Canada vs. Sweden: An Environmental Face-Off

Eco-Research Chair of Environmental Law and Policy, University of Victoria
February 2002

TABLE OF CONTENTS

Title: Canada vs. Sweden:
An Environmental Face-Office

Author: David Richard Boyd

Executive Summary

Canada and Sweden are widely regarded as among the world's best in the sport of hockey and in the pursuit of environmental excellence. Canada has won more medals than any other nation in Olympic hockey history, although our last gold came in 1952. Sweden won its only gold medal in 1994, beating Canada in a shootout after the teams played to a tie through regulation and a period of overtime.

What happens when Canada and Sweden go head to head to see who has the superior record in protecting the environment? Canada's government claims that "Canada's environmental record is among the best in the world." However, Sweden recently finished first in a study of the sustainability of 180 nations.

This study examines ten key environmental indicators covering a range of issues--air, water, energy, biodiversity, marine, waste, climate change, agriculture, and sustainable development. All of the statistical data comes from reports published by the Organization for Economic Cooperation and Development (OECD).

SWEDEN CLOBBERS CANADA 9-1

The results of this comparison will disappoint Canadians concerned about our record of environmental protection. Sweden clobbers Canada 9-1. In other words, Sweden outperforms Canada on nine out of ten environmental indicators. Canada barely avoids a Swedish shutout, outperforming Sweden on only one indicator.

Canadians, both in total and on a per capita basis, generate more air pollution than Swedes. We use more than five times as much water. We use energy much less efficiently. We generate far more municipal waste. More of our sewage goes untreated. We use more pesticides. We produce far more greenhouse gases. Our fisheries are being depleted more rapidly. We provide substantially less assistance to developing countries to facilitate their sustainable development. On the other hand, Canada has protected a slightly higher percentage of land in parks.

A slightly brighter picture emerges when trends in environmental performance are examined. Since 1980, Canada's performance has improved on five

of the ten key environmental indicators. We have made progress in reducing air pollution, improving sewage treatment, reducing municipal waste, improving energy efficiency, and creating new protected areas. On the other hand, Sweden's environmental record is improving on seven of the ten indicators, and the Swedes are improving faster than Canada.

REASONS FOR SWEDEN'S ENVIRONMENTAL SUPERIORITY

Sweden's superiority comes despite close similarities between the two nations in climate, economy, and standard of living. Both of these northern, industrialized nations derive 2% of their GDP from agriculture, 27% from industry, and 70% from services. As a result, differences in environmental law and policy appear to account for the difference in performance between the two nations.

To begin with, Sweden has a bold national strategy to achieve sustainability within a generation (i.e. by the year 2025). Sweden recognizes that "the use of resources in this part of the world must be reduced significantly if the earth's ecosystems are to be capable of maintaining a growing population and if living standards are to be raised in the developing world." Sweden has passed laws setting general goals, specific targets, and timelines for improving environmental performance in 15 key areas.

Sweden, unlike Canada, uses innovative economic policies to reduce pressure on the environment. In particular, Sweden has moved toward full-cost pricing of environmental goods and services by removing subsidies and implementing environmental taxes. Sweden has also aggressively pursued improvements in efficiency, using less energy and fewer resources to produce the same quantity of goods and services. Using these policies Sweden has stabilized its greenhouse gas emissions, enjoyed a surge in renewable energy, decreased pesticide use by over 80%, caused organic agriculture to blossom, and decreased total water use by 34%. In contrast, Canadian greenhouse gas emissions, pesticide use, and water consumption are high and increasing.

IMPROVING CANADA'S ENVIRONMENTAL PERFORMANCE

Sweden provides a role model for Canada to emulate. Canada has a long history of importing the best Swedish hockey players, dating back to Borje Salming's debut with the Toronto Maple Leafs in the 1970s. Canadian hockey teams continue to benefit from importing the best Swedish hockey players, such as Mats Sundin (Toronto Maple Leafs), Tommy Salo (Edmonton Oilers), Markus Naslund and Mattias Ohlund (Vancouver Canucks), and Daniel Alfredsson (Ottawa Senators).

Now Canada needs to begin importing the best of Sweden's environmental laws and policies. Critics said Borje Salming would never adjust to the different style of hockey played in North America. However, Salming and his countrymen--Sundin, Naslund, Ohlund, Salo and Alfredsson and others--have put those fears to rest. Similarly, Swedish environmental laws and policies will need to be adjusted but should prove equally effective in Canada.

In 1994 Canada suffered a heart-breaking loss to Sweden in the gold medal hockey game of the Olympics. Now in 2002, Canada is badly outclassed in a comparison of environmental records.

Each of these experiences provides Canada with motivation to improve. Just as we strive to be the best in the world at hockey, Canada should strive to be the best in the world i protecting the environment. This report shows how far we have to go.

Ten Key Environmental Indicators

ENVIRONMENTAL INDICATOR	WINNER
1. CLIMATE CHANGE Greenhouse Gas Emissions (tonnes of CO2/capita)	SWEDEN
2. AIR POLLUTION Sulphur Oxides and Nitrogen Oxides (kg/capita)	SWEDEN
3. WATER POLLUTION Sewage Treatment (% of population served)	SWEDEN
4. WATER CONSUMPTION Water Consumption (cubic metres/capita)	SWEDEN
5. WASTE Municipal Waste (kg/capita)	SWEDEN
6. BIODIVERSITY Protected Areas (% of land designated as protected)	CANADA
7. MARINE Fisheries (total volume caught)	SWEDEN
8. ENERGY EFFICIENCY Energy Efficiency (tonnes of oil equivalent/$1000 GDP)	SWEDEN
9. AGRICULTURE Pesticide Use (tonnes of active ingredients/capita)	SWEDEN
10. SUSTAINABLE DEVELOPMENT Official Development Assistance (% of GDP)	SWEDEN

INTRODUCTION

There are many similarities between Canada and Sweden. Both are northern, industrialized nations, widely recognized as enjoying standards of living that are among the world's best. Both Canada and Sweden are renowned for their universal medicare systems, their excellence in winter sports, and for their compassionate societies. The two countries also have remarkably similar economies. Both Sweden and Canada derive 27% of their GDP from industry, 70% from services and 2% from agriculture. Canada is closely connected to the much larger United States economy while Sweden enjoys a similar relationship with Europe.

Canada has won 12 medals in Olympic hockey, more than any other nation. However, of Canada's five gold medals, the most recent came in 1952. Sweden has won seven medals in Olympic hockey competition. Sweden won its lone gold medal in 1994 in a nerve-wracking overtime shootout victory against Canada, thanks to a goal by Peter Forsberg.

To be sure, there are differences between the two nations. Canada is much larger, has three times the population, and enjoys a greater degree of cultural diversity. Canada plays a more physical style of hockey, dumping the puck into the offensive zone while Sweden relies on finesse and pinpoint passing. However, given the many broad similarities, an examination of the two countries' performance on environmental protection is warranted.

Both Canada and Sweden have enjoyed high profiles on specific environmental issues. Canada was a leader in the development of international agreements relating to the protection of the ozone layer, such as the Montreal Protocol on Substances that Deplete the Ozone Layer. Canada is also home to Ballard Power Systems, global leaders in the fuel cell technology that promises a clean energy future. Sweden played a leadership role in negotiations leading to the Stockholm Convention on Persistent Organic Pollutants dealing with the elimination of particularly dangerous toxic chemicals. Sweden is also the birthplace of a program called the Natural Step, a set of science-based principles intended to guide the transformation to sustainability.

OVERVIEW

This study examines ten key environmental indicators covering a range of issues--air pollution, water pollution, water consumption, energy efficiency, biodiversity, marine resources, municipal waste, climate change, agriculture, and sustainable development.

For each indicator, the environmental issue is introduced, Canada and Sweden's records are compared and trends are assessed. The Conclusion evaluates the primary reasons for the difference in environmental performance between the two nations.

SOURCES OF INFORMATION

The data used in this report are primarily from the Organization for Economic Cooperation and Development's 2001 publication called Key Environmental Indicators. Other data are from the OECD's Environmental Data Compendium, 1999.

CLIMATE CHANGE

Greenhouse Gas Emissions

The Environmental Issue

It is widely acknowledged that emissions of greenhouse gases by human society are causing climate change on a global scale. 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 gases from human activities are carbon dioxide, methane, and nitrous oxide.

Climate change is expected to cause rising sea levels (threatening millions of people), changing precipitation patterns, thinning of polar ice caps, heat waves, floods, droughts, water shortages, changes in disease patterns, and disruptions of forests and agriculture. Northern nations like Canada and Sweden 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.

Average winter temperatures are the same in Toronto and Stockholm. Canada and Sweden both 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. Sweden committed to reduce greenhouse gas emissions by 8% below 1990 levels by 2010.

Canada vs. Sweden

Canadians produce 16.84 tonnes of carbon dioxide, per person, per year. Swedes produce less than half this amount, at 6.36 tonnes of carbon dioxide, per person, per year. Canada's total carbon dioxide emissions were 515,375,000 tonnes, while Sweden's were 56,640,000 tonnes.

The 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. Swedish greenhouse gas emissions stabilized between 1990 and 1999.

OECD Rankings

Canada is a dismal 27th out of 29 OECD nations in greenhouse gas emissions per capita. Sweden ranks 5th out of 29.

Winner: Sweden

AIR POLLUTION

Sulphur Oxides and Nitrogen Oxides

The Environmental Issue

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. Sulphur dioxide is one of the ingredients of acid rain, which 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.

Nitrogen oxides are a component of smog, ground level ozone and acid rain. Nitrogen oxide emissions result from the combustion of fossil fuels--mainly by vehicles, electricity generation and industrial processes. Again, nitrogen oxides are hazardous to human health and the environment.

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 people with chronic respiratory disorders and cardiopulmonary disease are particularly vulnerable to air pollution. Medical studies show that air pollution causes childhood asthma, which has increased dramatically in Canada in recent years.

Canada vs. Sweden

Sweden produces 10.3 kg of sulphur dioxide emissions per capita. Canada produces 88.9 kg of sulphur dioxide emissions per capita, more than eight times the Swedish level.

Sweden produces 38.1 kg of nitrogen dioxide emissions per capita. Canada produces 67.1 kg of nitrogen dioxide emissions per capita, almost twice the Swedish level.

The Trends

There is some good news with respect to air pollution, in that Canada's performance is improving. Since 1985, Canada's emissions of sulphur dioxide have decreased by 15.3%. However, Sweden has reduced sulphur dioxide emissions by 80% over the same period, reflecting much more impressive progress in addressing this source of air pollution.

Since 1980, Canada's emissions of nitrogen dioxide have decreased by 1.6%. Sweden has reduced nitrogen dioxide emissions by 24.8% over the same period.

OECD Rankings

Canada ranks an embarrassing 27th out of 28 OECD nations in per capita sulphur dioxide emissions and 25th out of 28 in nitrogen dioxide emissions per capita, while Sweden ranks 5th and 18th respectively out of 28.

Winner: Sweden

WATER POLLUTION

Municipal Sewage Treatment

The Environmental Issue

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. Swedish coastal areas that were once closed are now open due to progress in reducing water pollution. In fact, it is now possible to fish for salmon in the river running through Stockholm, Sweden's capital.

Canada vs. Sweden

The percentage of the population served by public sewage treatment in Canada is 79%, whereas in Sweden the percentage of the population served by public sewage treatment is an impressive 93%, one of the highest rates in the world.

When the figures are looked at more closely to examine the degree of sewage treatment being provided, Sweden comes out even further ahead. There are three levels of sewage treatment--primary, secondary and tertiary--which provide progressively more effective treatment. In Sweden, 87% of the population is served by tertiary treatment, the best available treatment. In Canada, only 33% of the population is served by tertiary treatment, while 19% still have access to only crude primary treatment, the least effective form of sewage treatment.

The Trend

The percentage of Canadians served by sewage treatment has been steadily rising, from 64% in 1980 to the current level of 78%. 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). Sweden's percentage of people served by sewage treatment increased from 82% in 1980 to the current level of 93%, including a large jump in the proportion of people served by tertiary treatment.

OECD Rankings

Canada ranks 9th out of 29 OECD countries in terms of the percentage of population receiving public sewage treatment. Sweden ranks 3rd out of 29.

Winner: Sweden

WATER CONSUMPTION

Water Consumption

The Environmental Issue

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).

Both Sweden and Canada obtain the majority of their water from surface sources such as lakes, rivers and reservoirs. However pressure on groundwater is increasing in both countries, more rapidly in Canada.

Canada vs. Sweden

Sweden uses 310 cubic metres of water per person per year. Canada uses 1,600 cubic metres of water per person per year, more than five times the Swedish level of water consumption. These figures do not include water diverted for purposes of generating hydroelectricity.

Canada has been criticized repeatedly by the OECD for our excessive use of water. The main reason for Canadians' excessive use of water is that water in Canada is heavily subsidized, failing to reflect either the infrastructure costs or the value of the ecological services provided by water in nature.

The Trend

Since 1980, overall water use in Canada has increased by 25.7%. In contrast, Sweden has decreased its overall water use by 34% since 1980.

OECD Rankings

Canada ranks a dismal 28th among the 29 nations of the OECD in terms of water consumption. Sweden ranks 7th out of 29.

Winner: Sweden

WASTE Municipal Waste

The Environmental Issue

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. Swedes and Canadians spend billions annually to collect, transport, and dispose of municipal waste.

Canada vs. Sweden

Canadians produced 490 kg of municipal waste per person in 1997. Swedes generated 360 kg of municipal waste per person in 1997.

The Trend

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. Swedish levels of waste production are declining, both per capita and in total.

OECD Rankings

Canada ranks 18th out of 29 OECD nations in terms of municipal waste per person.

Winner: Sweden

BIODIVERSITY

Protected Areas

The Environmental Issue

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." Parks Canada admits that 38 out of Canada's 39 national parks are suffering from serious ecological stresses.

Canada vs. Sweden

With 9.6% of Canada's land mass protected, Canada is ahead of Sweden, where only 8.1% of the land is protected.

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 (mining, logging, hydroelectric dams, oil and gas exploration) is 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. In comparison, 4.54% of Sweden is strictly off limits to industrial development.

The Trend

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. In comparison, progress in Sweden has been slower.

OECD Rankings

Canada ranks 13th of 29 nations in the OECD in the area of land in protected areas. Sweden places 19th out of 29.

Winner: Canada

MARINE
Fisheries

Winner: Sweden

The Environmental Issue
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 vs. Sweden
In terms of the total volume of fish caught in 1997, Canada weighed in with 945 million kilograms. Sweden's total catch is 357 million kilograms.

The Trend
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.

In Sweden, the volume of fish caught is 42% above 1990 levels. In both nations, the volume of fish raised in aquaculture operations is rising.

OECD Rankings
Canada is 20th out of 29 in volume of fish caught while Sweden ranks 13th out of 29.

ENERGY
Energy Efficiency

Winner: Sweden

The Environmental Issue
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 vs. Sweden
Canada uses 0.30 tonnes of energy to generate $1,000 U.S. worth of GDP. Sweden uses 0.23 tonnes of energy to generate $1,000 U.S. worth of GDP. In other words, Sweden is roughly 25% more energy efficient than Canada.

The Trend
There is a glimmer of hope to be found in the fact that Canada's energy efficiency has increased considerably, by 21%, since 1980. Sweden's energy efficiency has increased at the same rate, by 21% since 1980. Despite increasing energy efficiency, the gains were more than offset by Canada's growing population and economic growth, so that total energy consumption continued to increase. Between 1980 and 1997, Canadian energy consumption grew by 20.3%. For the same period, the increase in Swedish energy use was only 1.7%.

OECD Rankings
Canada ranks a dismal 28th out of 29 OECD countries in terms of energy efficiency, behind countries like Mexico, Turkey, Poland and Portugal. Sweden ranks 22nd.

AGRICULTURE

Pesticides

The Environmental Issue

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 during the application process or 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 (i.e. building up in the food chain). These toxic substances can affect the immune system, harm the reproductive system and cause cancer.

Canada vs. Sweden

Sweden uses 170 kg of pesticides per 1000 inhabitants, the lowest level of pesticide use in the OECD. Canada uses more than five times as much per person, 950kg of pesticides per 1000 inhabitants. In total, Canada used 29,206,000 kg of pesticides in 1994. Sweden used a total of 1,527,000 kg of pesticides in 1997. Canada has more arable land but both countries generate 2% of their GDP through agriculture.

The Trend

According to OECD data, pesticide use in Canada appears to be declining, by 26% since 1985. However, Statistics Canada recently published figures indicating that pesticide use in Canada rose over 400% between 1970 and 1995. The OECD points out that Canada's "survey coverage has varied greatly (different active ingredients, registrants and products); survey trends therefore may not reflect actual trends but simply changes in the survey coverage." Canada's Commissioner for the Environment and Sustainable Development said in his 1999 report to Parliament that 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."

Sweden has decreased pesticide use by more than 80% since 1980 by charging special taxes on pesticides and aggressively promoting organic agriculture. In contrast, in Canada pesticide sales are exempt from the federal Goods and Services Tax (GST).

OECD Rankings

Canada ranks 22nd out of 28 OECD nations in pesticide use per capita. Sweden ranks 1st, meaning they use less pesticides per capita than any other OECD nation.

Winner: Sweden

SUSTAINABLE DEVELOPMENT

Official Development Assistance

The Environmental Issue

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 family planning programs.

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. In contrast, Scandinavian nations consistently exceed the 0.7% threshold.

Canada vs. Sweden

In 1998, the most recent year for which the OECD had data, Canada dedicated 0.29% of its GDP to official development assistance. Sweden achieved more than twice the Canadian level, contributing 0.71% of its GDP to official development assistance.

The Trend

Since 1980, the percentage of GDP that Canada dedicates to official development assistance has fallen by 32.6%. The percentage of GDP that Sweden dedicates to official development assistance has fallen by 8.9% but still exceeds the internationally accepted threshold of 0.7% of GDP. Indeed, Sweden has managed to consistently keep ODA above this threshold for more than twenty years.

OECD Rankings

Despite Canada's international reputation as a compassionate nation, we rank only 11th among the 20 OECD nations for whom data is available. Sweden ranks 4th.

Winner: Sweden

CONCLUSION

Based on this analysis of ten key environmental indicators, Sweden has a much better environmental record than Canada. Sweden comes out ahead of Canada on nine of the ten indicators examined, nearly posting a shutout. Sweden is superior on indicators related to climate change, air pollution, water pollution, water use, waste generation, fisheries, energy efficiency, pesticide use, and official development assistance. The lone indicator where Canada comes out ahead is in protected areas.

The Swedish superiority comes despite close similarities between the two nations in climate, economy, and standard of living. As a result, differences in environmental law and policy appear to account for the difference in performance between the two nations. Canada has relied on a regulatory approach similar to that used in the United States and increasingly, on ineffective voluntary programs. Sweden, in contrast, has combined regulations with a range of innovative policies designed to reshape its economy so as to place less pressure on the environment. In particular, Sweden has moved toward full-cost pricing of environmental goods and services by removing subsidies and implementing environmental taxes. Sweden has also aggressively pursued improvements in efficiency, using less energy and fewer resources to produce the same quantity of goods and services.

Sweden's Global Leadership on Environmental Issues

Sweden provides an inspiring role model for Canada and other industrialized nations in search of sustainable development. Sweden ranked the highest among 180 nations in a comprehensive study examining economic, social and environmental elements of sustainability.

In comparison to Canada, Sweden has adopted a much more holistic and aggressive, approach to sustainable development. Indeed, Sweden is globally renowned for its innovative leadership in pursuing ecological sustainability. Sweden recognizes that "at a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings." The nation's bold goal is to achieve ecological sustainability within a generation (by the year 2025).

Internationally, Sweden seeks to be "a driving force and a model of ecologically sustainable development." Sweden hosted a global meeting of Environment Ministers in 2000, resulting in the Malmo Declaration which called on nations of the world to address the "alarming discrepancy between commitments and actions" on environmental issues and recognize that "special attention should be paid to unsustainable consumption patterns." Sweden also used its term as the President of the European Union (EU) to make environmental issues the number one priority for the EU in 2001.

Swedish Environmental Laws and Policies

Nationally, the government of Sweden seeks "to hand over to the next generation a society in which all the major environmental problems in our vicinity have been solved." Sweden acknowledges that as an industrialized nation it must reduce its consumption of energy and resources while assisting developing nations to overcome poverty through economic growth. The Swedish government defines ecological sustainability as incorporating three elements:

1. Environmental protection--meaning that emissions of pollutants must not harm human health or exceed nature's capacity to absorb them;

2. Sustainable supplies--guaranteeing the long-term productive capacity of ecosystems by not using resources faster than nature can regenerate them and finding renewable substitutes for nonrenewable resources; and
3. Efficient resource use--using energy and resources much more efficiently so as to reduce overall levels of consumption.

Based on these three objectives, a Swedish law introduced in 1998 outlines fifteen general environmental quality goals. Sweden's 15 general environmental quality objectives include clean air, high-quality groundwater, flourishing wetlands, natural acidification only, sustainable forests, a magnificent mountain landscape, a non-toxic environment, and a protective ozone layer. A law introduced in 2001 sets concrete, measurable targets and timelines for each of the 15 Swedish environmental quality goals.

For example, the general goal of a "non-toxic environment" means that the environment should be free from manmade substances and metals that represent a threat to human health or biological diversity. Targets for substances that occur naturally are set at background (i.e. natural) levels, while targets for harmful manmade substances are set at "close to zero." Sweden is engaged in an ambitious screening process to review thousands of potentially harmful manmade chemicals. These chemicals will be either phased out or banned by the year 2010.

Sweden has introduced taxes on waste, the sulphur content of fossil fuels, pesticides and artificial fertilizers, gravel, motor vehicles, carbon dioxide emissions, energy, and electricity. Sweden raises roughly $10 billion per year from energy and carbon dioxide taxes and has invested heavily in renewable energy. A sulphur tax introduced in 1991 resulted in a reduction in the sulphur content of fuels by almost 40% below the legal standards. Gradually increasing taxes on pesticides and policies promoting organic agriculture have enabled Sweden to reduce pesticide use by over 80%.

Sweden uses an innovative fee-bate system to reduce nitrogen oxide emissions. Companies are charged for their emissions and then refunded for the amount of energy produced, which rewards the most efficient producers and provides incentives to become more efficient.

Through a concept known as extended producer responsibility, Swedish law makes producers responsible for the packaging and products that they produce. Producers must either re-use or recycle their goods--even products as large and complex as cars are covered by the law. The effect of the law is that producers have an incentive to reduce environmental pressures throughout the entire life-cycle of their products. Companies that use innovative designs and processes to make their products more durable and more easily recycled can gain a leg up on the competition through cost advantages.

Sweden already spends more than 3% of its GDP on environmental protection while Canada spends under 1%. Sweden also plans a major increase in spending on environmental protection in the coming years.

Canada: The Path Forward

In 1994 Canada suffered a heart-breaking loss to Sweden in the gold-medal hockey game at the Olympics. Now in 2002, Canada has been humiliated by Sweden in a comparison of environmental records.

Both of these experiences provide Canada with an impetus to improve. Just as we strive to be the best in the world at hockey, Canada should strive to be the best in the world in protecting the environment. This report shows how far we have to go, and how we can benefit from emulating Sweden's leadership.

Canada has a long history of importing the best Swedish hockey players, dating back to Borje Salming in the 1970s. Canadian hockey teams continue to benefit from importing the best Swedish hockey players, such as Mats Sundin (Toronto Maple Leafs), Tommy Salo (Edmonton Oilers), Markus Naslund and Mattias Ohlund (Vancouver Canucks), and Daniel Alfredsson (Ottawa Senators).

Now Canada needs to begin importing the best of Sweden's environmental laws and policies. Critics said Borje Salming would never adjust to the different style of hockey played in North America. Salming and his countrymen--Sundin, Naslund, Ohlund, Salo and Alfredsson and others--have put those fears to rest. Similarly, Swedish environmental laws and policies will need to be adjusted but should prove equally effective in Canada.

There is no reason why Sweden's environmental record should be so much better than Canada's record. Canada, with its environmentally concerned public and incredible natural wealth, should also be able to chart a course towards ecological sustainability.

Canada must recognize, like Sweden, that "the use of resources in this part of the world must be reduced significantly if the earth's ecosystems are to be capable of maintaining a growing population and if living standards are to be raised in the developing world." Then Canada should emulate Sweden's National Sustainability Strategy and aim to achieve environmental sustainability within a generation.

ENDNOTES

1. Environment Canada, The State of Canada's Environment 1996. p. 16-47.

2. Prescott-Allan, Robert, 2001. The Wellbeing of Nations: A Country-by-Country Index of Quality of Life and the Environment. (Washington, D.C.: Island Press).

3. Swedish Ministry of Environment, 1999. Sustainable Sweden: A Progress Report on Measures Promoting Ecologically Sustainable Development 1999/2000, p.8 See www.miljo.regeringen.se

4. Organization for Economic Cooperation and Development, 1999. Environmental Data Compendium, 1999 (Paris: OECD).

5. Organization for Economic Cooperation and Development, 2001. Key Environmental Indicators. Paris: OECD.

6. Organization for Economic Cooperation and Development, 1999. Environmental Data Compendium, 1999. Paris: OECD.

7. Weaver, Andrew. 2001. "Global warming debate is a puzzle", Victoria Times-Colonist, Feb. 8, 2001, p. A17. See also United Nations Intergovernmental Panel on Climate Change, 2001. 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's "Summary for Policymakers: Scientific Technical Analysis of Impacts, Adaptations and Mitigation of Climate Change."

8. Swedish Ministry of Environment, 2001. Sweden's Third National Communication on Climate Change. Sweden: Ministry of Environment. www.miljo.regeringen.se

9. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

10. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

11. Lunquist, Lennart J. "Municipal Sewage Treatment in Sweden: From Bans on Bathing to Schools of Salmon," in Martin Janicke and Helmut Weidner, eds. Successful Environmental Policy: A Critical Evaluation of 24 Cases.

12. Nova Scotia Department of Environment, 1998. 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.

13. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

14. 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.

15. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

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

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

18. 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).

19. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

20. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

21. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

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

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

24. Canada is one of the only OECD nations that does not require reporting of pesticide sales. 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. 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). Environment Canada, 1996. The State of Canada's Environment 1996. p. 13-17.

25. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

26. These rankings are from Boyd, David R. 2001. Canada vs. The OECD: An Environmental Comparison. Victoria: Eco-Research Chair in Environmental Law and Policy. See www.environmentalindicators.com

27. Prescott-Allan, Robert, 2001. The Wellbeing of Nations: A Country-by-Country Index of Quality of Life and the Environment. (Washington, D.C.: Island Press).

28. Swedish Ministry of Environment, 1998. 1 Environmental Quality Objectives Bill, Government Bill1997-98. See www.miljo.regeringen.se Swedish Ministry of the Environment, 2001. The Swedish Environmental Objectives--Interim Targets and Action Strategies. Government Bill 2000/01: 130. See www.miljo.regeringen.se

29. Kenny, Michael and James Meadowcroft, eds., 1999. Planning Sustainability. (New York: Routledge). Dalal-Clayton, Barry. 1996. Getting to Grips with Green Plans: National Level Experience in Industrial Countries. (London: Earthscan). Janicke, Martin and Helmut Weidner, eds. 1997. National Environmental Policies: A Comparative Study. (New York: Springer).

30. World Commission on Environment and Development, 1987. Our Common Future. (Oxford: Oxford University Press, 1987), p. 44-5.

31. Swedish Ministry of Environment, 1998. Environmental Quality Objectives Bill, Government Bill1997-98, p. 2. See www.miljo.regeringen.se

32. Swedish Ministry of Environment, 2000. Sustainable Sweden: A Progress Report on Measures to Promote Ecologically Sustainable Development. Government Communication 2000/01: 38. www.miljo.regeringen.se

33. Swedish Ministry of the Environment, 2001. The Swedish Environmental Objectives--Interim Targets and Action Strategies. Government Bill 2000/01: 130. See www.miljo.regeringen.se

34. Swedish Ministry of Environment, 1998. Environmental Quality Objectives Bill, Government Bill1997-98, p. 2. See www.miljo.regeringen.se

35. Swedish Ministry of Environment, 1998. Environmental Quality Objectives Bill, Government Bill1997-98, pp. 3-4. See www.miljo.regeringen.se

36. Swedish Ministry of Environment, 1998. Environmental Quality Objectives Bill, Government Bill1997-98. See www.miljo.regeringen.se

37. Swedish Ministry of Environment, 1998. Environmental Quality Objectives Bill, Government Bill1997-98, p. 2. See www.miljo.regeringen.se

38. Swedish Ministry of the Environment, 2001. The Swedish Environmental Objectives--Interim Targets and Action Strategies. Government Bill 2000/01: 130. See www.miljo.regeringen.se

39. Swedish Ministry of the Environment, 2001. The Swedish Environmental Objectives--Interim Targets and Action Strategies. Government Bill 2000/01: 130. See www.miljo.regeringen.se

40. Organization for Economic Cooperation and Development. Eco-efficiency. Paris: OECD.

41. Gale, Robert, Stephan Barg and Alexander Gillies, 1995. Green Budget Reform: An International Casebook of Leading Practices. (London: Earthscan)

42. Ackerman, Frank. 1997. Why Do We Recycle? Washington, D.C.: Island Press, pp. 105-22. Halpert, Amy. 2001. "Germany's Solid Waste Disposal System: Shifting the Responsibility," 14 Georgetown International Environmental Law Review 135. Davis, Gary A. et al. 1997. "Extended Product Responsibility: A Tool for a Sustainable Economy," Environment 39.7, pp. 10-15, 36-38

43. Swedish Ministry of the Environment, 2001. The Swedish Environmental Objectives--Interim Targets and Action Strategies. Government Bill 2000/01: 130. See www.miljo.regeringen.se

44. Swedish Ministry of the Environment, 2001. Press Release, September 21, 2001. The Swedish Ministry of the Environment expects to spend an additional $600 million ($Cdn) between 2002 and 2004. Swedish Ministry of Environment, 2000. Sustainable Sweden: A Progress Report on Measures to Promote Ecologically Sustainable Development. Government Communication 2000/01: 38.

45. Sustainable Sweden: A Progress Report on Measures Promoting Ecologically Sustainable Development 1999/2000, p.8. See www.miljo.regeringen.se