

CANADA AND THE UNITED STATES OF AMERICA: OVERVIEW OF THE PHYSICAL AND HUMAN DIMENSIONS OF LIFE SUPPORT SYSTEMS

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Summary

Canada and the United States are rich in natural resources, which they owe to their continent's climates, and geological and glacial histories. Americans and Canadians have skillfully converted those assets into enormous material wealth and living standards that are among the best in the world. In doing so, however, they may have exerted too much pressure on several parts of their life support systems, resulting in significant drawdown of natural capital. Evidence of this drawdown comes from air and water pollution, land subsidence, reduced wetlands, depleted marine fish stocks, and a growing list of threatened and endangered species. Additionally, the rewards of a great economy seem to have eluded sizable segments of their population. With an equity ratio of 12, a poverty rate of 14 percent, and 41 million citizens without medical coverage, the United States scores poorly in equity and social justice.

To their credit, both countries are facing up to their environmental and human development problems, and achieving results. Air quality in urban areas has improved over the last five years, thanks to stricter emission regulations and enforcement, and environmental action by government. Production and use of non-fossil fuels are up. The forests that were under siege are showing signs of recovery. Relationships with indigenous people have improved.

Despite these measures of progress, problems remain. Greenhouse gas emissions are rising, contrary to commitments made at Kyoto. Groundwater is still being mined in many states of the USA, and groundwater pollution threatens aquifers everywhere. It is

unlikely that North Americans will let their life support systems slip into unsustainability. There is too much talent to let that happen. Pressure from a well-educated public, and the energy of non-governmental organizations, both operating within a democracy, should ensure success.

1. Introduction

Canada and the United States (USA) are neighbors. They are members of the North Atlantic Treaty Organization (NATO), the North American Free Trade Agreement (NAFTA), the group of eight most industrialized countries (G8), and partners in the North American Aerospace Defense Command (NORAD). They share the world's longest undefended international border. Even though they operate different systems of government – Canada a parliamentary system, and the United States a presidential system – governments in both countries are run on truly democratic principles. Human resources are so highly developed in both countries that equivalent skills can be exchanged across the border with minimal testing.

A poll of Canadians and Americans, conducted by *Maclean's* and the Canadian Broadcasting Corporation (CBC) in December 1999, confirmed similarities in how citizens of the two countries view themselves as well as each other (*Maclean's*, 1999). For instance, Canadians (93 percent) and Americans (96 percent) consider preservation of family values very important; 78 percent of Americans and 80 percent of Canadians favor gun registration; 32 percent of Canadians and 30 percent of US citizens are afraid to walk alone at night; 31 percent of Canadians and 39 percent of Americans identify social and moral issues as their most pressing concern. Forty-nine (49) percent of Canadians surveyed believed that they had become more American over the past decade (only 18 percent specifically said that Canadians are becoming less American), while 71 percent of Americans said that they were culturally "essentially the same" as Canadians. Only 25 percent of Americans and 26 percent of Canadians would swap citizenship.

The two countries have an abundance of natural resources that they have used to create enormous wealth. Given similarities in methods used to achieve their high economic status, and the equivalence in lifestyle accruing from their wealth, it is not surprising that the two countries share almost identical environmental problems. Their attitudes towards those problems, and their approaches to solving them, are also similar, as are the obstacles to solutions. In a survey conducted by Ekos Research, Canadians rated the environment 6.02 on a seven-point scale as a factor that influenced their health and well-being (*Vancouver Sun*, 2000). Surveys in the United States have given similar priority to the environment. A Mellman Group poll conducted in 1999 found that 70 percent of Americans believe that global warming is a serious problem, and 66 percent want action taken right away; two-thirds agreed the United States should reduce its carbon emissions unilaterally (Dunn, 2000).

Environmental concerns are both immediate and future. Immediate concerns involve the possible impacts of environmental degradation on health and well-being. These range from minor discomfort from foul air, to serious illnesses such as cancer and heart disease due to long-term exposure to environmental hazards, and even to death from unsafe drinking-water due to reductions in governmental budgets for water quality

monitoring. For the longer term, North Americans are fearful that a heavily compromised environment will destroy the life support systems for their children and grandchildren. At Thanksgiving, celebrated on both sides of the border as a major holiday in the fall, citizens give thanks for the year's harvest while looking forward to subsequent repeats. In that sense, Thanksgiving is a celebration of nature's sustainability.

But Americans and Canadians are not always content with the status quo; they demand improved performance (development). They expect that of themselves and from the land, atmosphere, and water resources that combine to produce the harvest. Sometimes, in their eagerness to improve, they exert too much pressure on those resources. In the process, they may impair the long-term viability of the resources while compromising the health of other systems to which they are linked. The harvest example is paralleled by similar activity-impact relationships in other areas of life support systems such as forests, minerals, fresh water, oceans, and atmosphere. These individual systems themselves are connected with one another by loops that often bear the fingerprints of human activity. (*Two articles provide good examples of such loops: Riebsame, W. E. and Magalhaes, A. R. "Assessing the Regional Implications of Climate Variability and Change," and Norse, D. "Population and Global Climate Change." In: J. Jager and H. L. Ferguson (eds.), Climate Change: Science, Impacts and Policy, Cambridge University Press, 1991.*)

The World Commission on Environment and Development (WCED) was established by the United Nations General Assembly "to reexamine the critical issues of environment and development and to formulate innovative, concrete and realistic proposals to deal with them" (WCED, 1990). In its report, the Commission directed that all efforts be made toward achieving the goal of "sustainable development," a term that has been defined in many ways. The Canadian Council of Ministers of the Environment, for example, defined sustainable development as "development which ensures that the utilization of resources and the environment today does not damage prospects for their use by future generations (Environment Canada, 1990). The Ministers' version of the Commission's interpretation of the term – "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" – inadvertently separates environment and resources when, in truth, they belong together. The environment is *the* resource. When humans intervene in any part of it, they are either drawing down or restoring a capital asset that supports life. The Commission expressed hope for the future conditional on decisive political action aimed at managing *environmental resources* in a manner that ensures sustainable human progress and human survival. Commission members noted that achievement of this vision posed problems for national and international institutions which were established on the basis of narrow preoccupations and compartmentalized concerns.

The contributions to this encyclopedia under the theme "Canada and United States" have addressed several areas of the subcontinent's life support systems within the framework of sustainable development as defined by the WCED. For convenience, the topic level entries under the theme are divided into five broad categories, namely:

- natural resources
- human resources

- environmental management
- institutional framework—structure
- the future.

Together these topics provide a comprehensive summary of the present state of North America's life support systems, their linkages, and pressure points; update some of the methods used to relieve pressure and the successes achieved; highlight failed experiments; and suggest methodology for integrating the environment in development policies and programs.

2. The Physical Resources

2.1. Basis for abundance and abuse

Canada (9.2 million square kilometers) and the United States (9.4 million square kilometers) share 90 percent of the world's second largest continent. With a combined population of only 300 million, the two countries have a population density of 16 persons per square kilometer (29 per square kilometer for the USA and 3 per square kilometer for Canada) which gives them one of the lowest population densities in the world, and second only to Australia among developed countries. This large "elbow room" represents a natural asset which few nations enjoy.

North America's latitudinal position ranges from subtropical to polar, affording the two countries a wide range of climates and the resource variety they represent. Canada and the USA control large parts of three oceans, and their glacial and geological history left behind unparalleled natural riches. Their physical isolation from other continents has enabled them to develop a culture that is uniquely North American. Originally populated by small groups of aborigines, these magnificent lands were taken over by immigrants from the Old World who skillfully turned them into the most prosperous part of this planet.

In the process of creating their material wealth, North Americans developed a culture of overconsumption, the main cause of many environmental problems that threaten the future of their civilization. In a lifetime, the average American uses 500 tonnes (T) of construction material, 18 T of paper, 23 T of wood, 16 T of metal, and 32 T of organic chemicals. Each person in the USA consumes 90,000 kilograms (kg) of grain annually, directly or indirectly through livestock and dairy products, twice as much as an Italian and more than four times as much as an Indian. With a per capita consumption of 82,000 kg, Canadians are not far behind. North Americans produce the most waste per capita, waste that is often dumped into the atmosphere, landfills, lakes and rivers, and oceans.

Compromising their own life support systems is one thing; compromising those of other nations (because of ecological interconnectedness) is another. North Americans have been doing both, and the world is increasingly resentful. The United States leads the world in emission of the greenhouse gases that are believed to cause global warming. Of the major industrialized countries, only the United States produces more carbon dioxide per person than Canada. Yet, in spite of their leading-edge research on climate change,

and the eagerness of their general public to respond to the emergency in meaningful ways, both nations show very little political will to follow through with corrective measures designed to rectify past errors and help global warming. While their physical isolation may have dulled their sense of responsibility to the environment in other parts of the world, Canada and the United States strive to protect their shared environments. They have worked together to reduce air pollution and acid rain, and save the Great Lakes.

2.1.1. Climate, agriculture, and forest resources

Climate correlates very strongly with many areas of the environment. Major soil groups are a function of climate, as are forests, water, and agriculture. Human comfort is a function of climate, as are clothing, diet, recreation, transportation, and even housing. Within North America the climate ranges from subtropical in the southern United States to polar in northern Canada. There are eight distinct climate groups, representing different combinations of temperature and precipitation and consequently different life support systems.

North America grows and exports a greater variety of agricultural products than most countries. The United States either leads world production in – or is a leading producer of – many commodities, including soya, wheat, rice, corn, and peanuts. In 1998, the United States harvested more grains per person than any other country in the world (United States Department of Agriculture, 1998). Canada is a leading producer of wheat, barley, and canola. This outstanding list is due in no small part to the range of climates that has enabled farmers in the subcontinent to grow products that cut across several latitudinal zones.

The range of climate also has endowed North Americans with a substantial assortment of forest types that yield a variety of hard and soft wood, used for everything from paper to furniture and house construction. The USA and Canada, along with Russia, have remained among the top five producers of industrial roundwood for the last forty years. In 1997, Canada harvested 182.7 million cubic meters of timber, representing about 0.8 percent of the accessible and managed productive forest (Environment Canada, 1998). In 1998, Canada exported over \$39.7 billion worth of forest products, amounting to more than the energy, mining, and agricultural sectors combined. Although per capita wood consumption has been declining in North America, due to use of substitutes such as plastics and metals, and replacement of fuel wood by fossil fuels, the two countries have continued to expand their wood production to supply the growing appetite for wood and forest products overseas. Moreover, in both countries, where most domestic consumption is dedicated to home construction, the penchant for larger homes has ballooned. In the United States, the average new house is approaching 200 square meters, double the size of half a century ago. Meanwhile, the average number of people occupying family units has shrunk from 4.8 in 1900 to the present 2.6 (US Department of Commerce, 1992).

2.1.2. Water resources

Canada and the United States average 700 millimeters (mm) of precipitation annually.

While precipitation in the United States falls mostly as rain, in Canada, and the northern and mountainous parts of the USA, there is a healthy mix of rain and snow. The mix is important because melting snow in the warmer season ensures year-round continuity of streamflow in many of the major drainage systems, continuous recharge of the majority of the aquifers, and thriving wetlands. Because evaporation averages only 380 mm per year, the subcontinent is freshwater rich. Stable runoff averages 8,240 cubic meters per capita per year. Canada alone has between 6 and 10 percent of the world's renewable water, and the shared Great Lakes represent 18 percent of the world's fresh water. The largest of the lakes, Lake Superior, is the purest freshwater lake in the world (Nkemdirim and Peterson). Although the spatial distribution of freshwater sources is uneven, less than 5 percent of the inhabited area of the two nations is officially classified as dry. Even those areas have reasonable access to surface water, as well as a healthy share of considerable groundwater resources.

The two countries carry from 10 to 20 percent of Earth's groundwater resources. The USA has at least 125,000 trillion liters in groundwater reserves, equivalent to the amount of water discharged into the Gulf of Mexico by the Mississippi, the world's fourth longest river, in the past 200 years. The High Plains aquifer known as the Ogallala contains 3,520 cubic kilometers of water. Second only to South America in water wealth, Canada and the United States have used their resources to advance human and economic development. Both countries pay the lowest prices for water among industrialized countries (United States Department of Agriculture, 1998).

Inexpensive water helps Canada and the USA produce vast quantities of energy, both instream (hydroelectricity) and offstream (thermal plants), which is used to power industry, and to support a high living standard. In no small measure, their diverse agricultural output is due to water supply: close to 20 percent of the water in the United States is utilized for irrigation. (*Data compiled by the United Nations Statistics Division on economic activities, UN Economic Statistics, 2000.*) The abundance of water has enabled the two countries to maintain a high level of hygiene and sanitation. Each person in the USA and Canada uses approximately 400 liters of water daily; over 90 percent of that water is utilized for bathing, washing, and waste disposal (US Geological Survey, 1996; Environment Canada, 1990).

2.1.3. Atmospheric resources

In spite of the atmosphere's role in climate, water resources, carbon and nitrogen cycles, and ventilation, North Americans tend to use it as a sewer. Through the chimneys and smokestacks of billions of homes and factories, they dump waste, exhaust gases, and particulates from air, land, and water vehicular traffic into the atmosphere. In addition, the atmosphere is a favorite pathway for some of the most toxic substances, such as polychlorinated biphenyls (PCBs), present in the waters and oceans of the two nations (Environment Canada, 1992).

2.1.4. Land resources

The land itself is highly varied. The valleys of the Rocky Mountain chain in the west and the Appalachians in the east favor fruit growing, predominantly apples in the north,

as in Oregon, Washington, British Columbia, and Nova Scotia, and citrus in the south, as in Florida. The high plains and prairies are relatively flat lands whose soils, black earth or chernozem, are among the world's best. Although parts of the prairies are precipitation deficient, the land is highly irrigable, supporting one of the richest agricultural activities anywhere. The wide belt from central Alberta and Saskatchewan in Canada, southwards through the eastern part of the Dakotas and Nebraska, and across central Kansas and western Oklahoma to central and southern Texas, is the heart of the subcontinent's grain belt and the reason for its world grain market dominance.

2.1.5. Ocean resources

Canada and the United States share access to three oceans, Atlantic, Pacific, and Arctic. The Grand Banks off the Newfoundland coast, and the northwest Pacific coast from Oregon to Alaska, are high in phytoplankton production; their mean daily output of over 250 milligrams of carbon per square meter makes them one of the world's top fishing grounds (McCarthy, 1991). In addition, rich fossil fuel deposits are being tapped off the Newfoundland and Nova Scotia coasts, and off California, and large deposits exist in the Arctic.

3. Human Resources

3.1. Population characteristics

Canada and the United States comprise two of the four major land masses that are dominated by immigrants. (*Statistics Canada. Components of population growth*, <http://www.statscan.ca/English/pgdp/>) The largest group is of European stock. In the United States, whites make up 83 percent of the population, while in Canada whites account for nearly 90 percent. The proportional breakdown of major ethnic groups in the two countries is presented in Table 1. Between 1991 and 1999, the trend in ethnic composition was away from whites toward minorities. In the USA, the non-Hispanic white population share declined from 73.6 percent to 71.3 percent; Asians increased by 1 percent, and Hispanics by 1.4 percent. If present trends continue, by 2050 Hispanics of all races will account for one-fourth of the population. Black representation will grow to 15 percent.

Groups	USA	Canada
Total Population*	274	31
White (%)	82.3	89.4
White (non-Hispanic)	71.6	n/a
Black	12.8	2.0
Hispanics	11.8	n/a
Asians	4.0	6.0
Aborigines	0.9	2.5

Table 1. Ethnic Composition of the population of USA and Canada, 2000.

More dramatic demographic shifts have already occurred. California, America's most populous state, became the first "minority majority" state when in 2001, the combined

Hispanic, Asian, and African-American population (51.3 percent) pulled ahead of non-Hispanic whites (49.7 percent). (*US Census Bureau, 2002. This outcome confirmed a projection made earlier in The National Post, quoting from statistics released by the demographic Research Unit of the California Department of Finance, July 6 2000, and analysis by David Ross of the Milken Institute of Santa Monica.*) In Canada, where the birth rate fell 25 percent between 1980 and 1998, immigration is the primary source of population growth. Between 1986 and 1991, immigration accounted for 61 percent of the population increase. In the 1990s, Asia became the principal source of immigrants to Canada, contributing 57 percent of all new Canadians, up from a 12 percent share in the 1960s. Meanwhile, the proportion of European immigrants declined from 69 percent to 19 percent over the same period. By 2005, the proportion of “visible minorities” in Canada will rise from the 12 percent it was in 1996 to 16 percent, and to 20 percent by 2016.

While whites tend to be fairly homogenous in the United States – except for the frequent distinction made among white and non-white Hispanics – in Canada those of French ancestry with their base in Quebec constitute a very distinct white ethnic group. Accounting for only 10 percent of Canada’s population, their concentration in one province gives them a relevance that may be seen by some as disproportionate to their numbers.

Official national policy toward cultural development across ethnic groups differs on both sides of the border. Canada is officially a multicultural country, where ethnic groups are encouraged to retain as much of their culture as possible, with government funding on request. The United States, on the other hand, is a melting-pot in which ethnically based culture is not encouraged overtly by the government. However, to most observers, the ethnic groups in America each seem to have developed a culture that is distinct one from another. Blacks have a cultural identity that is unmistakable through their music and unique dialect, while Hispanics are pressing their own musical and language distinction. In several states in the south, governments have confronted spreading bilingualism in schools and the workplace, as more Hispanics insist on being served in Spanish.

In Canada, on the other hand, the separate cultural identities that government was encouraging do not appear to have materialized beyond the community hall. Relatively little ethnicity is seen in music, theater, and other forms of cultural expression outside Quebec, New Brunswick, and Newfoundland. Even in those provinces, special efforts are made by governments to preserve a cultural identity that is under siege from a predominantly American-driven dominance of culture, commerce, and communication. Ethnic diversity is an asset in human development, but in the subcontinent such differences can be a source of tension as demonstrated in the article.

Virtually identical age-group statistics (Table 2) reveal that the median ages of the two populations are close to each other: 36.5 years for the USA and 36.2 years for Canada. What is more, the two peoples are aging at the same rate of 1.5 years per decade. The male-female ratio is 49.5 : 50.5. Gender representation in the population is almost equal until the age group 75 and over, when the number of women in both countries exceeds men by almost a two to one margin.

Age Group	Canada	United States
Under 15	19	21
15-24	12	14.2
25-44	31.6	29.2
45-64	20.8	22.2
65 and over	12.7	12.5

Table 2. Age Profile of Americans and Canadians

The geographical distribution of population in both countries is changing. Between 1995 and 1999, the USA grew by almost 4 percent. Growth was above average in the south (5 percent) and west (6 percent). Texas, Arizona, Florida, and California, the so-called sun-belt states, are among the fastest-growing states in the country. Growth in the north-east (0.7 percent) and midwest (2.2 percent) was below average. In Canada, population has also shifted westward. Between 1991 and 1996, the population of the most westerly provinces, British Columbia and Alberta, rose by 13 percent and 8 percent respectively.

3.2. Literacy and education

The literacy rate in the United States is 99.5 percent. Ninety two and one half (92.5) percent of its people have at least a high school diploma, while 16 percent have a first degree from a university or college. At the upper end, 1.4 percent have professional degrees, and 1 percent have doctorates. The figures for Canada are slightly lower but represent impressive educational accomplishments. Sixty-two (62) percent have graduated from high school, and 15 percent hold university diplomas. College enrollment continues to grow, especially among women. By the end of the first decade of the twenty-first century, 5.5 million women will have enrolled in college each year, up from 4 million in 1984. The growth in female participation in higher education already outdistances that of the men and the gap is widening. By 2010, there will be 1.5 million more women in colleges and universities than men (Begin, 2000). In both countries, trade schools have helped prepare people for careers in industry. In Canada, 10 percent of the workforce holds diplomas from such schools. Both countries are attracting skilled immigrants. Encouraged by a change in government policy, skilled and entrepreneurial immigrants have replaced family class types as the dominant immigrant group in Canada.

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issues dealt with in this overview, e.g. First Nations, Metis, and Inuit people and their land claims and treaties, and forest heritage.]

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