 33% less energy efficient than our major trading partner, the United States. The only OECD nation that is less energy efficient than Canada is Iceland.

Canada uses 0.30 tonnes of oil equivalent to generate \$1,000 U.S. worth of GDP, almost two times the OECD average.

Trend

There is hope to be found in the fact that Canada's energy efficiency has increased considerably, by 21%, since 1980. However, many OECD nations experienced greater energy efficiency gains than Canada over the same period, including the United States, the United Kingdom, Denmark, Germany, Ireland, Luxembourg, the Netherlands, Norway and Sweden.

More importantly, the gains from increasing energy efficiency were more than offset by Canada's growing population and economic growth, so that total energy consumption continued to increase. As noted earlier, between 1980 and 1997, Canadian energy consumption grew by 20.3%.

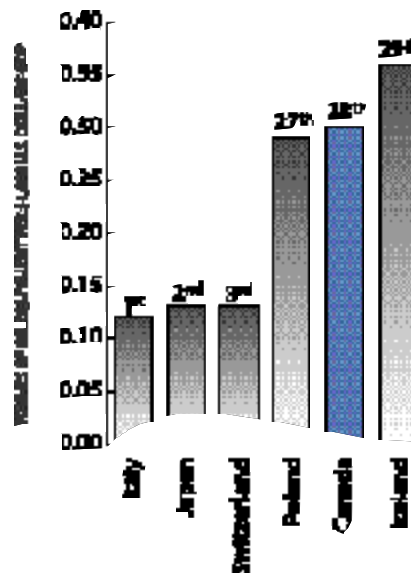


FIGURE 9. Energy consumption, in tonnes of oil equivalent per \$1,000 U.S. dollars of GDP

SOURCE: IEA, ENERCON, 1998



Waste

Municipal Waste

Municipal waste contributes to several environmental problems including habitat destruction, surface and groundwater pollution and other forms of air, soil and water contamination. Depending on the disposal method, there may be other negative consequences, such as the creation of toxic substances through incineration. Landfills also emit methane (which contributes to global warming) and other gases.

Over 90% of Canada's municipal waste goes to landfill sites, with a small percentage incinerated. The result is problems such as those faced by metropolitan Toronto, which is experiencing difficulty finding a viable landfill location for its garbage. Although in theory there is plenty of room in Canada for landfill sites, few locations are without vocal opposition from local communities and residents.

Municipal waste is also very expensive. Canadians spend billions annually to collect, transport and dispose of municipal waste.

Canada's OECD Ranking

Canada ranks 18th out of 29 OECD nations in terms of municipal waste per person. Again Canada is firmly in the bottom half of the industrialized nations. Canadians produced 490 kg of municipal waste per person in 1997, slightly below the OECD average of 500 kg.

Canada also ranks 18th out of 29 OECD nations in total municipal waste generated.

Trend

There is good news in the fact that between 1980 and 1997, municipal waste per capita in Canada declined by 3.9%. However the decrease in municipal waste per capita has been more than offset by the increase in population during this period. Total municipal waste generated in Canada rose by 17% between 1980 and 1997.

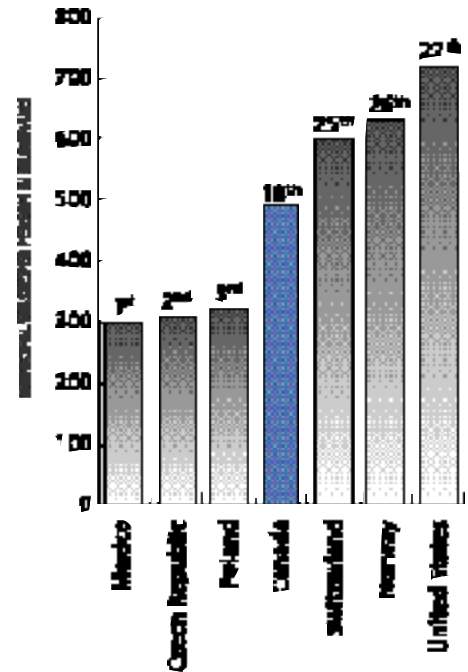
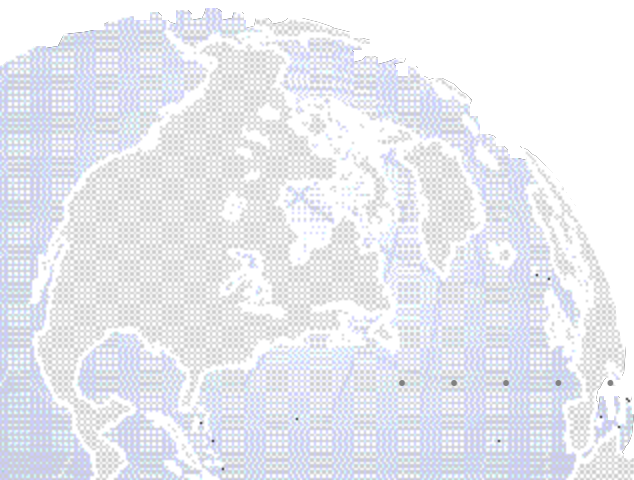


FIGURE 10. Municipal waste per person, in kilograms

SOURCE: OECD ENVIRONMENTAL DATA, 1998



Waste

Recycling

The OECD defines recycling as the “reuse of material in a production process that diverts it from the waste stream”.¹⁵ Recycling is an important activity because it reduces the amount of material being treated as waste, reduces energy requirements and relieves pressure on virgin sources of natural resources. Levels of recycling vary widely among different materials such as glass, metal, plastic, wood, paper and cardboard. Composting is an important means of diverting food and yard waste from the municipal waste stream.

The environmental problems caused by municipal waste can be significantly alleviated through increased recycling, although reducing the amount of waste generated is a more effective and efficient strategy in the long run.

Canada’s OECD Ranking

Canada’s ranking among OECD nations for recycling is very poor. For glass, Canada ranks 24th out of 25 countries for whom data is available. Only Mexico has a worse record for glass recycling. For paper and cardboard, Canada ranks 21st out of 28 countries.

For glass, Canada recycles 17%. For paper and cardboard, Canada recycles 33%.

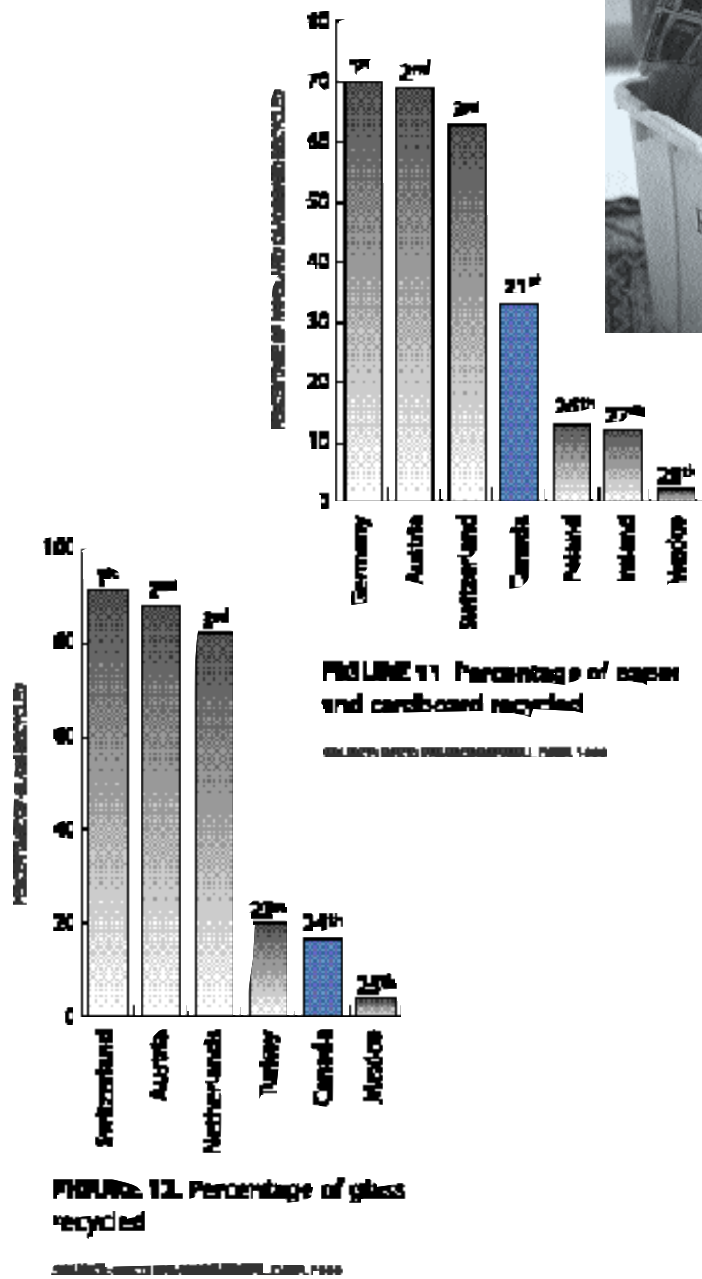
It should be noted that 1992 was the latest year for which the OECD could obtain reliable Canadian data. It is likely that there has been considerable improvement in Canadian recycling rates since that time because of the expansion of blue box programs.

Trend

Canada has made modest progress in recycling. Between 1980 and 1992, the level of paper and

cardboard recycling in Canada rose from 20% to 33%. For glass, the level of recycling rose from 12% to 17% between 1980 and 1992.

Many European nations have achieved much higher recycling rates much more quickly than Canada.



Waste

Hazardous Waste

Hazardous wastes are those substances that require special technologically advanced methods of disposal to render them harmless or less dangerous because of the threat they pose to human health and the environment. If disposed of without proper treatment, hazardous wastes can cause serious, long-lasting damage to both terrestrial and aquatic ecosystems. Human health impacts can also be severe. For example, long-term exposure to mercury, lead or cadmium can damage the brain, the kidneys, the nervous system and fetal development.

Hazardous wastes are produced by manufacturing processes, the chemical industry, the petroleum industry and other industrial sectors. Examples include acids, alkalis, solvents, medical waste, resins, sludge and heavy metals.

Canada's OECD Ranking

Canada's ranking among OECD nations for generating hazardous waste is very poor. Among the 27 OECD nations for whom reliable data are available, Canada ranks 24th in hazardous waste per capita. Canadians produce an average of 190 kilograms of hazardous waste annually. Only the United States, Hungary and Luxembourg generate more hazardous waste per capita than Canadians.

In 1991, the most recent year of Canadian data available to the OECD, Canada generated 5,896,000 tonnes of hazardous waste, placing 23rd out of 27 in total hazardous waste. The only OECD countries producing more hazardous waste than Canada are the United States, Mexico, France and Germany.

Trend

Unfortunately, the OECD does not provide historical data on hazardous waste, so that no trend can

be detected. However, the OECD has observed that Canadian authorities have trouble keeping track of hazardous wastes, citing a study from Quebec which "revealed that around one-third of the waste sent to off-site disposal could not be traced." The OECD recommended that Canadian laws governing hazardous waste "should be strengthened to prevent pollution problems that would require very expensive clean-up later."¹⁶

In 1999 the Canadian Institute for Environmental Law and Policy revealed that the level of American hazardous waste imported by Ontario quintupled (i.e. grew by 500%) between 1993 and 1998 (from 56,000 tonnes to 288,000 tonnes). The dramatic increase coincided with a new American law requiring incineration of hazardous waste (to protect human health and the environment) while Ontario continued to allow hazardous waste to be buried cheaply in landfills.¹⁷

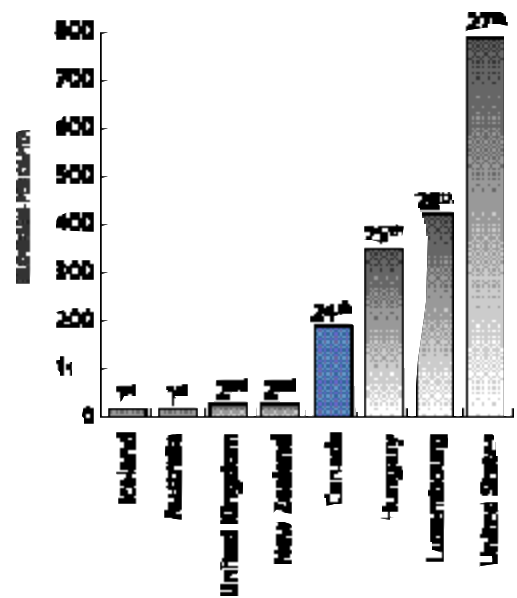
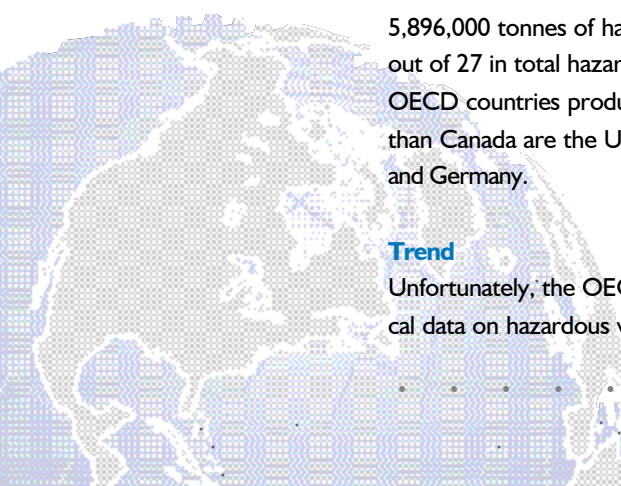


FIGURE 12. Kilograms of hazardous waste per capita

Source: OECD Environment Data Compendium, 1999



Waste

Nuclear Waste

Canada uses nuclear reactors to produce approximately 12% of this country's energy. An inevitable byproduct of the process is spent fuel, the most common form of nuclear waste. Radioactive waste is also generated by uranium mining and milling, fuel enrichment, decontamination and decommissioning of nuclear facilities and other activities using isotopes, such as scientific research.¹⁸

Nuclear waste is a major threat to human health and the environment, and poses a difficult disposal problem. As of 1992, Canada had accumulated over 200 million tonnes of low-level radioactive tailings from uranium mining, over one million cubic metres of contaminated soil and 900,000 bundles of nuclear fuel wastes.¹⁹

The dilemma about how to properly dispose of nuclear waste continues to plague Canada's nuclear industry. According to Environment Canada, "true walkaway disposal methods are unlikely to be possible, given the long time periods (a minimum of 250,000 years) for which the longer-lived radionuclides would have to be isolated from the soil, air, and water."²⁰

Canada's OECD Ranking

Canada generates far more nuclear waste than any other OECD nation on a per capita basis, placing us 28th out of 28. Canada generates 49.3 kg of nuclear waste per 1000 inhabitants.

The total amount of nuclear waste generated in Canada in 1998 was 1,510 tonnes, almost seven times the OECD average, and second only to the United States.

Twelve OECD nations reported zero nuclear waste: Australia, Austria, Denmark, Greece, Iceland, Ireland, Italy, Luxembourg, New Zealand, Norway, Portugal and Turkey.

Trend

Annual production of nuclear waste in Canada grew 76% between 1982 and 1998. Although the United States currently generates a greater total of nuclear waste, Canada is expected to surpass the U.S. in terms of total nuclear waste by the year 2010.²¹

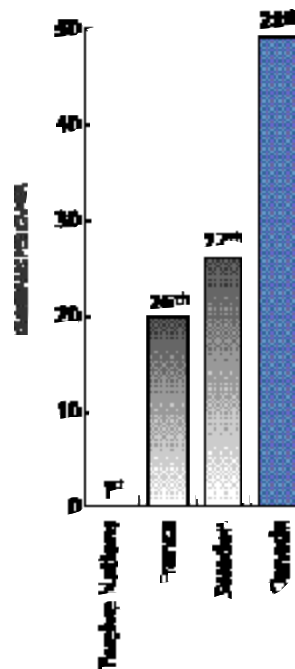


FIGURE 14. Nuclear waste generated in kilograms per capita

ENVIRONMENTAL CANADA



Ozone Depleting Substances

Consumption of ozone-depleting substances

The stratospheric ozone layer protects the planet from ultraviolet radiation. The release of certain manmade chemicals containing chlorine and bromine damages the ozone layer, resulting in harm to human health and the environment. The main ozone-depleting substances include chlorofluorocarbons (CFCs), halons, methyl chloroform, carbon tetrachloride, hydrochlorofluorocarbons (HCFCs) and methyl bromide. These chemicals are used in refrigeration and air conditioning equipment, aerosol sprays, fire extinguishers, foamed plastics and pesticides.

Potential health impacts arising from damage to the ozone layer include sunburn, skin cancer, eye cataracts and reduced efficiency of the immune system. Environmental damage may be inflicted on crops, trees and animals, particularly phytoplankton and zooplankton, the tiny plants and animals living in the surface layers of lakes and oceans.

A series of international agreements, beginning with the Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol (1987), establish a timetable for phasing out the production and consumption of ozone-depleting substances.

Canada's OECD Ranking²²

Despite commendable progress, Canada ranks 13th among the 16 nations for whom the OECD has data on the per capita consumption of ozone-depleting substances. In large part this is due to uneven provincial laws and regulations governing the consumption and release of ozone-depleting substances.

Canada deserves credit for the fact that it no longer produces CFCs, halons, carbon tetrachlo-

ride or methyl chloroform. However, Canada still produces HCFCs and consumes 0.18 kg of CFCs and HCFCs per person, twice the OECD average. Only the United States and Korea consume higher levels of these ozone-depleting substances. In many European nations, consumption of CFCs has virtually reached zero.

Trend

Canadian consumption of CFCs dropped 76% between 1986 and 1995, while Canadian consumption of HCFCs increased 76% in the same time span. It should be noted that although HCFCs have only two to five percent of the ozone-depleting potential of CFCs, they still have a long-term impact on the ozone layer. Under international agreements, HCFCs are to be phased out by 2020. Overall, according to Statistics Canada, Canadian production of ozone-depleting substances fell from 27.8 kilotonnes in 1987 to 1.0 kilotonne in 1996.²³

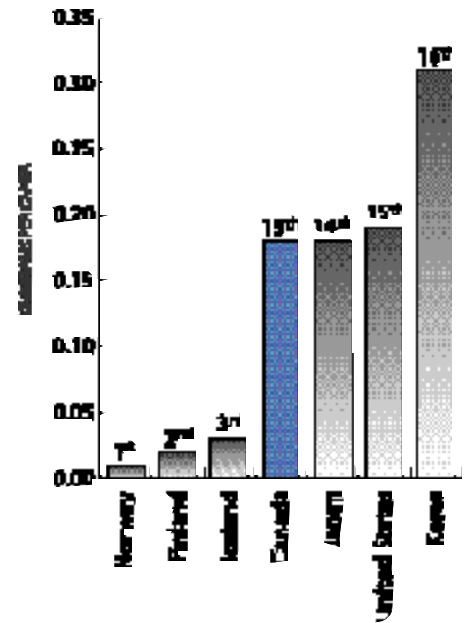
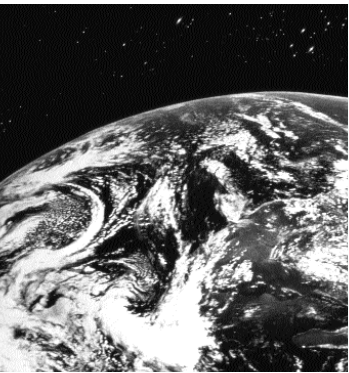
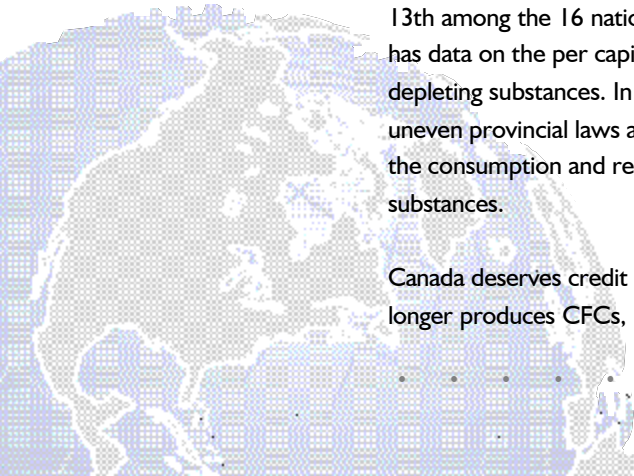


FIGURE 18. Consumption of CFCs and HCFCs in kilograms per capita

SOURCE: STATISTICS CANADA, ENVIRONMENTAL FACTBOOK 1999



Agriculture

Pesticides

Pesticides, including herbicides, insecticides and fungicides, are widely used in agriculture. However, many of the chemicals used in pesticides pose threats to human health and the environment. Pesticides cause a wide range of environmental impacts including degradation of habitat, contributing to loss of biodiversity and water pollution.

Humans can be harmed by pesticides through direct exposure during the application process or exposure through pesticide residues in food and water. Many pesticides include ingredients that are persistent (i.e. they do not breakdown in the environment), highly mobile and capable of bioaccumulating. These toxic substances can affect the immune system, harm the reproductive system and cause cancer. Pesticides are causing significant health impacts in northern Canada because of long-range air currents and the traditional diet of northern Canadians.

Canada's OECD Ranking

Canada ranks 22nd out of 28 OECD nations in pesticide use per capita. Canada used 0.95 kilograms of pesticides per capita in 1994. Only the Australia, Italy, France, Belgium, the United States, and Portugal use more pesticides per capita than Canada.

Canada used 29,206,000 kg of pesticides in 1994, ranking 18th out of 28 OECD nations.

The Trend

According to the OECD data, pesticide use in Canada appears to be declining, by 26% since 1985. However, Canada lacks credible information on pesticide use. The OECD points out that Canada's "survey coverage has varied greatly (different active ingredients, registrants and products); sur-

vey trends therefore may not reflect actual trends but simply changes in the survey coverage."²⁴ Statistics Canada recently published figures indicating that pesticide use in Canada rose over 400% between 1970 and 1995.²⁵

Canada is one of the only OECD nations that does not require reporting of pesticide sales. Canada's Commissioner for the Environment and Sustainable Development said in his 1999 report to Parliament that "without such data, Canada has no ability to accurately measure amounts of pesticides used and released into the environment. This information is needed to monitor the risks to health, safety and the environment."²⁶ Similarly, Environment Canada admits "the lack of more detailed data about pesticide production, use, emissions and effects over time represents a significant impediment to adequate tracking of these substances."²⁷

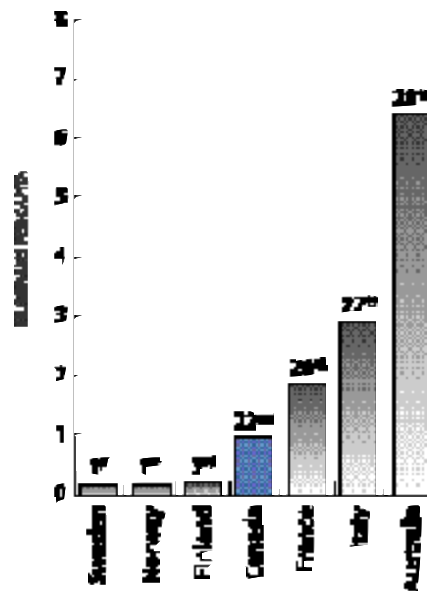


FIGURE 16. Consumption of pesticides in kilograms per capita

SOURCE: OECD ENVIRONMENTAL DATA 1994

Agriculture

Fertilizers

Three major nutrients – nitrogen, phosphorous and potash – are used as synthetic chemical fertilizers in industrial agriculture. According to the OECD, the application of these fertilizers “reflects the specialisation and intensification of cropping practices.”²⁸

These chemical fertilizers pose a threat to human health and the environment, particularly with respect to water quality. Nitrates from fertilizer can accumulate in groundwater and can reduce the ability of human blood to carry oxygen. Infants are particularly susceptible to nitrate poisoning – a phenomenon known as blue baby syndrome.

Canada’s OECD Ranking

Canada ranks 25th out of 28 OECD nations in terms of consumption of commercial fertilizers (both on a per capita and a total basis). Canada used 90 kilograms of commercial fertilizers per capita in 1997. Only Australia, New Zealand and Ireland use more fertilizer per capita.

In total, Canada used 2,753,000 tonnes of commercial fertilizers in 1997, with only the United States, France and Germany using larger amounts.

Trend

Canadian consumption of commercial fertilizers increased by 42% between 1980 and 1997. In contrast, the OECD as a whole experienced a 10% decrease in fertilizer use. Nineteen out of 28 OECD nations decreased their fertilizer use between 1980 and 1997.

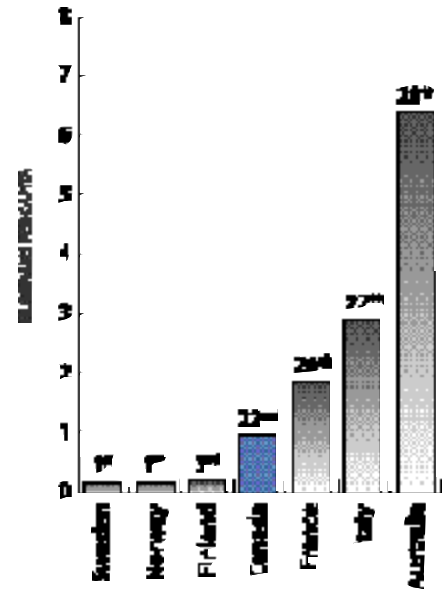
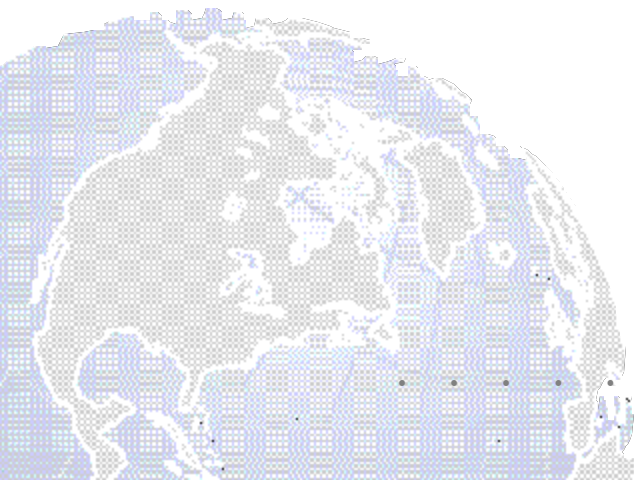


FIGURE 14. Consumption of pesticides in kilograms per capita

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Agriculture

Livestock

Animals kept for livestock purposes cause a range of environmental problems, including excessive water consumption, water pollution, soil pollution and erosion. Methane, a gas that contributes to global warming, is produced in significant quantities by livestock. The dangers of animal waste were illustrated in dramatic fashion by the Walkerton water tragedy. As well, diets that are heavy in meat and other animal products create more environmental pressures and health concerns.

The OECD statistics for livestock include cattle, pigs, sheep, goats, horses and mules. Horses and mules have been excluded from this indicator because they are used for purposes other than producing meat.

Canada's OECD Ranking

Canada ranks 16th out of 28 OECD countries in terms of livestock per capita and 17th out of 28 for total number of livestock (meaning 16 countries have less total livestock than Canada). As of 1998, Canada had 0.84 head of livestock (cattle, pigs, sheep and goats) per person, only slightly above the OECD average.

In terms of the total amount of livestock, Canada had 25,663,000 head. Only the United States, Australia, Mexico, Germany and France have more cattle than Canada. Poland, Spain, the United States, Australia, Mexico, Germany and France have more pigs. On the other hand, sixteen OECD countries have more sheep and goats than Canada.

Trends

In all three categories – cattle, pigs and sheep plus goats – livestock levels in Canada are on the rise. The number of cattle went up 8.5% between 1980 and 1998. The number of pigs went up 17.4% between 1980 and 1998. The number of sheep increased 30.8% between 1980 and 1998.

A disturbing aspect of this overall increase in livestock is the trend towards factory farms where large numbers of livestock create unprecedented volumes of manure, posing a serious water pollution problem.

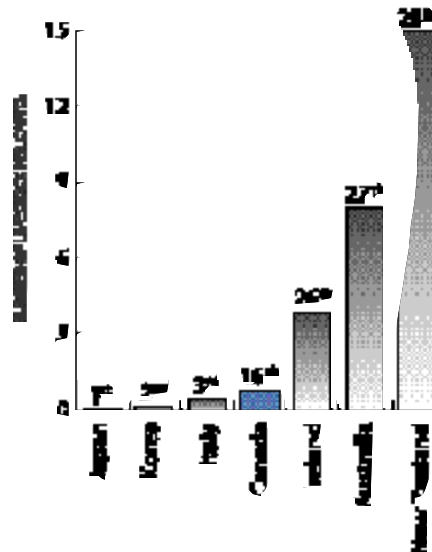


FIGURE 10. Number of livestock (cattle, pigs, sheep and goats) per capita

SOURCE: OECD ENVIRONMENTAL DATA, 1998



Biodiversity

Species at Risk

A rough but useful yardstick for measuring the health of a country's biological diversity is the number of species at risk of becoming extinct in the wild. Of course, the greater a country's overall biodiversity, the higher the number of species potentially at risk.

The loss of biological diversity is considered to be one of the world's most serious environmental problems because wild species and ecosystems provide so many invaluable goods and services. From food, medicine and material to cleaning air and water, regulating the climate, preventing floods, assimilating wastes and pollination, biodiversity is essential to life as we know it.

Canada's OECD Ranking

Canada ranks 7th out of the 29 OECD nations for the number of species officially considered to be endangered. Only Iceland, Ireland, Norway, Korea, New Zealand and Finland have fewer species officially designated as endangered. Comparisons with other countries must be regarded with considerable caution because of widely varying levels of information, different classification systems for species at risk, different standards and different definitions.

According to the OECD, as of 1997, Canada had 280 species at risk. This was the number of species identified as endangered by COSEWIC, the Committee on the Status of Endangered Wildlife in Canada. This figure cannot be regarded as reliable, as COSEWIC has never had adequate resources to conduct research on the vast majority of species in Canada. COSEWIC's figure of 280 species at risk is based on scientific reviews of fewer than 500 species. As of 1997, British Columbia's Ministry of

Environment listed over 800 species at risk in that province alone.²⁹ COSEWIC's figures do not include mosses, lichens, fungi or algae. As well, in Canada approximately 72,000 species have been reported while scientists estimate that another 66,000 species are as yet unidentified and unnamed (mainly plants and invertebrates).³⁰

Trend

The number of endangered species in Canada is growing. The more species COSEWIC studies, the more species are added to Canada's endangered species list. In 1978 there were seventeen officially designated endangered species in Canada. The figure grew to 178 endangered species in 1988 and 339 endangered species in 1999. As of 2001, there are 364 species on COSEWIC's list.

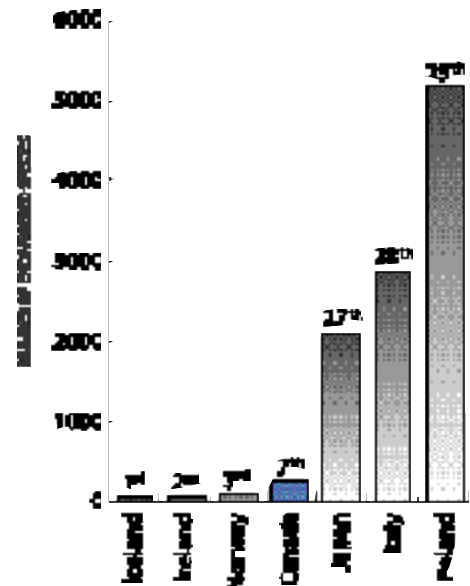
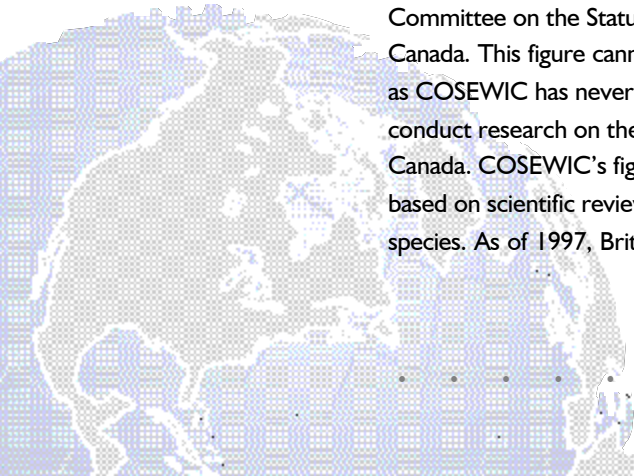


FIGURE 18. Number of species designated as critically endangered, endangered or vulnerable

SOURCE: OECD ENVIRONMENTAL DATA, 1999



Biodiversity

Protected Areas

A protected area is a geographic region in which certain activities that cause ecological damage are restricted or prohibited. Originally created to promote recreation and tourism, protected areas are now viewed as critical wildlife conservation areas – the modern equivalent of Noah’s Ark. The primary goals of protected areas are to maintain biodiversity, allow ecological processes to continue and provide recreational opportunities.

Protected areas in Canada include national parks, provincial parks, ecological reserves, wildlife management areas and conservation areas.

It is important to recognize that parks are not a panacea for conserving biodiversity. According to Environment Canada, “protected areas are increasingly affected by habitat fragmentation and alteration due to the effects of development, competition and disease from exotic or non-native plant and animal species and pressures from tourism and recreational facilities.”³¹ Parks Canada admits that 38 out of Canada’s 39 national parks are suffering from serious ecological stresses.³²

Canada’s OECD Ranking

With 9.6% of Canada’s land mass protected, Canada places 13th out of 29 OECD nations, below the OECD average of 12.6%. The United States, New Zealand, Austria, the Czech Republic, Denmark, France, Germany, Luxembourg, the Netherlands, Norway, Switzerland and the United Kingdom have protected a larger proportion of their national territory than Canada.

The World Conservation Union (IUCN) has a classification system for protected areas that includes six categories. Categories I-III are areas where industrial resource extraction activities (mining,

logging, hydroelectric dams, oil and gas exploration) are strictly prohibited. Categories IV-VI are areas where looser standards apply. If one looks at the percentage of land in the IUCN’s strict conservation categories, Canada’s performance is less impressive, falling to 4.32% protected. This is largely because many provinces continue to allow industrial activities like logging, mining and oil and gas development within protected areas under their jurisdiction.

Trends

Although the OECD does not provide historical protected area information, Canada has made significant strides in recent decades at both the federal and provincial levels. The percentage of Canada that is protected has risen from 5.5% in the early 1980s to 9.6% in the late 1990s.³³

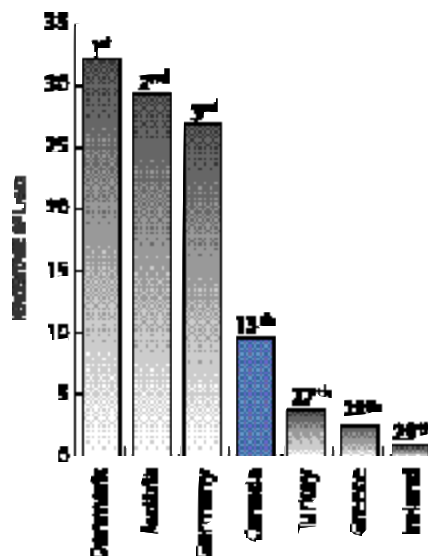


FIGURE 20. Percentage of land in designated protected areas

SOURCE: OECD ENVIRONMENTAL DATA HANDBOOK 2004

Biodiversity

Fisheries

The volume of wild fish captured annually is an indicator of the pressure being placed on fish populations and aquatic ecosystems (both marine and freshwater). Declines in total fish catch are primarily due to over-fishing, although pollution, habitat destruction, climate change and the introduction of exotic species are also factors. In some cases, declines in total fish caught may reflect the enforcement of stricter conservation measures.

The following data includes fish caught in both marine and fresh water ecosystems but excludes aquaculture.

Canada's OECD Ranking

In terms of the volume of fish caught in 1997, Canada ranked 20th out of 28 OECD nations, with a total catch of 945 million kilograms. The countries catching larger volumes of fish than Canada include, in descending order, Japan, the United States, Norway, Iceland, Korea, Denmark, Mexico and Spain.

With respect to the amount of fish caught per capita, Canada is 20th out of 28 nations at 30.88 kilograms. Four nations – Iceland, Norway, Denmark and New Zealand – catch extraordinarily high volumes of fish on a per capita basis, led by Iceland at a staggering 8,000 kilograms per person.

When it comes to actually eating fish, Canadians rank 15th out of 28 (meaning 14 OECD nations eat less fish per capita). In 1997, Canadians ate 22.2 kg/capita, up 11% from 1980. Fish consumption in the OECD ranges from 4.4 kg/capita in Hungary to 92.5 kg/capita in Iceland.

The Trends

The total volume of fish caught in Canada has fallen 43% since 1980, and an even more precipitous 73% since 1990. The majority of this decline is due to ecological catastrophes on both coasts. In Atlantic Canada, cod populations crashed in the late 1980s and early 1990s because of over-fishing. In British Columbia, salmon populations plummeted for a variety of reasons including over-fishing, habitat destruction and pollution.

Canada is now implementing a more conservation-oriented approach to fisheries management.

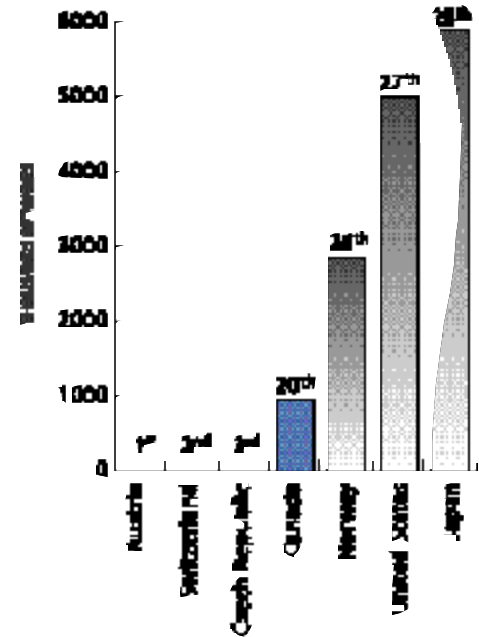
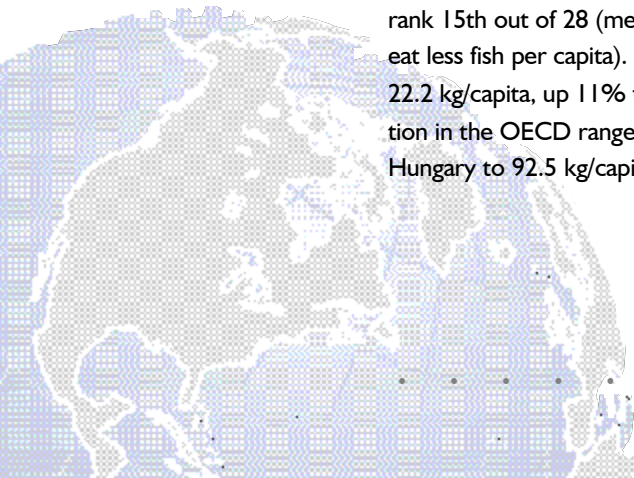


FIGURE 20. Total fish catch in thousands of tonnes

SOURCE: OECD ENVIRONMENTAL DATA, 1998



Biodiversity

Forests

The volume of timber harvested annually provides an indication of the pressure being placed on forest ecosystems. Forests are much more than a source of timber, providing recreation and tourism opportunities, a range of non-timber forest products and ecosystem services such as clean air, flood control, clean water and carbon sequestration.

Over the past two centuries there has been a wholesale transformation of the forests in most OECD countries. Wild natural forests have largely disappeared, with Canada one of the few exceptions to this trend in the OECD. Thus while Canada retains a relatively larger proportion of its primary forests, these forests have taken on a new global importance because of the loss of old-growth forests elsewhere.

Caution should be exercised when making comparisons between countries because of major differences in geographic area, the extent of forest cover and forest management practices, including harvesting methods. For example, most logging in Canada occurs in old-growth forests, most logging in Sweden occurs in second-growth forests and most logging in New Zealand occurs on monoculture plantations.

Canada's OECD Ranking

In terms of forest depletion from logging, Canada finishes 28th out of 29 OECD nations with only the United States logging a larger volume of timber. The Canadian volume logged in the late 1990s was 202,050,000 cubic metres. A cubic metre of wood is roughly comparable to a telephone pole.

In terms of logging per capita, Canada ranks 27th out of 29, with only Finland and Sweden logging greater volumes per capita. Canada logs 6.6 cubic metres per person annually.

The Trend

The volume of logging in Canada increased 14.6% from 1980 to 1997. Six OECD nations (New Zealand, Austria, Ireland, Portugal, Spain and the United Kingdom) experienced larger increases. Six nations had smaller increases and eleven nations had declines in the volume of logging.³⁴

Between 1970 and 1997, Canada experienced a larger decline in the percentage of forested land than any other OECD nation. Only six other nations experienced declines, while 22 countries enjoyed an increase in the percentage of forested land.

The good news for Canada is that annual growth of wood exceeds annual harvest by a margin of approximately two to one.

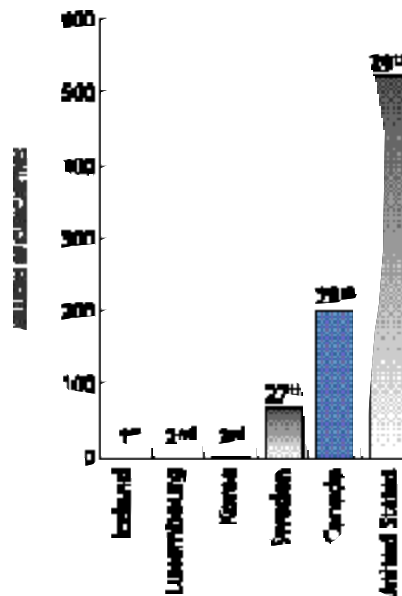


FIGURE 22. Volume of timber logged, in millions of cubic metres

SOURCE: ENVIRONMENTAL MANAGEMENT SYSTEMS, 1998

Transportation

Road vehicles

The number of motor vehicles reflects a number of environmental impacts arising from both the production of vehicles and their use. Manufacturing a vehicle uses large amounts of energy and resources and generates considerable waste, including the disposal of old vehicles.

Operating motor vehicles causes significant air pollution (nitrogen oxides, carbon monoxide and volatile organic compounds), the emission of greenhouse gases and water pollution. The amount of oil leaked from motor vehicles into rivers, lakes and groundwater in Canada is estimated to be six times the annual volume of oil spills.³⁵

The use of vehicles requires the construction and maintenance of road systems that also cause significant environmental consequences, including air pollution, water pollution, habitat destruction and fragmentation, stream sedimentation and increased access for hunting, fishing and poaching.

The following statistics refer to cars, sport utility vehicles, trucks, vans and buses.

Canada's OECD Ranking

Canada is 25th out of 29 OECD nations in motor vehicles per capita. In Canada there are .58 motor vehicles for every person, slightly higher than the OECD average of .50 vehicles per person. Only the United States, Luxembourg, Australia and Italy have more cars per capita.

In 1997, the total number of vehicles in Canada was 17,859,000, placing Canada 22nd out of 29 nations, ahead of only the United States, Japan, France, Germany, Italy, Spain and the United Kingdom. Although the OECD nations comprise less than 20% of the world's population, they own over 80% of the world's motor vehicles.

Trend

The number of motor vehicles in Canada has more than doubled since 1970 and is currently growing faster than the Canadian population. The number of motor vehicles in the OECD has also more than doubled since 1970.

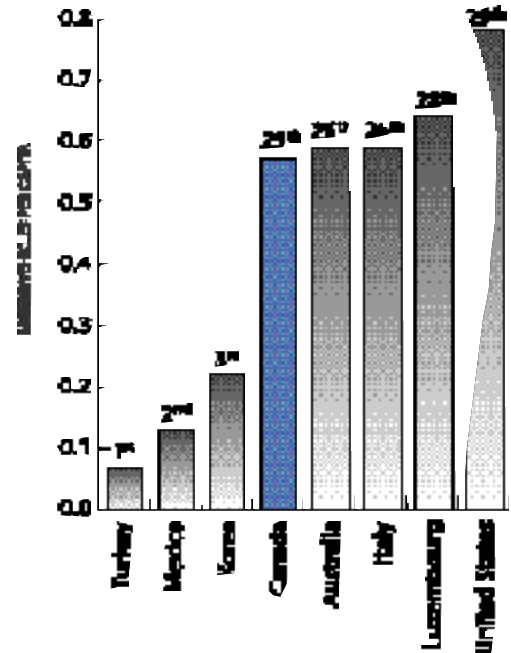
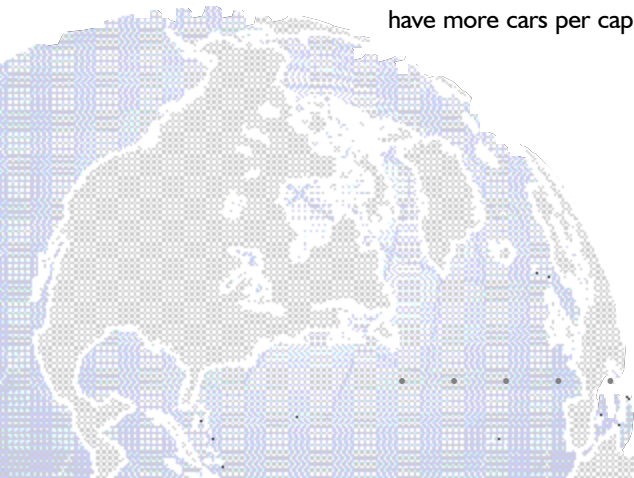


FIGURE 22. Motor vehicles per capita

Source: OECD Environmental Data, 1998



Transportation

Road distance traveled

The transportation sector is responsible for significant environmental impacts, particularly in the areas of air pollution, water pollution and greenhouse gas emissions. Transportation uses about 30% of the energy consumed in Canada, almost entirely through burning fossil fuels.³⁶

As previously noted, the construction and maintenance of road networks also causes extensive environmental damage. Canada's public road network is approximately 900,000 km in length, more than 23 times the distance around the planet. Roads used to access natural resources (e.g. logging roads) add hundreds of thousands more kilometres to the national total.³⁷

Canada's OECD Ranking

Canada ranks 26th out of 29 OECD countries in distance traveled by road vehicles per capita. Only residents of the United States, Australia and Luxembourg travel further via road vehicles. Canada's large geographic size is apparently not the determining factor, as "the largest proportion of the travel [in Canada] occurs within cities or the urban region surrounding the major cities."³⁸

It is worth noting that 23 out of 26 other OECD countries charge higher taxes on gasoline than Canada.

Canadians travel an average of 8954 km per person annually in road vehicles. In total, the distance traveled by road vehicles in Canada is 274 billion km, placing Canada 24th out of 29 OECD nations. Only the United States, Germany, France, the United Kingdom and Italy tallied greater total distances of road vehicle travel.

Trend

The per capita distance traveled by road vehicles in Canada increased by 33% between 1980 and 1997. The total distance traveled by road vehicles increased by 117% between 1970 and 1997, reflecting growth in population, growth in the number of vehicles on the road and greater distances traveled per person.

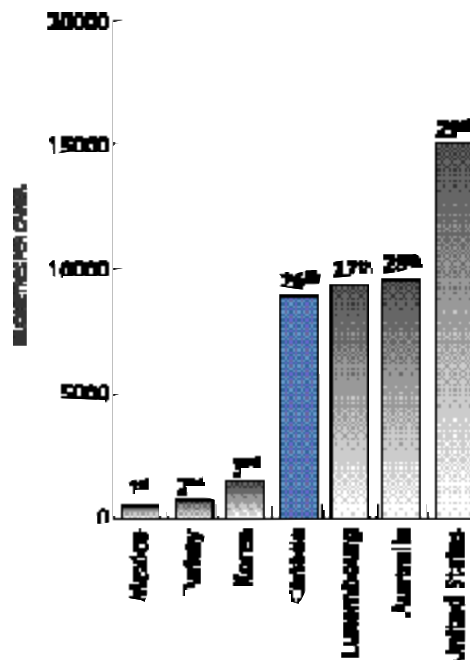


FIGURE 24. Road distance travelled in kilometres per capita



Miscellaneous

Population Growth

Population is a key element in calculating overall human impact on the environment. As other parts of this report indicate, Canadians consume a disproportionately high amount of resources and produce a disproportionately high amount of waste. Because Canadians have such a large environmental impact on a per person basis, each additional Canadian places significant incremental stress on the environment.



Scientists have calculated that if everyone on earth consumed as much as the average Canadian, we would need three additional planets to produce the resources and absorb the pollution.³⁹

Canada's OECD Ranking

Surprisingly, Canada has one of the fastest growing populations in the OECD, up 24.4% between 1980 and 1998. As a result, Canada places 26th out of 29 OECD nations in population growth. Only Turkey, Mexico and Australia are experiencing faster population growth than Canada. Canada's rate of population growth is 37.7% above the OECD average.

In terms of total population, Canada finishes 18th out of 29 OECD nations, meaning that 17 OECD countries have smaller populations. Canada has approximately 30.6 million people.

Trend

As noted above, Canada's population grew much faster (24.4% between 1980 and 1998) than the OECD average and faster than any OECD countries except Turkey (45.8%), Mexico (43.6%) and Australia (27.3%). Canada's population continues to grow by around 1% per year. At this current rate of growth, Canada's population would double, to over 60 million people, in seventy years.

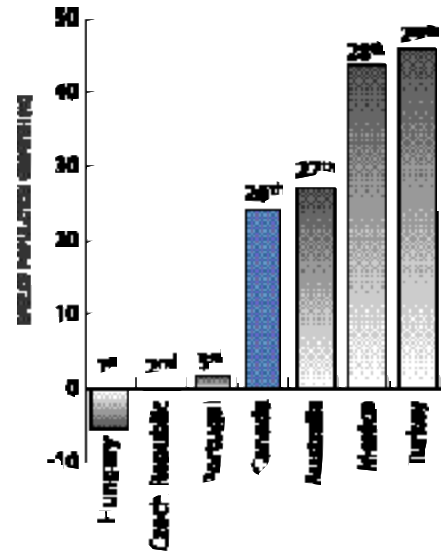
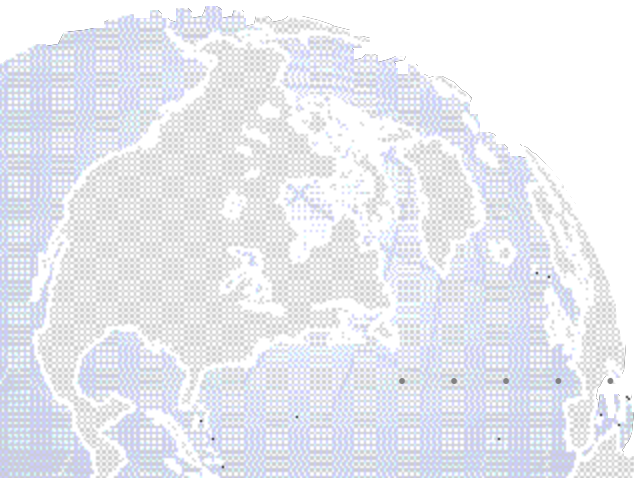


FIGURE 28. Rate of population growth (%) between 1980 and 1998

SOURCE: OECD ENVIRONMENTAL DATA BANK



Miscellaneous

Official Development Assistance

Official development assistance, or foreign aid, consists of loans, grants, technical assistance and other forms of cooperation extended by governments to developing countries. A significant proportion of official development assistance is aimed at promoting sustainable development in poorer countries, particularly through natural resource conservation, environmental protection and population programs.

Canada's OECD Ranking

Despite Canada's international reputation as a compassionate nation, we rank only 11th among the 20 OECD nations for whom data is available. We are well behind the Scandinavian and other European nations who double and sometimes triple the level of Canadian aid.

In 1998, the most recent year for which the OECD had data, Canada dedicated 0.29% of its GDP to official development assistance. In comparison, Denmark and Norway devoted 0.99% and 0.91% of their GDP, respectively, to official development assistance.

Internationally, 0.7% is seen as a threshold that all industrialized nations should surpass. Canadian Prime Ministers dating back to Lester Pearson have promised to raise Canadian assistance to this level but the promises have never been fulfilled. The Netherlands, Norway, Denmark and Sweden are all above this threshold, and have consistently surpassed it for the past twenty years.

Trend

Since 1980, the percentage of GDP that Canada dedicates to official development assistance has fallen by 32.6%. Only the United States, Australia

and Germany have cut official development assistance more sharply than Canada. In contrast, nine OECD nations increased their percentage of GDP dedicated to official development assistance between 1980 and 1998 (Austria, Denmark, Finland, Ireland, Italy, Luxembourg, Norway, Spain and Switzerland).

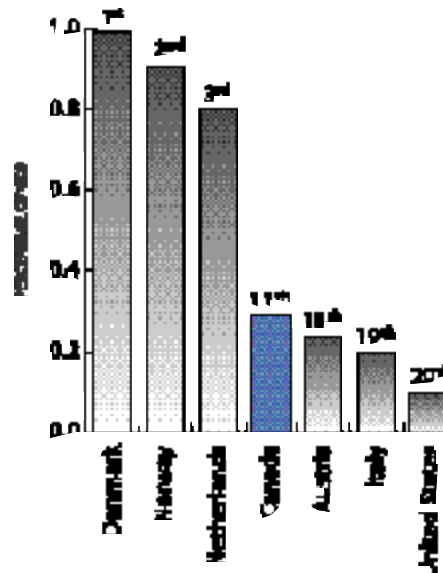
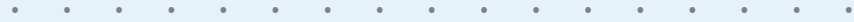


FIGURE 34. Percentage of GDP dedicated to official development assistance

SOURCE: OECD DEVELOPMENT ASSISTANCE COMMITTEE, PARIS, 1999





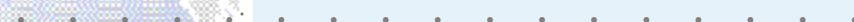
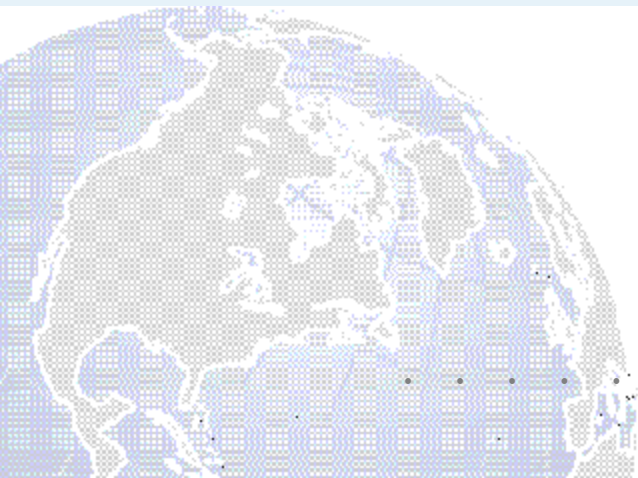
Conclusion

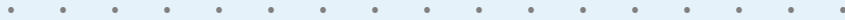
The results of this study can only be described as profoundly disturbing to Canadians concerned about the environment. The study provides compelling evidence that Canada is a laggard, not a leader, with one of the poorest environmental records in the industrialized world. For the twenty-five environmental indicators examined here, Canada's overall ranking is 28th out of 29 OECD nations.

Canada is among the three best countries on zero indicators and among the three worst countries on nine indicators. Canada is among the three worst nations in the OECD on a per capita basis when it comes to various forms of air pollution (27th out of 28 on sulphur oxide emissions, 26th out of 27 carbon monoxide emissions and 25th out of 26 on emissions of volatile organic compounds), water consumption (28th of 29), energy consumption (27th out of 29), energy efficiency (28th out of 29), creation of nuclear waste (28th out of 28), greenhouse gas emissions (27th out of 29) and volume of forests logged (27th out of 29). On another six indicators we are the fourth worst in the OECD (per capita nitrogen oxide emissions, hazardous waste, fertilizer consumption, consumption of ozone-depleting substances, kilometres traveled by road and population growth).

Canada's performance on 22 out of 25 environmental indicators is in the bottom half of the OECD. In contrast, the only three indicators for which Canada is not in the bottom half of the OECD countries are the percentage of the population connected to sewage treatment (9th), the number of endangered species (7th), and the percentage of land protected by parks (13th).

Canada's performance on most environmental indicators continues to worsen, including: increasing water consumption; increasing energy consumption; increases in nuclear and hazardous waste; higher greenhouse gas emissions; higher numbers of endangered species; declining fish populations; higher commercial fertilizer use; more livestock; more timber logged; more motor vehicles; more kilometres traveled by road; higher population; and less official development assistance.





Another negative finding of this study is that Canada's economy is inefficient, in that it is both pollution and energy intensive relative to our international competitors. Canada averages 24th out of 27 in air pollution per unit of Gross Domestic Product (GDP) and is 28th out of 29 in energy use per unit of GDP.

If there is a silver lining hidden amongst these dismal results, it lies in the fact that Canada's performance is improving on 10 environmental indicators. Canada has reduced air pollution (lower emissions of sulphur dioxide, nitrogen oxides, carbon monoxide and volatile organic compounds), improved sewage treatment, reduced municipal waste, increased recycling, improved energy efficiency, decreased production and release of ozone-depleting substances and increased in areas designated as parks and protected areas.

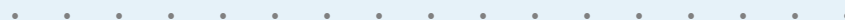
The reasons for Canada's dismal performance are not immediately obvious, although possible reasons include:

- ineffective environmental laws and policies;
- inadequate resources for environmental protection and enforcement;
- government bias favouring economic growth over environmental protection;

- gaps in coverage due to jurisdictional disputes between federal and provincial governments;
- a continued reliance on resource and energy intensive industries; and
- failure to incorporate environmental limits, values and costs into our economic system.

The Eco-Research Chair of Environmental Law and Policy is now embarking on a comprehensive assessment of Canadian environmental law and policy with the objective of determining the reasons behind our failures and successes in protecting the environment. The Eco-Research Chair's study of Canadian environmental law and policy is expected to be published in 2002.

Meanwhile, this analysis of environmental indicators will be up-dated every two years, following the bi-annual publication of the OECD's Environmental Data Compendium.



Endnotes

All statistical data in this report that is not footnoted comes from the Organization for Economic Cooperation and Development, "Environmental Data Compendium 1999", (Paris: OECD, 1999). The majority of the background information about environmental problems is from Environment Canada's, "The State of Canada's Environment 1996" (Ottawa: Minister of Public Works and Government Services, 1996).

1. This trend is based on data deemed unreliable by the OECD ("Environmental Data Compendium 1999", p.284) and is contradicted by Statistics Canada, "Human Activity and the Environment, 2000", Ottawa: Ministry of Industry, 2000, pp. 99, 202-03. See also the section of this report on pesticides, p.23).

2. It should be noted that Canada's relatively high ranking on the number of species at risk is partially due to inconsistent and incomplete data both in Canada and other nations. See also the section of this report on species at risk, p.26).

3. Ministry of the Environment, "A Framework for Discussion on the Environment", Ottawa: Ministry of Supply and Services, 1990, quoted in George Hoberg, "Comparing Canadian Performance in Environmental Policy", in Robert Boardman, ed., "Canadian Environmental Policy: Ecosystems, Politics and Process" (Toronto: Oxford University Press, 1992, pp. 246-262).

4. David Suzuki and Anita Gordon, "It's A Matter of Survival", Toronto: Stoddart, 1990, p.1.

5. Laura Jones, Fraser Institute, "Let's Not Ignore the Good News", Calgary Herald, April 22, 2000, p. A7.

6. Mark MacKinnon, Globe and Mail, Dec. 9, 2000.

7. For example, the Fraser Institute's report Environmental Indicators (2000) claims that environmental quality in Canada improved 18% since 1980 but excludes key issues like climate change, loss of biodiversity and ozone depletion. In contrast, a report from the U.S. National Center for Economic Alternatives claims that environmental quality in Canada declined by 5.4% since 1980 and declined a total of 38.1% since 1970 ("Index of Environmental Trends: An Assessment of Twenty-one Key Environmental Indicators in Nine Industrialized Countries over the Past Two Decades").

8. OECD Environmental Data Compendium 1999, p. 6.

9. OECD Environmental Data Compendium 1999, p. 7.

10. Environment Canada, "The State of Canada's Envi-

ronment 1996", (Ottawa: Minister of Public Works and Government Services, 1996) p. 10-9.

11. Andrew Weaver, "Global warming debate is a puzzle", Victoria Times-Colonist, Feb. 8, 2001, p. A17. See also United Nations Intergovernmental Panel on Climate Change "Climate Change 2001: The Scientific Basis" available on-line at (www.ipcc.ch). In November 1995, 2500 leading climate scientists endorsed the U.N. Intergovernmental Panel on Climate Change "Summary for Policymakers: Scientific Technical Analysis of Impacts, Adaptations and Mitigation of Climate Change".

12. Organization for Economic Cooperation and Development, "Economic Survey of Canada, 2000" (available online at www.oecd.org), Organization for Economic Cooperation and Development, "Canada: Environmental Performance Review" Paris: OECD, 1995.

13. Environment Canada, "The State of Canada's Environment 1996", p. 10-40.

14. Nova Scotia Department of Environment, "The State of the Nova Scotia Environment, 1998", p. 36. As well, more than half the population of the Atlantic provinces is connected to sewer systems that release raw, untreated sewage directly into estuaries and coastal waters.

15. OECD Environmental Data Compendium 1999, p. 173.

16. Organization for Economic Cooperation and Development, "Canada: Environmental Performance Review" 1995, pp. 85-89.

17. Martin Mittelstaedt, "Group to apply for review of Ontario toxic waste laws", Globe and Mail, Dec. 20, 1999, p. A9. The Globe and Mail reported that landfill disposal of hazardous soil costs roughly \$250 per tonne while incineration costs about \$1000 per tonne.

18. Environment Canada, "The State of Canada's Environment 1996", p. 11-83, 84.

19. Environment Canada, "The State of Canada's Environment 1996", p. 11-83.

20. Environment Canada, "The State of Canada's Environment 1996", p. 11-71.

21. OECD Environmental Data Compendium 1999, p. 179.

22. Data from OECD's "Towards Sustainable Development: Environmental Indicators", 1998, p. 22.

23.. Statistics Canada, "Human Activity and the Environment 2000", p. 12.

24. OECD Environmental Data Compendium 1999, p. 284.

25. Statistics Canada, "Human Activity and the Environment 2000", pp. 99, 202-203. According to Statis-

tics Canada, the amount of pesticide applied rose 411.3% between 1970 and 1995. During that same period, the area treated with herbicides grew 18 times while the area treated with insecticides grew 3.5 times.

26. Brian Emmett, "Report of the Commissioner for Environment and Sustainable Development to the House of Commons, 1999", (Ottawa: Minister of Public Works and Public Services, p. 4-30).

27. Environment Canada, "The State of Canada's Environment 1996", p. 13-17.

28. OECD Environmental Data Compendium 1999, p. 276.

29. BC Ministry of Environment, "Environmental Trends, 1998".

30. Environment Canada, "The State of Canada's Environment 1996", p. 10-59

31. Environment Canada, "The State of Canada's Environment 1996", p. 10-31.

32. Parks Canada Panel on Ecological Integrity Panel, (available on-line at www.parksCanada.pch.gc.ca).

33. Environment Canada's, "The State of Canada's Environment 1996" indicated (at p. 14-22) that as of 1983, approximately 55,000,000 hectares (550,000 square kilometres) was protected in Canada (including federal, provincial and territorial parks). The OECD's "Environmental Data Compendium 1999" reports that as of 1997, Canada had protected 953,103 square kilometres (p. 115).

34. Without further analysis, it is difficult to assess whether these increases are environmentally positive or negative. For example, New Zealand increased the volume logged by 75% but also virtually ended logging in native forests by switching to a plantation system with its own ecological pros and cons.

35. Environment Canada, "The State of Canada's Environment 1996", p. 11-94.

36. Environment Canada, "The State of Canada's Environment 1996", p. 11-90.

37. Environment Canada, "The State of Canada's Environment 1996", p. 11-90 and B.C. Ministry of Environment, Land and Parks, "Environment Trends in British Columbia 2000", Victoria, 2000.

38. Environment Canada, "The State of Canada's Environment 1996", p. 11-88.

39. Centre for Sustainability Studies and Redefining Progress, "Ecological Footprints of Nations" (available on-line at www.ecouncil.ac.cr). Canadians have an ecological footprint of 7.7 hectares, while there are 1.7 hectares available per person in the world.

About the Author

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About the Eco-Research Chair

Established in 1995, the Eco-Research Chair of Environmental Law and Policy at the University of Victoria seeks to identify the underlying legal, economic and social causes of ecological decline, and develop sustainable alternatives to current policies, practices and institutional arrangements. The Chair encourages a trans-disciplinary approach to research, and a strategy of public education, legal and policy interventions. The Chair provides opportunities for graduate study in the natural, social and health sciences and in law.

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