



HEALTHY ENVIRONMENT

HEALTHY CANADIANS

prescription for a healthy Canada

TOWARDS A NATIONAL
ENVIRONMENTAL HEALTH STRATEGY



SUMMARY FOR POLICY-MAKERS



David
Suzuki
Foundation

SOLUTIONS ARE IN OUR NATURE

SEPTEMBER 2007

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Prescription for a Healthy Canada: Towards a National Environmental Health Strategy
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ISBN 1-897375-08-5

Canadian Cataloguing in Publication Data for this book
is available through the National Library of Canada

ACKNOWLEDGEMENTS

The author would like to thank: Ann Rowan, David Hocking, and Dr. David Suzuki for enthusiastically supporting this project; Dr. Ray Copes for teaching me about the finer points of environmental health; Dr. Amir Attaran, Dr. David Bates, Dr. Jeanette Boyd, Dr. Hadi Dowlatabadi, Dr. Stephen Genuis, Dr. Scott Harrison, Dr. Terre Satterfield, and Dr. Meg Sears for their helpful guidance, feedback, and suggestions on improving various elements of this report; and the David Suzuki Foundation, especially Lisa Gue, Dr. Faisal Moola, Dr. Scott Wallace, Jason Curran, Panos Grames, and Lindsay Coulter.

The David Suzuki Foundation would like to thank: Carmela Graziani, Kimberly Blais, Katie Albright, Louise Aubin, Pierre René de Cotret, Dr. Erica Frank, Dr. Tee Guidotti, Dr. Blake Poland, Dr. Robert Woollard, the Canadian Network on Environment, Health and Social Equity, the Canadian Public Health Association and the Ontario Public Health Association, for their contributions to this report.

This report was made possible through the generous support
of the Lefebvre Charitable Foundation.



DEDICATION

This report is for my daughter Meredith, my niece Sonje, and my nephew Seamus.
Healthy kids need a healthy planet.

David Suzuki Foundation

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DESIGN AND PRODUCTION: Arifin Graham, Alaris Design

PHOTOGRAPHS: David Suzuki by Rich Frishman/Frish Photo; all others by iStockphoto.com

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This summary for policy-makers highlights the main findings and recommendations of the full report, *Prescription for a Healthy Canada: Towards a National Environmental Health Strategy*. Both documents are available at: www.davidsuzuki.org/publications.

*We increasingly understand that the health and well-being
of our families depends on a clean and healthy environment.*

– DECLARATION ON CHILDREN'S ENVIRONMENTAL HEALTH,
BY LEADERS OF THE G8 SUMMIT (1997)



Executive Summary

Environmental pollution and degradation take a tremendous toll on the health of Canadians. Environmental hazards contribute to the deaths of thousands of Canadians each year, largely due to respiratory disease, heart disease, and cancer. Each year, millions of Canadians become ill or disabled after being exposed to environmental contaminants. Environmental contaminants are linked to asthma, gastrointestinal illness, poisonings, cancer, Alzheimer's disease, Parkinson's disease, developmental disorders, birth defects, and reproductive problems. These negative health effects impose enormous costs on Canadian society. We cannot adequately put a price on the pain, the suffering, the diminished quality of life, and the loss of life caused by these illnesses and deaths. However, we do know that environmental contamination costs Canada billions of dollars each year due to healthcare expenses, school absenteeism, decreased intelligence, and lost productivity.

Many Canadians will find it disturbing to learn that their country has fallen behind other industrialized nations in protecting its citizens from environmental threats to their health. While most developed countries have adopted national health and environment strategies or action plans, Canada has not. Unlike the U.S., Australia, and the European Union, Canada lacks both a national program to monitor children's exposures to environmental contaminants, and a national system to track diseases and deaths caused by environmental contaminants. Many Canadian health and environmental laws and policies are weaker than corresponding laws and policies in other nations. For example:

- Canada does not have legally binding national standards for air quality and drinking water quality.
- Canada permits the use of pesticides that other countries have banned for health and environmental reasons.
- Compared to other nations, Canada allows higher levels of pesticide residues on our food.

- Canada has completely failed to regulate some toxic substances, including polybrominated diphenyl ethers (PBDEs), phthalates, and polycyclic aromatic hydrocarbons (PAHs).
- Canada has weaker regulations for toxic substances such as radon, lead, mercury, arsenic, and asbestos.

The good news is that we can prevent the majority of the adverse environmental effects on our health. Canada could join other world leaders in protecting public health by embracing this report's recommendations for reducing air pollution, protecting water quality, improving food safety, addressing threats posed by consumer products, and banning the most hazardous substances currently being used. The history of pollution regulation in Canada proves that industry overestimates the costs, governments underestimate the benefits, and action to regulate toxic substances is taken only after significant health and environmental damage has been inflicted.

We must learn from the mistakes of the past. Our failure to regulate lead, benzene, sulphur, CFCs, mercury, PCBs, and other toxic substances in a timely fashion has resulted in significant costs. We must adopt a preventative and precautionary approach to our future. There are safer substitutes for most, if not all, of the toxic chemicals currently being used and released into the environment. These safer substitutes would save lives, prevent illnesses, protect ecosystems, and benefit our economy. Preventing environmental impacts on our health is crucial to relieving the pressure on Canada's health care system and to fulfilling the David Suzuki Foundation's vision of achieving sustainability within a generation.

The David Suzuki Foundation calls on the federal government, in collaboration with the provinces and territories, to adopt a national environmental health strategy for Canada. This must include initiatives to improve monitoring and research; strengthen laws, regulations, and policies; build professional capacity and raise public awareness; protect vulnerable populations; and promote environmental health on the international stage.

These five priority areas for a national environmental health strategy are summarized below and explained in more detail in the report.

I. IMPROVE RESEARCH AND MONITORING

Canada should conduct regular biomonitoring studies – testing blood, urine, etc. – to identify and track toxic substances that enter our bodies. The federal government and the Province of Alberta recently launched initial, exploratory studies. These programs, however, must be expanded and extended to provide comprehensive and ongoing data on Canadians' exposure to environmental contaminants. This and other information should be fed into a national environmental health tracking system designed to inform the public and health professionals about environmental contamination and to hold industry accountable for toxic products and releases. The government must also increase funding for health and environment research.

II. STRENGTHEN LAWS, REGULATIONS, AND POLICIES

Canada must consistently apply the precautionary principle and ban potentially dangerous substances, unless industry can prove beyond any reasonable doubt that they are safe. Canada must also apply the substitution principle, requiring manufacturers to replace all toxic products with safer alternatives. Specific amendments to this effect are proposed to the *Canadian Environmental Protection Act 1999*, the *Pest Control Products Act*, and the *Hazardous Products Act*. More broadly, the government should impose pollution taxes, eliminate subsidies and incentives that cause environmental damage, require manufacturers to be responsible for the life-cycle environmental costs associated with their products, and accelerate the transition to an energy-efficient, low-carbon economy.

III. BUILD PROFESSIONAL CAPACITY AND RAISE PUBLIC AWARENESS

Governments must work with educational institutions and medical associations to ensure that training and professional development programs include an environmental health component. A national environmental health strategy should also support information services for both health professionals and the public at large.

IV. CONFRONT THE UNJUST DISTRIBUTION OF ENVIRONMENTAL HARMS AND PROTECT VULNERABLE POPULATIONS

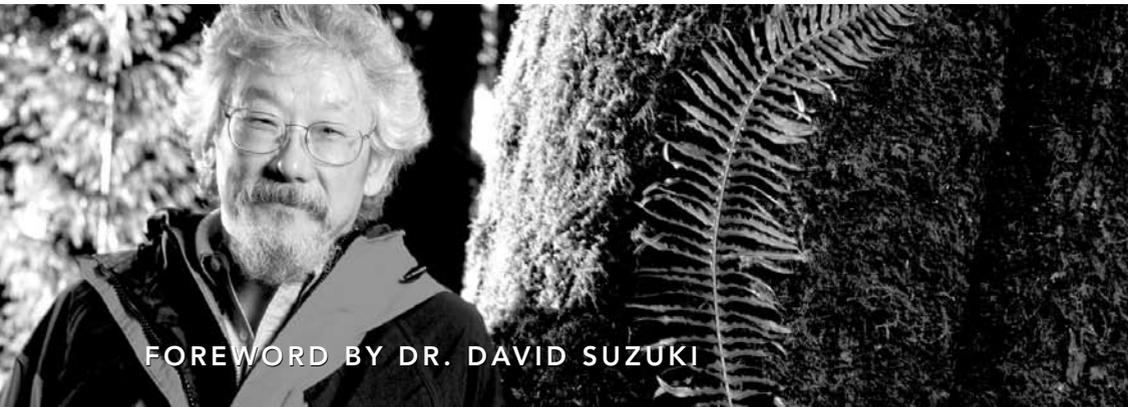
The national environmental health strategy must include an explicit commitment to achieving environmental justice. Too often in Canada, environmental health hazards disproportionately impact Aboriginal and poor communities. Environmental health policy must also recognize the heightened vulnerability of children, pregnant women, and people with compromised immune systems.

V. PRIORITIZE ENVIRONMENTAL HEALTH ON THE INTERNATIONAL STAGE

Canada must stop exporting toxic substances that are banned in Canada. We must support international laws that are designed to phase out the production, use, and release of toxic substances – such as asbestos – instead of obstructing such laws. Canada must also acknowledge that all citizens have the right to live in a healthy environment, including the right to clean water.

*Canada's environmental performance is, by most measures,
the worst in the developed world. We've got big problems.*

– PRIME MINISTER STEPHEN HARPER (2006)



In Canada, human health and the environment have become two of the most interconnected and salient issues we all face today. While we fight to maintain and improve one of the world's best health-care systems, we have ignored new, important preventative actions that can save us from illness and death. We should pay attention to keeping healthy people healthy, instead of focusing on treating illness after it sets in.

Most Canadians agree that environmental degradation has a negative impact on their health. Sadly, children are particularly vulnerable to environmental health hazards.

This report, *Prescription for a Healthy Canada*, champions the idea of a national environmental health strategy. Such a strategy can save or improve the lives of thousands of Canadians, increase productivity, protect biodiversity, and enhance the quality of life in this country.

As a species capable of forethought, we possess the capacity to preserve our health and our children's health before illnesses emerge. Through proper judgement and planning, we can ensure we're breathing clean air, drinking clean water and eating food that's free from harmful pollutants. Individuals can also play a role by taking the steps outlined in our Nature Challenge. As well, businesses have an obligation to clean up their act. But to guarantee a clean natural environment and healthy citizens, we require adequate systems, laws, policies and commitments by all levels of government.

Our Foundation is committed to achieving sustainability within a generation in Canada – a national plan to address environmental health is a huge step in that direction. A healthy environment is a vital cornerstone of a sustainable, prosperous future.

David Suzuki

FOUNDER, DAVID SUZUKI FOUNDATION

ACRONYMS

CEPA	Canadian Environmental Protection Act, 1999
CFC	Chlorofluorocarbon
CRTK	Community Right To Know
DecaBDE	Decabromodiphenyl Ether
EPR	Extended Producer Responsibility
GST	Goods and Services Tax
IQ	Intelligence Quotient
LEED	Leadership in Energy and Environmental Design
NCCEH	National Collaborating Centre for Environmental Health
NPRI	National Pollutant Release Inventory
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyl
PCPA	Pest Control Products Act
PFC	Perfluorochemical
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
POP	Persistent Organic Pollutants
PVC	Polyvinyl Chloride
OECD	Organization for Economic Co-Operation and Development
SARS	Severe Acute Respiratory Syndrome



Introduction

On the surface, Canada is one of the most beautiful nations in the world, with seemingly abundant fresh water, clean air, and few obvious signs of environmental contamination. However, looks are deceiving. Pollution is pervasive, affecting every ecosystem in Canada. Twenty-first century environmental contaminants are largely invisible. We cannot necessarily see the pollution in the air we breathe, taste the pathogens and chemicals in the water we drink, or smell the pesticides and bacteria in the food we eat. Yet, we intuitively understand that these invisible contaminants are harming us.

Environmental contamination and degradation cause thousands of deaths, tens of thousands of hospital and emergency room visits, millions of days lost to illness, and billions of dollars in health care costs.¹ The World Health Organization estimates that nearly one-quarter of the global disease burden (years lost to premature death, disability, and illness) is attributable to environmental factors. Scientists link environmental threats to adverse health outcomes, including premature birth, birth defects, permanent decreases in IQ, autism, behavioural problems, asthma, chronic obstructive pulmonary disease (COPD), cancer, cardiovascular disease, brain damage, and damage to the immune, nervous, gastrointestinal, hormone, and reproductive systems.

Canadians hear media reports about smog advisories, contaminated drinking water, pesticide-laced food, high cancer rates, mind-boggling volumes of toxic industrial emissions, and hazardous chemicals in products ranging from cosmetics and children's toys, to household cleaning products and building materials. Pollution ranks at the top of the list, ahead of stress, when Canadians are asked to identify the main factors that are harming their health. The proportion of Canadians who believe that environmental problems will affect the health of future generations "a great deal" has risen in recent years from one of out of two Canadians to two out of three Canadians. The top three environmental concerns among Canadians are air quality, climate change, and water quality. Seventy-four to 91 per cent of Canadians state that hazardous chemicals are definitely present at unsafe levels in the air they breathe, the

This summary for policy-makers highlights the main findings and recommendations of the full report, available at: www.davidsuzuki.org/publications.

water they drink, and the food they eat.² Public opinion polls conducted in late 2006 and early 2007 indicate that the environment is now the overriding concern among Canadians, propelled to the top of the list by a growing unease about our changing climate.³

Experts agree that Canadians should be concerned about environmental contaminants. New research linking environmental factors to human health are published in medical and scientific journals almost every week (see Table 1).⁴ Also, Canada's National Advisory Committee on SARS and Public Health, the U.S. Institute of Medicine, the World Health Organization, and Roy Romanow's Commission on the Future of Health Care in Canada have all urged governments to allocate greater attention and resources towards environmental health.

Studies published by Environmental Defence Canada in 2005 and 2006 revealed that a toxic cocktail of industrial chemicals contaminates the bodies of Canadians in all parts of the country and from all walks of life.⁵ Lab tests that screened volunteers for 88 chemicals detected an average of 44 in each person's body. These chemicals included 18 heavy metals, 14 PCBs, 10 organochlorine pesticides, seven volatile organic compounds, five PBDEs, five organophosphate pesticide metabolites, and one PFC. A study involving children produced similar results, with the level of toxins higher in the bodies of some children than in the bodies of their parents.⁶

Although this report details a number of environmental threats to health for Canadians, there are some signs of hope. Of note, in 2006, Health Canada and Environment Canada completed the preliminary assessment of 23,000 chemicals. Canadian regulators had never previously scrutinized these chemicals for their adverse health and environmental effects. They identified approximately 4,000 chemicals of concern that they will examine more closely. A new chemical substances management plan, unveiled in 2006, begins to immediately tackle 500 of the most hazardous substances. For 200 of these dangerous chemicals, industry must provide evidence that the chemicals can be used safely and that safer alternatives are not available. The government will prohibit these substances unless industry meets the burden of proof. There are no current Canadian uses for 150 of the 500 chemicals, and the government will not permit new uses for these chemicals unless industry can prove that they are safe and that safer alternatives do not exist. The government will permit the limited use of another 150 chemicals, but it will not permit new uses and it will encourage industry to find safer alternatives.¹⁹

Health Canada also recently revised the Canadian radon guideline to be more protective of human health, lowering the threshold for mitigation from 800 Bq/m³ to 200 Bq/m³. Radon is a naturally occurring radioactive gas that comes from the decay of uranium, which is distributed in varying concentrations throughout soil and rocks in Canada. Although it receives little public attention, radon is one of the most harmful forms of indoor air pollution in Canada. In fact, radon is the leading cause of lung cancer among non-smokers. The previous Canadian radon guideline dated back to 1970, and it was four to five times higher than guidelines in other western countries. While we recommend in this report that the guideline be further strengthened, the recent revision was long overdue and points in the right direction.²⁰

TABLE 1

**Twelve breakthrough studies in environmental health
(Published in 2006)****1. YOUR EXPOSURE TO TOXIC SUBSTANCES CAN HARM YOUR GRANDCHILDREN**

JOURNALS: *Endocrinology* and *Journal of Andrology*

New research has identified multi-generational effects of exposure to environmental toxins that operate not through genetic mutation but through a more subtle process that changes the way that genes work. When pregnant mice were exposed to vinclozolin (a pesticide that is known to disrupt the endocrine system), four generations of male offspring experienced reduced sperm production. The authors observe: "If the exposure of your grandmother at mid-gestation to environmental toxins can cause a disease state in you with no exposure, and you will pass it on to your grandchildren, the potential hazards of environmental toxins need to be rigorously assessed. Trans-generational studies need to be performed in evaluating the toxicology of environmental compounds."⁷

2. PESTICIDE EXPOSURES INCREASE RISK OF PARKINSON'S DISEASE

JOURNAL: *Annals of Neurology*

A new study examined the relationship between pesticide exposure and Parkinson's disease in more than 140,000 people. Exposure to pesticides, even at low levels, increased by 70 per cent the likelihood that an individual would suffer from Parkinson's disease, compared to individuals who had not been exposed to pesticides.⁸

3. LEAD EXPOSURE INCREASES RISK OF HEART ATTACK AND STROKE

JOURNAL: *Circulation*

Compared to adults with low levels of lead in their blood, adults with elevated blood lead levels are two-and-a-half times more likely to die of a heart attack, 89 per cent more likely to die of a stroke, and 55 per cent more likely to die of cardiovascular disease. More than one-third of American adults have blood lead levels in the elevated range.⁹

4. A CHEMICAL IN ANTIBACTERIAL SOAP DISRUPTS THE ENDOCRINE SYSTEM

JOURNAL: *Aquatic Toxicology*

Triclosan is widely used in antibacterial soaps in Canada and in the U.S. However, triclosan is structurally similar to toxic substances such as PCBs and PBDEs. Researchers discovered that exposure to triclosan at very low levels, similar to those found in many streams and rivers, can disrupt the endocrine system of frogs, resulting in abnormal development. Triclosan bioaccumulates in fish and it has also been detected in human breast milk.¹⁰

5. LIVING NEAR MAJOR ROADS AFFECTS CHILDREN'S LUNG DEVELOPMENT

JOURNAL: *The Lancet*

A study in California evaluated the effects of traffic-related air pollution on the development of children's lungs. More than 3,600 children were studied for a period of eight years. The researchers concluded that exposure to freeway traffic airborne contaminants harm the development of children's lungs and leads to decreased lung function later in life. The adverse effects were most pronounced among children living within 500 meters of a freeway.¹¹

TABLE 1 CONTINUED

6. NANOTECHNOLOGY PARTICLES CAN HAVE A WIDE RANGE OF TOXIC EFFECTS*JOURNAL: Wisconsin Medical Journal*

Nanotechnology is a rapidly growing field that involves the manufacture and use of material at a scale of less than 100 nanometers. (To put this in perspective, consider that a single sheet of paper is 100,000 nanometers thick.) Nanoparticles of titanium dioxide are used in cosmetic products such as sunscreen and toothpaste. Although there is still a dearth of knowledge about the potential adverse effects of nanotechnology, early toxicological evidence raises serious concerns. Nanoparticles can penetrate the skin and the blood-brain barrier. Scientists have observed genetic damage, respiratory disease, cardiovascular disease, and cancer in laboratory animals that are exposed to nanoparticles.¹²

7. PRENATAL EXPOSURE TO TOXIC CHEMICALS CAN CAUSE CANCER IN ADULTS*JOURNAL: Reproductive Toxicology*

Scientists exposed pregnant rats to extremely low doses of Bisphenol A, a substance widely used in plastic products. The prenatal exposure to Bisphenol A resulted in a higher risk of breast cancer among the rats' offspring when they reached adulthood.¹³

8. TINY METAL PARTICLES IN AIR POLLUTION CAUSE LUNG CANCER*JOURNAL: Journal of Thoracic Oncology*

Researchers in Texas discovered that metal particles found in particulate matter air pollution, especially zinc and chromium, are linked to lung cancer.¹⁴

9. ORGANIC DIETS LOWER CHILDREN'S EXPOSURE TO PESTICIDES*JOURNAL: Environmental Health Perspectives*

This study concluded that children who switch from conventional food grown with pesticides to an organic diet have "immediate and dramatic" protection against the adverse health effects of exposure to pesticides.¹⁵

10. MAINTAINING HEALTHY POPULATIONS OF NATIVE BIRD SPECIES PREVENTS SPREAD OF WEST NILE VIRUS*JOURNAL: Proceedings of the Royal Society B: Biological Science*

Scientists discovered that higher levels of native bird diversity are strongly associated with lower levels of West Nile virus prevalence in both humans and mosquitoes.¹⁶

11. EATING RED MEAT INCREASES THE RISK OF BREAST CANCER FOR YOUNG WOMEN*JOURNAL: Archives of Internal Medicine*

A study of more than 90,000 premenopausal women found a strong association between higher red meat consumption and an elevated risk of certain forms of breast cancer.¹⁷

12. PARTICLES IN AIR POLLUTION TRIGGER CARDIAC ARRHYTHMIAS*JOURNAL: Journal of Occupational & Environmental Medicine*

Studies in the U.S. and in Germany have found that elevated levels of air pollution, especially fine- and ultra-fine particulate matter, can disrupt normal heart functioning and can increase the risk of cardiac arrhythmias.¹⁸

Although the new chemical substances management plan, the revisions to the radon guideline, and other initiatives indicate good intentions, these policy changes are made in the absence of an overall health and environment framework, making it difficult, if not impossible, to rationally establish priorities. The federal government continues to move in an ad hoc, fragmented, and reactive manner. As individuals and families, we can take some steps to safeguard our health, but it is impossible to protect ourselves and our children from many environmental threats. The David Suzuki Foundation urges the federal government to develop and implement a national environmental health strategy in order to address these pressing concerns in a coordinated, effective, and timely fashion.

The Health Effects of Environmental Hazards

We need to define *environmental impacts on human health*. The failure to clearly define this term has contributed to public misunderstanding – and in some cases it has exaggerated fears – about the connection between the environment and health. For example, it has been reported that up to 90 per cent of cancers in Canada and other industrialized nations are due to environmental factors. This potentially misleading statistic originates from medical studies that indicate that less than 10 per cent of cancers are caused by genetic factors unique to specific individuals. Defined as broadly as possible, the remaining 90 per cent of cancers are described as being caused by all factors outside of individual genetic characteristics. Using this broad definition, “environmental” factors would then include factors such as fitness, diet, lifestyle, occupation, and socio-economic status.²¹

This non-specific definition is at odds with the narrower, conventional understanding that defines environmental factors affecting human health as pollution and damage to the natural environment, for example. The latter definition forms the basis of this report. It is important to emphasize that the majority of adverse environmental impacts on human health are preventable.

This study considers the key environmental health issues in Canada, including indoor air pollution, outdoor air pollution, water pollution, industrial chemicals, heavy metals, pesticides, toxic substances in consumer products, climate change, ozone depletion, and declining biodiversity. The full report examines each issue in terms of its impact on human health, drawing on scientific literature and government reports. We also assess the shortcomings in Canadian environmental policy in these areas, and we compare them to the progressive environmental policies adopted by other nations.¹

Genetics loads the gun, but environment pulls the trigger.

– JUDITH STERN,
UNIVERSITY OF
CALIFORNIA, DAVIS

¹ See chapters 2 through 6 of the full report, available at: www.davidsuzuki.org/publications

PAYING A HIGH PRICE: THE ECONOMIC COSTS OF ENVIRONMENTAL HEALTH HAZARDS

- In 2001, the Organization for Economic Co-operation and Development estimated that environmental impacts on health (e.g., school absenteeism, reduced quality of life, reduced productivity, large liability claims) cost Canada between \$35 billion and \$40 billion a year.²²
- The Ontario Medical Association estimated that each year air pollution causes \$374 million in lost productivity and work time, \$507 million in direct health care costs, \$537 million in pain and suffering due to non-fatal illness, and \$6.4 billion in social welfare loss due to premature death in Ontario alone.²³
- Government estimates of the potential health benefits of achieving better overall air quality in Canada range from \$8 billion to \$24 billion over 20 years.²⁴
- Health Canada estimated that the direct health care costs and lost productivity caused by environmental factors add up to between \$46 billion and \$52 billion a year.²⁵
- A 2005 study of the U.S. Acid Rain Program identified annual benefits of US\$122 billion and annual costs of just US\$3 billion. The study suggested that Canada would gain \$6 billion in health and environmental benefits annually by 2010, including 1,000 avoided premature deaths, because of the American program.²⁶
- Researchers at McMaster University identified strong correlations between pollution, municipal expenditures on environmental protection, and health care costs. Annual health care expenditures are higher – by as much as \$355 per capita – in areas with high levels of pollution, and lower – by as much as \$200 per capita – in municipalities that invest more in environmental protection.²⁷



The Prescription: An Environmental Health Strategy for Canada

To ensure a healthy future for Canadians and our environment, the David Suzuki Foundation calls for the immediate development and effective implementation of a national environmental health strategy. This strategy must embody a commitment to catching up: environmental hazards known to adversely impact Canadians' health require immediate attention. It must be a national strategy to ensure collaboration and coordination among all levels of government.

We identified five priority areas that a national environmental health strategy would address:

- I. Improve research and monitoring
- II. Strengthen laws, regulations, and policies
- III. Build professional capacity and raise public awareness
- IV. Confront the unjust distribution of environmental harms and protect vulnerable populations
- V. Prioritize environmental health on the international stage

This report summarizes our recommendations for achieving progress in each of these key areas. Of course, this list is not exhaustive. We call on the prime minister and the federal ministers of health and environment, in collaboration with their provincial and territorial counterparts, to initiate a process for developing and implementing the national environmental health strategy. This process should engage the expertise of key civil society groups (e.g., health professionals, academics, environmentalists, Aboriginal communities, labour unions, and community organizers). It should also include opportunities for broad, public involvement. Canada's national environmental health strategy should provide for the regular review of priorities and achievements.

Most industrialized nations, including the U.S., Australia, and all western European countries have already committed to the development and the implementation of environmental health strategies or action plans. These international examples can serve as models for Canada.

We recognize that the process of refining a national environmental health strategy will take time. Nonetheless, implementing the action items highlighted below should not be delayed. Governments, businesses, medical professionals, and individuals must undertake a sustained and coordinated effort over the course of the next generation in order to alleviate the substantial environmental health impacts from which Canadians are currently suffering. In the absence of a sustained effort, the implication is that our children and our grandchildren will inherit a nation, and indeed a world, where environmental impacts on health will be even worse than they are today. Surely we can do better.

Priority Area I

IMPROVE MONITORING AND RESEARCH

The extent of our knowledge about environmental impacts on human health is dwarfed by what we do not know. There are three general categories of information required to protect the health of Canadians from environmental threats. First, we need data on environmental hazards. What harmful substances, in what quantities, and in what locations, are present in our environment, and where are they coming from? Second, we need data on human exposures to environmental hazards. What harmful substances are entering our bodies, in what concentrations, and along which pathways (e.g., air, water, food, skin)? Third, we need to understand the relationships between human exposures to environmental threats and the adverse health effects that may occur as a result of these exposures. Canada faces serious gaps in its knowledge of these three critical categories. In part, these gaps exist because resources allocated to environmental health research in Canada are relatively meagre compared to other wealthy industrialized nations. Due to these knowledge gaps, the government is unable to rationally establish priorities or to make the informed policy and regulatory decisions that are necessary to protect Canadians from environmental threats.

WHAT DOES CANADA NEED TO DO?

- **Conduct comprehensive, national biomonitoring studies.** Biomonitoring studies measure the environmental pollutants in people, including the substances formed when chemicals are metabolized, and the substances formed through chemical reactions in the body. Unlike the U.S., which has conducted extensive biomonitoring studies for hundreds of environmental contaminants since the 1990s,²⁸ Canada does not systematically collect even the most basic information about the chemicals that enter our bodies and about the routes of exposure. The province of Alberta recently began the largest biomonitoring study of its kind in Canada. Alberta is testing the blood of more than 30,000 children and pregnant women to determine which pollutants are contaminating their bodies, and it expects to release the study results later in 2007.²⁹ The federal government has announced an initial national study, beginning in 2008, on a limited subset of chemicals of concern. These new programs should be expanded and extended to provide comprehensive, ongoing exposure data. A critical weakness of the new national study is the exclusion of children under the age of six. Biomonitoring studies should be designed to enable the analysis of environmental exposures impacting

Currently there are many gaps in the knowledge base regarding the toxicity of chemicals and Canadians' exposure to them.

– HOUSE OF COMMONS
STANDING COMMITTEE
ON ENVIRONMENT
AND SUSTAINABLE
DEVELOPMENT (2007)

vulnerable subpopulations, such as young children and Aboriginal communities, as well as the general population.

A national study of lead levels in the blood of Canadian children is an urgent priority.³⁰ Such a study should focus on children living in environments known to present elevated risks of exposure, including older homes (lead paint in older homes has been linked to elevated blood lead levels in U.S. studies),³¹ areas where there are known problems with lead pipes in the drinking water infrastructure, and Aboriginal communities.

The biomonitoring program should also study individuals newly diagnosed with diseases having suspected or confirmed environmental causes (e.g., some cancers, neurological and developmental problems, etc.) in order to assess patients' environmental exposures.

The results of biomonitoring studies should be published regularly and they should be easily accessible to researchers, health professionals, governmental agencies, and the public at large.

- **Establish a national environmental health tracking system.** The federal government, in partnership with the provinces, should establish a national environmental health tracking system to monitor environmental hazards, environmental exposures, and health impacts. This health tracking system should include national databases to integrate provincial records of:
 - Boil water advisories and water-borne disease outbreaks (as recommended by Environment Canada³² and the Walkerton Inquiry³³); and
 - Poisonings caused by pesticides, cosmetics, household cleaners, and other products (as recommended by the Commission on Environmental Co-operation³⁴).

The national environmental health tracking system should also capture information about hospital admissions caused by cardiovascular and respiratory illnesses that are related to air quality, learning and behavioural disabilities, childhood cancers, reproductive health outcomes, and other health issues. This information should be publicly accessible to help inform and shape public health policies and actions. The U.S. recently began building a national environmental health tracking system, and it also maintains a poisoning database – both of which could serve as models for Canada.^{35, 36}

- **Pursue real-time, continuous monitoring of air quality and water treatment processes.** Environment Canada's Air Quality Health Index, now being piloted in Toronto, should be expanded to urban centres across Canada, as planned. This tool will help to assess health risks from air pollution, based on hourly air quality readings and forecasts.³⁷

Federal funding should also be provided to develop cost-effective, real-time continuous monitoring of water treatment processes to provide an early warning of possible treatment failure. The Walkerton Inquiry recommended real-time continuous monitoring.³⁸ The U.S. Environmental Protection Agency is already investing significant resources in this area,³⁹ and Canadian research could be designed to be complementary.

- **Conduct a national study to assess the overall environmental burden of disease in Canada.** A national study that would estimate the magnitude of mortality and morbidity caused by environmental hazards would provide valuable information that could be used to direct research, to inform public education efforts, to assist physicians in providing advice to patients, and to guide health and environmental policy-making. Environmental health specialists across Canada identified this recommendation as a research priority of “high importance” to policy-makers.⁴⁰
- **Increase funding for health and environment research.** Canada must increase funding for research on health and environment issues through the Canadian Institutes of Health Research, the National Research Council, Health Canada, the Social Sciences and Humanities Research Council, and the Natural Science and Engineering Research Council. Research should focus on informing public policy and assisting medical professionals by: identifying pathways from hazards to exposures; understanding the effects of these exposures on health; identifying vulnerable subpopulations; and exploring the health effects of new substances, substances in combination, and gene-environment interactions. Research grants should promote theoretical and methodological diversity, and the interdisciplinary study of the complexity of influences on environmental health (e.g. socio-economic factors, governance issues).

In addition, Canada should significantly increase support for the new National Collaborating Centre for Environmental Health (NCCEH), which is designed to facilitate the exchange of knowledge, identify gaps in research, and practice and build capacity among health practitioners, policy-makers, and researchers. Ongoing support for the work of the NCCEH is critical, as is action on the environmental hazards NCCEH identifies as major risk factors for illness in Canada. The federal government established the NCCEH with minimal funding in 2004. At \$1.5 million, its annual budget is a mere fraction of the resources invested in parallel U.S. institutes. In 2006, the U.S. National Institute of Environmental Health Sciences budget was US\$647,608,000, while the U.S. National Center for Environmental Health budget for 2006 was US\$148,000,000.

As part of an enhanced environmental health research agenda, Canada should participate in the U.S. National Children’s Study, the world’s largest longitudinal birth cohort study on children’s health and the environment (see box).⁴¹

- **Develop and publicize environmental health indicators.** Canada should develop a robust set of environmental health indicators, building on research conducted in the U.S., Europe, and Australia.⁴² Publicizing these indicators would ensure accountability by enabling Canadians to monitor progress, and it would also help to educate the public.

THE U.S. NATIONAL CHILDREN'S STUDY

Many crucial questions about childhood disease remain unanswered, despite advances in children's health over the past century. Thousands of Canadian children continue to suffer from preventable illnesses such as asthma, leukemia, and developmental disorders. The U.S. National Children's Study, designed by the world's leading experts – including Canadian researchers – hopes to answer these questions. Researchers will follow more than 100,000 children, their families, and their environment from before birth until the age of 21. Researchers will examine natural and man-made environmental factors, biological and chemical factors, social factors, behavioural influences and outcomes, cultural differences, and geographic locations in order to better understand the role that these factors play in the development of diseases.⁴³

The study results will likely inform child health policies and practices for generations to come, and they will help us to better understand what can harm and what can help children's health. This is a timely and vital study, especially considering the increasing rates of asthma and developmental disorders (e.g., attention deficit disorder), increasing concerns about widely used chemicals such as PBDEs and phthalates (i.e., fire retardants and plasticizers), and recent insights into children's vulnerability to environmental contaminants.

The Canadian government has not agreed to participate in the study, even though the U.S. has repeatedly invited its northern neighbour to do so. Canada is environmentally, socially, culturally, and economically distinct from the U.S. Involving Canadian children in the study would provide special Canadian insights and it would strengthen the study results. The U.S. National Children's Study will cost approximately US\$100 million per year, suggesting that the Canadian component (a cohort of 10,000 Canadian children) would cost between C\$10 million and C\$12 million per year.⁴⁴ This is a small price to pay to fulfill every child's right to grow up in a healthy environment. It is also less expensive than having Canada pursue a similar, but independent study. The expected benefits from health care savings, increased productivity, and improved quality of life will dwarf the costs of the study.

Priority Area II

STRENGTHEN LAWS, REGULATIONS, AND POLICIES

Despite repeated calls for action by the public, medical experts, scientists, and environmental groups, the Canadian government has failed to enact strong and effective laws, regulations, and policies to protect Canadians from toxic substances. Canada lags behind other wealthy, industrialized nations, such as the U.S. and Australia, in addressing the environmental impacts on health. European nations such as Sweden, Finland, Germany, the United Kingdom, and the Netherlands are even further ahead, as they have already made health and the environment cornerstones of their national sustainable development strategies.⁴⁵ Canada often relies on weak, ineffective, and voluntary measures to manage releases of harmful chemicals. It is unacceptable that our country has fallen so far behind other industrialized nations when it comes to protecting both the health of its citizens and the environment. Canadians deserve a level of protection from environmental threats to health that is on par with the leading international standards.

WHAT DOES CANADA NEED TO DO?

- **Establish ambitious goals and timelines for environmental health.** Canada's national environmental health strategy must include a comprehensive set of short-term, medium-term, and long-term environmental objectives, including specific targets and timelines for environmental health outcomes. The federal government should regularly report on progress made towards meeting the targets and objectives, and it should incorporate new information that is generated by the monitoring and research agenda outlined above.
- **Strengthen laws to protect all Canadians from environmental hazards in air, water, food, and consumer products.** Canadian environmental laws need to be strengthened, effectively implemented, and aggressively enforced in order to adequately protect human health from environmental hazards. Two overarching principles should guide this process:

- **The Precautionary Principle.** This means that, "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."⁴⁶ Because it is often challenging to reach definitive conclusions about environmental impacts on human health, the application of the precautionary principle is critical in addressing uncertainty. Canada needs to consistently apply the precautionary principle in decisions involving potential health and environmental effects.
- **The Substitution Principle.** All environmental laws in Canada should explicitly require that safer alternatives replace toxic products, processes, and inputs. The substitution principle is found in Swedish chemicals legislation and was recently endorsed by the parliamentary committee that led the five-year review of the *Canadian Environmental Protection Act* (CEPA).⁴⁷ Even large corporations, spurred on by imminent regulatory changes, are beginning to apply this principle. For example, Wal-Mart is phasing out 20 hazardous chemicals used in pesticides, cleaning products, and other household items. Loblaw's no longer sells chemical pesticides at its garden centres, and it markets natural alternatives instead.

In particular, amendments are needed to three cornerstones of environmental/consumer safety legislation: the *Canadian Environmental Protection Act 1999*, the *Pest Control Products Act*, and the *Hazardous Products Act*.

a) Canadian Environmental Protection Act, 1999

Canada should use the *Canadian Environmental Protection Act, 1999* to phase out the manufacture, use, production, sale, import, or release of substances when it is known or probable that these substances cause: cancer; birth defects; abnormal development; damage to the brain; damage to the nervous, immune, or reproductive systems; or interference with the hormone system. In 1995, the Ontario Task Force on the Primary Prevention of Cancer recommended that the government set timetables to eliminate carcinogens, chlorine, and

In Europe, governments have clearly applied the precautionary principle more rigorously than in Canada.

– HOUSE OF COMMONS
STANDING COMMITTEE
ON ENVIRONMENT AND
SUSTAINABLE
DEVELOPMENT (2007)

persistent, bioaccumulative toxic substances. As the Task Force concluded, “the only prudent approach to safeguarding the health of the public from known and suspected environmental carcinogens is to be precautionary while the necessary research efforts are being made to resolve the uncertainty.”⁴⁸

Historically, the Canadian approach to regulation has been to consider chemicals “innocent until proven guilty.” Canada should follow Sweden’s example and prohibit substances that have not been tested for human health impacts.⁴⁹ This measure would reverse the burden of proof and require a toxicological safety evaluation *before* substances are permitted on the market. All products should be tested for their carcinogenic, mutagenic, endocrine-disrupting, neurotoxic, and developmental effects.

In addition, the National Pollutant Release Inventory (NPRI) should be expanded to cover a broader range of toxic substances and Environment Canada should be required to conduct audits of the releases reported by industry. The NPRI tracks the release of toxic chemicals by major polluters. However, it covers only about 300 of the thousands of chemicals permitted in Canada. More ominously, the NPRI may encourage companies to switch to chemicals that are not covered by the NPRI, or to lower volume but more toxic chemicals.

Parliament should endorse these initiatives to improve the effectiveness of CEPA in the context of the *Act’s* five-year review, which is currently underway.

b) Pest Control Products Act

Pending a mandatory special review by a panel of independent experts, the *Pest Control Products Act* (PCPA) should be amended to require the immediate suspension of the registration of pesticides that are prohibited by other member countries of the Organization for Economic Co-Cooperation and Development for health and environmental reasons. This would result in the suspension and study of at least 50 active ingredients used in approximately 1,000 pesticide products in Canada. For example, atrazine has been banned in the European Union.⁵⁰ Studies show that this chemical causes reproductive abnormalities in frogs that are exposed to very low doses (i.e., at levels exceeded in some Ontario drinking water). Atrazine is one of the most heavily used pesticides in Ontario – about 500,000 kilograms are applied annually. In 1995, the Ontario Task Force on the Primary Prevention of Cancer recommended banning atrazine.

The PCPA should also be amended to phase out the registration of lawn and garden pesticides, as recommended by the Canadian Cancer Society.⁵¹ More than 125 Canadian municipalities, as well as the province of Quebec, have passed laws restricting the use of so-called cosmetic pesticides.⁵² All Canadians deserve the same level of protection from pesticides. Children are especially vulnerable to unintentional pesticide poisoning.⁵³

NEGLECTED BY THE NPRI

Canada’s National Pollutant Release Inventory (NPRI) fails to require reporting on the following toxic substances:

- PBDEs and other chemical threats posed by consumer products;
- Many endocrine disrupting substances;
- Pollution from mobile sources, such as cars and trucks, including aldehydes produced by the combustion of ethanol;
- New products generated by nanotechnology and biotechnology;
- Pollution from agricultural operations or urban run-off;
- Pollution from sources such as dry cleaners, gas stations, and small manufacturing facilities.

c) Hazardous Products Act

The Hazardous Products Act is badly outdated and needs a major overhaul. The Act should be amended to authorize the mandatory recall of consumer products that Health Canada deems hazardous to human health (e.g., electronics and home furnishings containing PBDEs, non-stick cookware containing per-fluorochemicals, products containing lead). As an interim step, Canada should require the mandatory labelling of all consumer products (including foods) with particular emphasis on synthetic chemicals and heavy metals known or suspected of causing: cancer; birth defects; abnormal development; damage to the brain; damage to the nervous, immune, or reproductive systems; or interference with the hormone system. The Canadian Strategy for Cancer Control has recommended legislation that would require the full disclosure of all known and probable carcinogens in consumer products, including pesticides.⁵⁴ Similar labelling requirements already exist in Europe and California, and they could serve as models for Canada.

- **Raise all health and environmental standards to meet or exceed international best practices.** Canada should take immediate steps to raise health and environmental standards that currently fail to reflect international best practices. A comprehensive comparative review of regulatory standards may be necessary to identify areas in which Canadian environment and health standards are less protective than those of other industrialized countries. As a starting point, this report highlights deficiencies in Canada's regulation of the following substances:
 - **Pesticides.** Canada continues to register pesticides that other nations have banned for health and environmental reasons. This signals a systematic weakness in Canada's pesticide evaluation process that should be addressed. Also, Canadian Maximum Residue Limits, which determine the quantity of pesticides permitted on food, are significantly weaker than pesticide residue limits for other nations – in some cases, by several orders of magnitude. For example, Canada allows up to 1,400 times the European limit for a specific pesticide on particular foods (e.g., methoxychlor on fruits and vegetables).⁵⁵ Maximum residue limits should be upgraded if they are found to be less protective than the standards that other countries enforce.
 - **Ambient air quality.** Unlike the U.S., Australia, and Europe, Canada does not have legally binding national standards for ambient air quality.⁵⁶ Instead, Canada has voluntary guidelines that set less protective targets compared to the legally binding standards of other industrialized nations for ozone, particulate matter, sulphur oxides, nitrogen oxides, and carbon monoxide. The federal government should replace existing, voluntary guidelines with health-based, national standards that are legally binding – as in the U.S., Australia, and the European Union. The new standards should be at least as stringent as the leading international standard.

- **Drinking water.** Canada's guidelines for drinking water quality are voluntary, quantitatively weaker, and less comprehensive than those in other jurisdictions. A recent study identified 55 contaminants for which Canada has weaker guidelines than at least one other jurisdiction (the U.S., the European Union, or Australia) or to the World Health Organization recommendation. These contaminants include bacteria, pesticides, carcinogenic industrial chemicals, disinfection by-products, naturally occurring toxic substances, and radioactive discharges from nuclear reactors.⁵⁷ The federal government should replace existing voluntary guidelines with health-based, national standards that are legally binding – as in the U.S. and the European Union. The new standards should be at least as stringent as the leading international standard.
- **PBDEs.** Polybrominated diphenyl ethers are a group of industrial chemicals widely used as fire retardants. These chemicals are accumulating in the environment, wildlife, and humans at an alarming rate. While European countries and some U.S. states now regulate PBDEs, Canada does not.⁵⁸ Canada recently published a proposal to prohibit the import of a subgroup of PBDEs, but the proposal applies only to PBDEs that are no longer commercially available. The most widely used chemical in this class, decaBDE, would not be subject to this regulation. Environment Canada's proposed PBDE regulations should be extended to prohibit the import, use, and sale of *all* PBDEs and all products containing them – as in Sweden and the U.S. states of Maine and Washington.
- **PFC's.** Perfluorochemicals are a complex group of chemicals (including PFOS and PFOA), widely used as stain repellents and in making non-stick coatings. Many PFCs are toxic, persistent, and bioaccumulative. The PFCs that have been detected in the bodies of Canadians most likely come from consumer products.⁵⁹ Sweden and the United Kingdom have already banned PFOS, and Sweden is advocating for a global ban. Other European nations and the U.S. are phasing out PFOA.⁶⁰ Initially, Canada showed leadership in this area by temporarily banning four chemicals that are precursors to PFCs, meaning that they transform into PFCs through decay or chemical reaction. However, the proposed regulations that would make this prohibition permanent are narrow in scope, and they will continue to allow imported products that contain these precursors.⁶¹ Canada's action plan for other PFCs is undermined by several weaknesses, including the failure to address consumer products or PFOA. Canada should replace the current piecemeal approach to PFCs with a regulation that prohibits the manufacture, import, sale, and use of *all* PFCs.
- **Radon.** Radon protection measures should be incorporated into all building codes in Canada – as in Denmark, Ireland, Sweden, and the United Kingdom.⁶² In addition, Health Canada should further strengthen its new radon guideline, lowering the threshold for recommended mitigation from 200 Bq/m³ to 100 Bq/m³.
- **Lead.** Despite the known hazards of low-level lead poisoning, Canada still does not have a national program to reduce children's exposure to lead. In contrast, in

GOOD NEWS
FOR A CHANGE:
STRONG
REGULATIONS
PRODUCE POSITIVE
RESULTS

Strong regulatory action can produce swift results. Sweden banned PBDEs after Swedish scientists discovered that concentrations of PBDEs in women's breast milk were doubling every five years. Subsequently, there was a rapid decline in the concentration of PBDEs in the breast milk of Swedish women, and no noticeable negative economic impacts on Swedish society. Furthermore, Swedish cancer experts believe that early regulatory action on pesticides and other toxic substances by the Swedish government may have contributed to declining rates of some cancers, particularly non-Hodgkins lymphoma.

Despite progress, lead poisoning remains one of the top childhood environmental health problems today. Without further action, over the coming decades, large numbers of young children may be exposed to lead in amounts that could impair their ability to learn and to reach their full potential.

– U.S. PRESIDENT'S
TASK FORCE ON
ENVIRONMENTAL
HEALTH RISKS AND
SAFETY RISK TO
CHILDREN (2000)

the U.S., the President's Task Force on Environmental Health Risks and Safety Risks to Children developed a strategy to eliminate, by 2010, lead paint hazards in housing occupied by children under the age of six. Canada should follow this example and implement a national lead exposure reduction program, with a particular focus on older housing stock in low-income areas and other hotspots, as one in four Canadian children under the age of five lives in a home where lead paint may pose a threat.⁶³ Also, regulations under the *Food and Drug Act* currently allow lead concentrations in apple juice at levels twenty times higher than permissible in drinking water. These regulations should be amended immediately.

- **Phthalates and Nonylphenols.** Canada has not enacted regulatory restrictions on either phthalates or nonylphenols, despite growing concerns that these chemical additives can disrupt the normal functioning of the human hormone system. The European Union has banned the use of phthalates in cosmetic products, toys, and other children's products, and it has also banned nonylphenols in cleaning products because of concerns about their effects on human health.⁶⁴ Canada should adopt similar regulations.
- **PAHs.** Polycyclic aromatic hydrocarbons are a mixture of organic compounds that are released into the atmosphere as gases or particles during the incomplete combustion of organic materials, including fossil fuels. Health effects include cancer, cardiovascular and respiratory problems, and negative impacts on birth outcomes. Canada should regulate PAH emissions from diesel engines – as in California,⁶⁵ Australia,⁶⁶ and the European Union.⁶⁷
- **Implement a national tax on polluters and eliminate perverse subsidies.** We need to overcome the market's failure to put a price on damage to the environment and to reflect the value inherent in environmental and human health. Pollution taxes are the most effective, efficient, and equitable way of addressing the first failure and of implementing the "polluter pays" principle. European countries have successfully used pollution taxes to reduce the release of toxic chemicals into bodies of water, the use of pesticides, and air pollution.⁶⁸ For example, Sweden used a tax on sulphur to reduce sulphur dioxide emissions by more than 80 per cent – to levels that are one-eighth of the per capita level of sulphur dioxide emissions in Canada.⁶⁹ Data on pollutant releases gathered by the National Pollutant Release Inventory could serve as the basis for such a policy in Canada. Pollution taxes could initially be modest and increase with time. The revenue collected from a Canadian pollution tax could be used to finance a just transition strategy for workers who lose jobs due to the elimination of toxic substances. The Ontario Task Force on the Primary Prevention of Cancer recommended such a pollution tax and transition strategy in 1995.⁷⁰ Alternatively, the pollution tax could be made revenue neutral by concurrently reducing income and employment taxes.

In addition, the government must end programs that support or encourage activities that cause environmental harm (i.e., perverse subsidies). For example, Canada should remove the current GST exemption for agricultural pesticides and impose a special charge on pesticides. This would help to finance programs that support organic

agriculture, assist farmers in reducing pesticide use, and promote local food distribution systems, such as farmers' markets.

- **Enact extended producer responsibility (EPR) legislation.** EPR laws require manufacturers to assume responsibility for their products when consumers no longer want them. Manufacturers internalize the life-cycle environmental costs of their products, thus driving innovations in manufacturing and packaging that, in turn, reduce these costs. European EPR laws also explicitly require manufacturers to eliminate the use of toxic substances, to reduce packaging, and to ensure that an increasing percentage of their products are recycled. For example, by 2015, 95 per cent of European motor vehicles must be composed of materials that can be recycled, reused, or recovered.⁷¹
- **Require health assessments of proposed developments, policies, and programs.** The *Canadian Environmental Assessment Act* should be amended to require that all environmental assessments consider the human health impacts of proposed developments, policies, programs, and legislation; and to require the evaluation of the potential environmental impacts on vulnerable populations.⁷²
- **Implement healthy procurement policies at all levels of government.** Governments at all levels should adopt procurement policies that require healthy purchases, such as chlorine-free recycled paper; hybrid and other ultra-low or zero-emission vehicles; buildings that meet Leadership in Energy and Environmental Design (LEED) standards; appliances, computers, and other electrical equipment that meet ENERGY STAR ratings; plastic products that do not contain polyvinyl chloride or Bisphenol A; and green cleaning products.
- **Implement effective policies to address climate change and to accelerate the transition to an energy-efficient, low-carbon economy.** Canada must stop treating the atmosphere like a free dumping ground for greenhouse gas emissions. Strong regulations that limit emissions from all sectors should be implemented immediately, along with economic instruments that put a price on carbon and that make polluters pay. Canada must start reducing total greenhouse gas emissions now in order to achieve at least an 80 per cent reduction below 1990 levels by 2050. As well, Canada should play a constructive role in ensuring that international agreements in the post-Kyoto era are strong enough to achieve global reduction goals.
- **Adopt “Community Right-to-Know” (CRTK) legislation and bylaws.** All levels of government should recognize that citizens have the right to know about the toxic chemicals that are used, stored, and released in their neighbourhoods, and should collaborate in order to ensure that this information is easily accessible. The proposal for a CRTK bylaw in Toronto could serve as a model for other municipalities, while CRTK legislation in U.S. states could serve as a model for Canadian provinces. At the federal level, improvements to the National Pollutant Release Inventory, as recommended above, would facilitate CRTK efforts. Canadian environmental laws should be amended to require corporations to publicize the results of all epidemiological, toxicological, and other health studies related to their products.

- **Recognize that Canadians have the right to live in a healthy environment.** The federal government should recognize that all Canadians enjoy a basic human right to breathe clean air, to drink clean water, and to live in a healthy environment. The Supreme Court of Canada has endorsed the recognition of the right to live in a healthy environment.⁷³ More than 70 nations, including at least 20 European nations, have specifically acknowledged in their constitutions that all citizens have the right to live in a healthy environment. Canadians also need procedural rights, including access to information, participation in government decision-making, and access to judicial remedies.

Priority Area III

BUILD PROFESSIONAL CAPACITY AND RAISE PUBLIC AWARENESS

When it comes to protecting human health from environmental hazards, knowledge is power. One indication that Canada lags behind in the field of environmental health is the lack of a specialized, peer-reviewed medical journal devoted to Canadian environmental health issues. Governments must work with educational institutions and medical associations to ensure that training and professional development programs include an environmental health component. A national environmental health strategy should also develop effective mechanisms for sharing information among health professionals, and for conveying information to policy-makers and to the general public. Information-sharing initiatives should promote an understanding of environmental health problems and focus on publicizing solutions.

WHAT DOES CANADA NEED TO DO?

- **Promote the study of environmental health in training programs for health professionals.** The federal and provincial governments should support the development of curricula and teaching capacity in the field of environmental health. They should work with medical associations and academic institutions to integrate environmental health in medical, nursing, and public health study programs, as well as graduate programs specializing in environmental health.
- **Increase the number of environmental health specialists.** Canada needs more medical professionals with specialized training in environmental health. The national environmental health strategy should encourage universities, hospitals, public health departments, and industry to hire appropriately trained environmental health specialists.
- **Support professional development in the field of environmental health and application in clinical practices and public health programs.** Health Canada should approach medical associations and academic institutions to develop and promote opportunities for practising health professionals to receive training in environmental health issues, and information about how to integrate knowledge of these issues into day-to-day practice. Health Canada is currently developing modules for public health

professional development; this project should be expanded to include a module on environmental health.

- **Educate Canadians about environmental health.** Citizens must have access to information about environmental threats to health, in a user-friendly format, so that they can make better everyday decisions. The Public Health Agency of Canada, Health Canada, Environment Canada, and their provincial/territorial counterparts should make the dissemination of health and environmental health information a priority.⁷⁴ All levels of government should publicize information gathered from the enhanced research and monitoring efforts that are outlined in this report.

A user-friendly government website that posts pollution information by postal code should be developed.⁷⁵ The federal government should provide pollution data from the National Pollutant Release Inventory. The provincial and territorial governments should provide information on issues such as contaminated sites and landfills. Municipalities should post reports on drinking water quality, which provincial laws are beginning to require following the Walkerton disaster. Over time, such a website could develop into a single window, with all levels of government, businesses, and non-governmental organizations across the country sharing information on environmental health issues.

All levels of government should support organizations and coalitions that conduct outreach programs on environmental health. These include the Canadian Cancer Society, the Canadian Lung Association, the Canadian Institute for Child Health, the Learning Disabilities Association of Canada, the Canadian Association of Physicians for the Environment, the Canadian Partnership for Children's Health and the Environment, the Canadian Public Health Association, Pollution Probe, the Labour Environmental Alliance Society, and other allied national, provincial/territorial, and local groups.

Priority Area IV

CONFRONT THE UNJUST DISTRIBUTION OF ENVIRONMENTAL HARMS AND PROTECT VULNERABLE POPULATIONS

There is significant injustice in the distribution of environmental benefits and the risks associated with environmental hazards. The Government of Canada recently admitted that, "we know that some segments of our population are exposed to unacceptably high levels of environmental pollutants."⁷⁶ Vulnerable groups of Canadians include children, Aboriginal people, individuals with environmental sensitivities or compromised immune systems, and people experiencing social and economic disadvantages, such as poverty and homelessness. Often these factors operate in combination. Environmental hazards can have particularly dire consequences for the health of individuals facing compounded vulnerabilities (e.g., poor, aboriginal, pregnant women). The complex problem of environmental injustice requires special attention and action.

Children are especially vulnerable to environmental impacts on their health for a number of reasons. First, they face disproportionate levels of exposure to toxic substances because of their unique behaviour, diet, physiology, and metabolism. Second, environmental

exposures can cause developmental damage during windows of vulnerability, which are key stages of the developmental process during which children are particularly sensitive. Third, children will live longer than adults, so they will be exposed to environmental chemicals for a longer period of time. This, in turn, could result in adverse consequences, such as cancers that have long latency periods. Fourth, the natural defences of children's bodies, such as their ability to metabolize toxic substances into less harmful substances, are less developed. Fifth, children have limited knowledge of potential risks, and so they have limited ability to avoid risks to their health.⁷⁷

Yet, most Canadian environmental standards – to the extent that they incorporate health considerations – are designed to protect adults, not children, for whom more stringent standards are often needed.⁷⁸ The North American Commission for Environmental Cooperation recently published a report that concluded: “If we create an environment that is safe and healthful for children, possibly the most sensitive and vulnerable among us, we create an environment safe and healthful for all.”⁷⁹

If there is a Canadian analogy to the American experience of pollution and other environmental hazards disproportionately affecting poor minority communities (mainly African-American and Hispanic-American), then it lays in the toxic burden carried by Aboriginal people. Traditional diets make them especially vulnerable to mercury and other contaminants in fish, as well as other toxic chemicals in wildlife. Also, many Aboriginal communities are located close to contaminated sites.

Northern Canadians, especially Inuit living a traditional lifestyle, have body burdens of toxic chemicals that threaten both their health and the health of their children.^{80,81} For example, mercury levels in Inuit children are 10 times to 20 times higher than in the general Canadian population – high enough to cause neurological damage.⁸² Aboriginal people living on reserves also face severe drinking water contamination and indoor air quality problems.⁸³ Boil water advisories in Aboriginal communities last an average of six months. Housing conditions on Aboriginal reserves are generally terrible. Severe indoor air quality problems caused by mould, poor construction, and overcrowding are common.

Canadian studies confirm that poor communities in both rural and urban areas tend to face higher levels of pollution. For example, the steel-producing and coal-producing communities of Cape Breton County in Nova Scotia are both socio-economically disadvantaged, and among the most polluted areas in North America. The steel-producing communities have cancer rates that are far above the national average, while the coal-producing regions have lung disease and lung cancer rates that are far above the national average.⁸⁵ Low-income neighbourhoods in Hamilton suffer from a disproportionate amount of air pollution.⁸⁶ Similar environmental health studies in the U.S. spawned the birth of the environmental justice movement, which has become a potent force in promoting the equal protection of all Americans from environmental hazards, regardless of their economic status or the colour of their skin.⁸⁷ The time has come for Canada to incorporate environmental justice into its policy decisions.

WHAT DOES CANADA NEED TO DO?

- **Strengthen laws to protect vulnerable populations from toxic substances.** When it comes to establishing priorities, setting standards, and assessing health and environmental impacts, all Canadian health, safety, and environmental legislation should be amended to explicitly require the protection of children, pregnant women, people with compromised immune systems, migrant farm workers, Aboriginal communities and other vulnerable populations. The Canadian government should develop a working definition of, and guiding principles for, environmental equity, and apply these to current and future legislation.
- **Conduct or fund studies to identify populations at risk.** Health Canada and Environment Canada should collaborate and support research that will identify populations that face elevated risks from environmental hazards. Studies should be designed to promote and improve partnerships between governments, researchers and communities. Environment Canada's Northern Contaminants Program and the Vulnerable Populations Office within Health Canada's Safe Environments Programme have started conducting such research. This work should continue and be expanded to inform priorities and assess progress towards achieving environmental justice.
- **Clean up known environmental threats that pose a risk to vulnerable populations.** All levels of government must work together to establish ambitious targets and timelines to clean up contaminated sites that threaten the health of children, minorities, and economically disadvantaged communities. Examples include the chemical contamination in Sarnia, Ontario; dioxins in the Great Lakes; and air pollution in Cape Breton County, Nova Scotia.

WHERE HAVE ALL THE BOYS GONE?

Researchers are learning more about the disturbing long-term effects of toxic substances on the human reproductive system. A team of researchers is studying an Aboriginal community that lives downwind of Sarnia, Ontario, one of Canada's most notorious pollution hotspots because of its concentration of petrochemical, polymer, and chemical industries. The proportion of male babies born on the Aamjiwnaang Reserve has fallen from normal levels (slightly more than half of all births) since the early 1990s, to less than 35 per cent of births between 1999 and 2003. Researchers suspect that individuals in this community have been exposed to chemicals that have disrupted their reproductive systems. Many studies have demonstrated that exposure to environmental contaminants such as dioxins, PCBs, pesticides, and mercury can affect sex ratios.⁸⁴

- **Take urgent steps to provide adequate drinking water on Aboriginal and Inuit reserves.** The federal and provincial governments must effectively invest in drinking water infrastructure, training, distribution systems, testing, and monitoring. The Commissioner for the Environment and Sustainable Development noted in her 2005 audit that a regulatory regime is required to ensure that people who live on reserves have access to the same quality of drinking water as people who live off reserves. The

Commissioner recommended the development of regulations that set forth roles and responsibilities, water quality requirements, technical requirements, operator training and certification, compliance and enforcement, and public reporting requirements.

Priority Area V

PROMOTE ENVIRONMENTAL HEALTH ON THE INTERNATIONAL STAGE

Environmental contamination has a devastating effect on the health of people living in developing nations. Canada should promote sustainability on the international stage. One-quarter of the total burden of disease (calculated as years of healthy life lost to premature mortality, illness, and disability) in developing nations is attributable to environmental factors.⁸⁸ The environmental impacts on health experienced in Canada, although substantial, pale in comparison to the more severe and widespread impacts in developing countries. Problems with outdoor air quality, indoor air quality, and drinking water quality are far more egregious. Acute exposures to pesticides and industrial chemicals are far more pervasive. The short-term impacts of climate change, such as more extreme weather events, changing patterns of disease, and changing patterns in agriculture, cause about 150,000 deaths per year.⁸⁹ A study published by the British medical journal, *The Lancet*, estimates that 700,000 people around the world will die prematurely by 2020 if policies to mitigate climate change are not successfully implemented.⁹⁰

As developing countries increase their populations and experience rapid economic growth, the already enormous toll of preventable environmental hazards on global health will likely increase in the decades ahead – unless preventive and remedial steps are taken immediately. As one of the wealthiest and healthiest nations in the world, Canada has a moral responsibility to foster collaboration and common purpose around a sustainable future. To the government's credit, Canada led the development of the Health and Environment Linkages Initiative, which is now run by the World Health Organization and the United Nations Environment Program. The Health and Environment Linkages Initiative is a global effort to reduce environmental threats to human health in developing nations. Still, Canada must do more.

WHAT DOES CANADA NEED TO DO?

- **Prioritize environmental health in Canadian foreign policy.** Canada's development assistance programs should reduce environmental impacts on health. These programs should focus on clean water, adequate sanitation, and air quality. Canada should establish a strategy with a legislated requirement to meet the internationally accepted target of 0.7 per cent of the GDP for development assistance programs by 2015. Canada should conduct an environmental audit of our international trade profile to ensure that we are not shifting polluting industries to developing nations that have less stringent health and environmental policies. Canada should continue to play a key role in efforts to cancel the debt of developing nations that meet human rights and anti-corruption criteria.

- **Promote environmental health in international negotiations.** Canada should re-evaluate its positions in international negotiations in cases where we are interfering with global efforts to reduce environmental impacts on health. Canada should champion, not oppose, the recognition of the human right to clean water. Canada should lead, not oppose, global efforts to eliminate exposure to mercury. Canada should advocate for a new international agreement to phase out the production, use, and release of developmental neurotoxins (e.g., lead, mercury, arsenic, PCBs, and toluene), which can cause irreparable brain damage to millions of babies and young children around the world.⁹¹ Such an agreement would be similar to the widely supported *Stockholm Convention on Persistent Organic Pollutants*.

Finally, Canada should support, rather than oppose, the listing of chrysotile asbestos under the *Rotterdam Convention*. Many industrialized nations, including Australia and all 25 members of the European Union, have already banned the import, sale, and use of asbestos because conclusive evidence proves that every type of asbestos is carcinogenic. The International Labour Organization also supports a global ban on the use of asbestos because exposure to asbestos causes mesothelioma, asbestosis, and lung cancer. Despite these well-established health hazards, Canada vigorously opposes international efforts to restrict global trade in asbestos, and it continues to export more than 90 per cent of its mined asbestos to developing countries, such as India and the Philippines, where adequate health and safety regulations either do not exist or are not enforced. It is unconscionable that Canada knowingly exports a product that will kill thousands of people in Asia, Africa, and South America.

- **Prohibit the export of substances and products that are banned in Canada.** It is morally indefensible for Canada to export toxic substances to other nations when our governments have determined that these substances should not be used in Canada. This is particularly true of exports to developing countries that do not undertake adequate safety precautions.



Conclusion

FIVE PRIORITY AREAS FOR A NATIONAL ENVIRONMENTAL HEALTH STRATEGY

- I. Improve research and monitoring
- II. Strengthen laws, regulations, and policies
- III. Build professional capacity and raise public awareness
- IV. Confront the unjust distribution of environmental harms and protect vulnerable populations
- V. Prioritize environmental health on the international stage

Achieving real progress in these five priority areas (*see left*) will require a commitment to funding and implementing a national environmental health strategy over several decades. Proactively protecting the health of present and future Canadians is a wise investment. A well-designed and well-executed national environmental health strategy will save thousands of lives; will prevent millions of illnesses and disabilities; will strengthen Canada's economy by increasing productivity and enabling people to reach their full potential; and will improve the quality of life for all Canadians, particularly those individuals in our society who are the most vulnerable. These benefits cannot be adequately calculated in dollars and cents. Yet even reduced to cold monetary terms, the contributions to well-being will dwarf the costs.

After all, if we cannot take the modest steps that are necessary to protect ourselves and our children from the adverse health effects of environmental hazards, how will we ever tackle the monumental challenges posed by global warming and the decline of biodiversity? An environmentally healthier, more socially equitable, more genuinely prosperous future is within our reach. Eliminating the preventable environmental impacts on our health and on our children's health is a cornerstone of the David Suzuki Foundation's vision of achieving sustainability within a generation.

This summary for policy-makers highlights the main findings and recommendations of the full report, available at: www.davidsuzuki.org/publications.

GLOSSARY

Aldehydes are air pollutants linked to respiratory illnesses. Vehicle exhaust is a major emissions source. The combustion of ethanol produces higher levels of aldehydes than the combustion of gasoline. Products such as plywood, particleboard, fiberboard, permanent press clothing and draperies, some types of foam insulation, fiberglass, carpets, carpet glues, and some paints and floor finishes can also off-gas **formaldehyde**. Exposure to formaldehyde can trigger asthma attacks. It is also a known carcinogen.

Arsenic occurs naturally in the environment and also as a result of anthropogenic sources, such as industrial releases, pesticides and pressure-treated wood. In certain areas of Canada, naturally occurring arsenic contamination in water exceeds the national guideline for drinking water quality. Exposure to arsenic increases the risk of lung cancer and bladder cancer. Anthropogenic arsenic is generally in a form that is more toxic to humans than naturally occurring arsenic.

Asbestos is a naturally occurring fibrous silicate mineral. It is used as insulation because it is resistant to heat and corrosion. There is conclusive evidence that every type of asbestos is carcinogenic. In particular, exposure to asbestos is associated with *mesothelioma*, an incurable form of cancer that affects the membrane linings (mesothelium) of the bodies' organs. The inhalation of asbestos fibres can also cause a lung disease called *asbestosis*.

Atrazine is a highly persistent triazine herbicide. In Canada, atrazine is registered for use in 17 agricultural pesticides, particularly for corn crops. The European Union has banned the use of atrazine because it disrupts the endocrine system; it interferes with the hormone system; and it causes limb deformities, abnormal sexual changes, and weakened immune systems. Studies also link the use of atrazine to declining frog and amphibian populations.

Benzene is a known human carcinogen. This air pollutant is produced by vehicle exhaust and tobacco smoke, and by burning coal and oil.

Bioaccumulation is a process in which a substance builds up in the environment, and ultimately, in the bodies of living organisms, including humans.

Biomonitoring is the direct measurement of environmental chemicals, the substances formed when these chemicals are metabolized, and the substances that are formed through chemical reactions in the body.

Bisphenol A (BPA) is a substance used in the production of polycarbonate plastic, a hard plastic used in many consumer products, including water bottles, baby pacifiers, and dental sealants. Studies show that exposure to Bisphenol A affects the reproductive system and the immune system, and it is linked to prostate cancer. It can also affect the chemistry of the brain, resulting in behavioural changes such as hyperactivity.

Chlorofluorocarbons (CFCs) were widely used for decades in refrigeration. They were considered the perfect chemical because they were non-toxic, non-flammable, and non-reactive. However, studies since the 1970s showed that they contributed to the destruction of the Earth's ozone layer. The Montreal Protocol, signed in 1987, resulted in near zero production of CFCs.

Chromium is an elemental metal. It is released into the environment through fossil fuel consumption (this accounts for more than half of the Canadian releases); iron and steel production; chemical processing; chromium-based automotive catalytic converters; and chromated fine powders that are used as toners in copying machines. Hexavalent chromium is more toxic than other forms of chromium. It is a known carcinogen.

Decabromodiphenyl ether (DecaBDE) – See Polybrominated diphenyl ethers.

Dioxins, or **Polychlorinated dibenzodioxins (PCDDs)**, are a group of organochlorine chemicals. Dioxins are classified as one of the “dirty dozen” persistent organic pollutants (POPs) under the *Stockholm Convention*. These chemicals are produced unintentionally due to incomplete combustion and they are found in automobile exhaust, tobacco smoke, and wood and coal smoke. They are also produced during the manufacture of certain pesticides and other chemicals. Certain kinds of metal recycling, and pulp and paper bleaching can also release dioxins. Dioxins can cause damage to the brain and to the central nervous system. They are known carcinogens.

Lead is a highly toxic heavy metal, once used in paint, gasoline, PVC, and pipes. Lead is still used in the production of batteries, ammunition, metal products (solder and pipes), jewellery, devices to shield X-rays, and computer monitors (to block radiation). Lead poisoning causes a range of chronic health effects. Lead exposure in children can cause cognitive deficits, developmental delays, hypertension, impaired hearing, attention deficit disorder, reduced intelligence, and learning disabilities. In the elderly, accumulated lead is released into the blood, contributing to various health effects, including cataracts, Alzheimer’s disease, Parkinson’s disease, other forms of dementia, high blood pressure, cardiovascular disease, and impaired kidney function.

Mercury is a toxic heavy metal. It is known to contaminate fish and animals. It is also a potent neurotoxin that can cause permanent damage to the brain and to the central nervous system, especially in young children. In pregnant women, mercury can pass through the placenta and harm the fetus.

Methoxychlor, an organochlorine pesticide, is neurotoxic and a potent endocrine disruptor. It is no longer registered for use in Canada. However, Canada continues to import food that is treated with methoxychlor.

Nitrogen oxides are one of the major air pollutants produced during fuel combustion. This group of chemicals is linked to increased levels of smog and to increasing rates of asthma.

Nonylphenols are potent endocrine disruptors. They are used as “inert” ingredients in pesticide formulations and in cleaning products. They have been found to contaminate many food products.

Organophosphate pesticides (OPs) are a group of insecticides that are esters of phosphoric acid. They block a neurotransmitter that destroys the enzyme responsible for stimulation. Exposed insects die as a result of over-stimulation. Humans can be exposed to OPs by drinking water or by eating fresh food or processed vegetables that are contaminated with OPs; by touching surfaces that are contaminated with OPs; or by breathing contaminated

air following pesticide applications. OPs are among the most acutely toxic pesticides. Some OPs cause developmental or reproductive harm, some are carcinogenic, and some are known or suspected endocrine disruptors.

Perfluorochemicals (PFCs) are man-made chemicals used in many consumer products, including household cleaners, cosmetics, food packaging, non-stick coatings on pots and pans, and stain repellents on furniture and clothing. PFCs are linked to cancer, birth defects, damage to organs, and damage to the immune system and the reproductive system. **Perfluorooctanic acid (PFOA)** is a highly persistent PFC used in the production of Teflon. Body burden studies conducted in different parts of the world reveal that humans are contaminated with PFOA. **Perfluorooctane sulfonate (PFOS)** was a key ingredient in 3M's Scotchguard and other stain repellents. It is a persistent organic pollutant. Studies show that it is very accumulative in humans.

Perfluorooctanic acid (PFOA) – See Perfluorochemicals (PFCs).

Perfluorooctane sulfonate (PFOS) – See Perfluorochemicals (PFCs).

Phthalates are used predominantly as softeners, or plasticizers, in PVC plastic products. They are found in a wide range of consumer products, including perfumes, hair sprays, building products, food packaging, children's toys, and medical devices. The World Health Organization identifies phthalates as a probable carcinogen. Phthalates can also disrupt the endocrine system, and cause reproductive disorders and developmental effects.

Polybrominated diphenyl ethers (PBDEs) are used extensively as fire retardants in many consumer products, including clothing, computers, televisions, and furniture. Although the human health impacts of exposure to PBDEs are not well understood, tests on animals indicate that they can impair the development of the brain, affect hormone and reproductive systems, and cause cancer. **Decabromodiphenyl ether (DecaBDE)** is the most widely used chemical in this class. Studies show that it can affect the brain, alter sex hormones, reduce male fertility, and disrupt the development of ovaries. It is classified as a possible human carcinogen.

Polychlorinated biphenyls (PCBs) are a group of non-flammable, stable, organochlorine persistent organic pollutants (POPs). At one time, they were widely used as coolants and lubricants in fire retardants, hydraulic fluids, transformers, capacitors, and other electrical equipment; and in liquid seals, paints, varnishes, inks, and pesticides. PCBs are known carcinogens and neurotoxins. They are also suspected endocrine disruptors.

Polycyclic aromatic hydrocarbons (PAHs) are a mixture of organic compounds that are released into the atmosphere as gases or particles during the incomplete combustion of organic materials, such as fossil fuels. PAHs are linked to cancer, cardiovascular and respiratory problems, and negative impacts on birth outcomes.

Polyvinyl chloride (PVC) is a thermoplastic polymer. It is used to make a wide variety of building materials and consumer products, including pipelines, vinyl siding, blinds, gramophone records, and furniture. Vinyl chloride, a toxic gas, is used in the production of PVC. It causes brain, liver, and lung cancers. Consumer products made from PVC off-gas vinyl chloride.

Radon is a ubiquitous, naturally occurring radioactive gas resulting from the decay of uranium. Uranium is distributed in varying concentrations throughout soil and rocks in Canada. Radon is one of the most harmful forms of indoor air pollution in Canada and the second most important cause of lung cancer, after smoking.

Sulphur dioxide (SO₂) is an industrial air pollutant. It is a main precursor of acid rain, along with nitrogen oxides. Prolonged exposure to sulphur dioxides can cause respiratory and cardiovascular diseases.

Triclosan is a chlorophenol, a class of chemicals that is suspected of causing cancer in humans. This chemical is widely used in antibacterial soaps. It is structurally similar to PCBs and PBDEs. It is known to disrupt the endocrine system.

Vinclozolin is a dicarboximide fungicide that is used on turf, fruit, and ornamentals. It is known to disrupt the endocrine system.

Zinc is a heavy metal. It is a major component of industrial air pollution. It is linked to lung cancer.

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Environmental pollution and degradation take a tremendous toll on the health of Canadians. Each year, thousands of Canadians die and millions become ill after exposure to environmental contaminants.

Prescription for a Healthy Canada: Towards a National Environmental Health Strategy is the culminating report in a series on how our environment affects human health in Canada. In an effort to propose real, workable solutions, this report lays the framework for a national strategy to protect both the health of Canadians and Canada's extraordinary natural assets. This is an action plan for the future.

The David Suzuki Foundation is committed to achieving sustainability within a generation. A healthy environment is a vital cornerstone of a sustainable, prosperous future.



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