



the science of the challenge

David Suzuki's nature challenge

David Suzuki's Nature Challenge contains a list of priority actions for Canadian households. This list was the result of research into the environmental impact of the average Canadian household. At the heart of this research is an innovative and comprehensive model of the environmental impact of consumer decisions prepared for the Union of Concerned Scientists (UCS). The objective of this study was to identify the categories expenditures of US households that caused the greatest environmental damage. From their research, the study's co-authors, Dr. Michael Brower, a physicist and expert on energy and environmental issues, and Dr. Warren Leon, a UCS deputy director, developed guidelines to help Americans make better environmental choices and to set priorities on changing their lifestyles.



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SOLUTIONS ARE IN OUR NATURE

The UCS Study

The objective of the UCS study was to provide Americans with a list of the most important things they could do to become better environmental consumers. People are generally overwhelmed with their daily obligations and activities, yet many have a basic concern about the state of the natural world. Therefore, a set of priority actions that could make a positive contribution to future generations would be useful and appreciated.

First, the UCS researchers identified the four environmental problems that posed the greatest threat to the earth's ecology and human health related to everyday consumption. These four problems are:

Climate change: Climate change is a serious problem that the global community is now beginning to address through the Kyoto Protocol. This international agreement seeks to reduce the emissions of heat-trapping gases that lead to global warming, such as carbon dioxide, methane and other gases, which are released when fossil fuels, such as coal or oil, are burned.

Air pollution: This category is further broken down into common and toxic air pollution. Common air pollution, such as smog and fine particulates, harms human health and damages plants and wildlife. Most

of these pollutants come from the burning of fossil fuels, both for transportation and for the generation of energy. Toxic air pollution presents even more serious health risks to people, and includes substances such as evaporated pesticides and emissions from chemical and metallurgical industries as well as sewage treatment plants.

Water pollution: Again this category is further refined into common and toxic water pollution. Common water pollution is caused by soil sediments and other biological materials entering streams, lakes and oceans. Common cause of soil erosion are farming, ranching and logging operations. A range of biological contaminants come from agricultural fields, feedlot operations, and sewage treatment plants. Toxic water pollution is more hazardous, and even in small quantities can contaminate drinking water and kill fish and other aquatic life. Examples are heavy metals from mining and other industries, organic compounds from petrochemical plants, and pesticides applied on lawns and agricultural fields.

Habitat Alteration: Habitat loss, both on land and in aquatic areas, is considered by many scientists to be the greatest threat to biodiversity. In North America, damage to natural habitat is caused by activities such

THE AUTHORS

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TABLE 1 US HOUSEHOLD ENVIRONMENTAL IMPACTS (BY CATEGORY AND % OF TOTAL)

IMPACT CATEGORY	Climate Change	Air Pollution		Water Pollution		Habitat Alteration	
	Greenhouse Gases	Common	Toxic	Common	Toxic	Water	Land
Food	12%	17%	9%	38%	22%	73%	45%
Transportation	32	28	51	7	23	2	15
Home	41	39	24	31	24	13	30
Subtotal	85	84	84	76	69	88	90
Other	15	16	16	24	31	12	10
TOTAL	100%	100%	100%	100%	100%	100%	100%

Source: *The Consumer's Guide to Effective Environmental Choices: Practical Advice from the Union of Concerned Scientists* by Michael Brower and Warren Leon, 1999, Three Rivers Press, New York.

as logging, mining, agriculture, poorly planned urban sprawl, ocean trawling, and drawing down of lakes, rivers and aquifers for irrigation and other consumptive use of water.

The UCS researchers then developed a list of eight indicators to quantify the *total* impact of household expenditures —transportation, food, household operations, housing, medical care, personal items and services, education and other—on each environmental problem. To ensure a thorough study of the impacts of consumer activities, the modelling included estimations of both the *direct* and *indirect* impacts of consumption spending. An example of a direct impact of consumer spending is when rainwater washed the pesticide residues off a lawn and into a stormsewer which eventually empties into a nearby stream system. An indirect impact is water pollution caused by runoff coming from agricultural lands after pesticides and other toxic chemicals have been applied. The authors traced the environmental impacts of the full-range of household expenditures (i.e., transportation, food, household operations, housing, medical care, personal items and services, education and other) by using an standard input/output model of the US economy.

From their research, the scientists concluded that three categories of consumer spending have the greatest impact on nature: transportation, food and household operations/housing. (Their findings are summarized in Table 1.) Together these categories amount to 69% to 90% of the average US household's

contribution to global warming, air pollution, water pollution and habitat alteration.

Their conclusion was that if consumers are to effectively reduce their negative impact on nature, the focus must be on the following:

- **Housing and Household Operations:**

Household energy use, for heating, lighting, running appliances and other electrical equipment, represent a significant source of greenhouse gas emissions and other pollutants. The burning of fossil fuels is an important source of electricity in most parts of the United States. In addition expenditures related to housing and household operations account for almost a quarter of the threats, attributed to households, to wildlife and natural ecosystems. This includes both direct impacts related to land used for new residential development and the indirect impacts associated with logging for timber used in new home construction.

- **Food:** Agriculture and food processing and distribution have a pervasive impact on nature. Most notably, livestock operations and meat processing lead to the pollution of ground and surface waters. In addition, grazing operations contribute to soil erosion problems, particularly in drier climates. Fruit, vegetable and grain agriculture also degrade lakes, rivers and streams, and aquifers through the consumptive use of

water for irrigation and the pollution associated with the use of pesticides, fungicides, fertilizers and manure. An increasingly globalized food production system means that food is travelling further distances from field to table. Fossil-fuel dependent shipping methods mean more emissions of greenhouse gases and other pollutants.

- **Transportation:** The use of personal vehicles is changing the climate and damaging air quality. Due to the combustion of fossil fuels, toxic and non-toxic air particulates are released into the air. Greenhouse gas emissions, mainly carbon dioxide, heat up the upper atmosphere of our

planet. Automobile manufacturing and maintenance also cause pollution through the production of steel, batteries, paints, plastics, lubricants, etc. The construction of roads, and contaminated rainwater runoff from them, degrade land and aquatic habitat.

From this list, the UCS developed a list of priority actions for American consumers interested in alleviating their negative impact on nature. A full explanation of this study, its analysis and findings, can be found in *The Consumer's Guide to Effective Environmental Choices: Practical Advice from the Union of Concerned Scientists* by Michael Brower and Warren Leon, 1999, Three Rivers Press, New York.

The Canadian Model

This UCS study speaks to the American experience, but is this analysis relevant to Canadians? A close comparison of environmental problems related to consumer behaviour and the expenditure patterns between the Canada and the United States suggests that there is.

The David Suzuki Foundation asked Canadian experts (Dr. David Schindler at the University of Alberta, Dr. Peter Dillon at Trent University, Dr. Michael Hayes at Simon Fraser University, and Dr. John Smol at Queens University) to review the UCS analysis of the environmental problems associated with consumption spending. Their analysis was that this list (which includes climate change, air pollution, water pollution and habitat alteration) was as relevant to Canada as it was to the United States.

We then compared the expenditures of Canadian to US households to determine if there were significant differences in consumer habits. The demographics of American and Canadian households are very similar. The average size of a Canadian household is 2.6 individuals while in the US it is 2.5. Eighty-seven percent of Canadians and Americans own (or lease) at least one vehicle. Interestingly though, in 1999, the average household in the US owned 1.9 vehicles while the average Canadian household owns 1.3. Home ownership (compared to rental) is 65% in the US and 64% in Canada. Looking more specifically at spending patterns, we found that Canadian households spend slightly more, on a percentage basis, on food, housing, clothing and personal care, and entertainment and recreation, while US households spend a larger percentage on transportation, health care, and personal insurance and pension contributions. The differences are slight, rather than substantial, so we decided there was validity in using the UCS model to prepare a similar analysis of the environmental impacts of Canadian households.

We then re-calibrated the estimates of total environmental impacts of the average Canadian

household using data from this country. To calculate the direct environmental impact of personal vehicle use, we relied primarily on Government of Canada sources. In most cases we used UCS calculations for estimating indirect impacts. For instance, we used Canadian data on the release of sewage effluents from residences and UCS calculations of the water pollution related to the manufacturing of appliances. The calculation of indirect impacts was then adjusted for differences between US and Canadian household spending patterns.

We assumed that the UCS estimates of indirect impacts would be valid for our model because of the trading relations between the two countries and the similarities in consumer spending patterns and industrial production patterns. For example, the indirect environmental impacts of eating bananas, which includes air pollution and greenhouse gas emissions from transporting the fruit from South America, would be roughly equivalent in both countries. Similarly, the indirect impacts of transportation, such as water pollution caused by manufacturing automobiles, would be the same in both countries because car manufacturing is done using the same industrial production standards.

We found that decisions made by Canadian households on transportation, food, and homes are the most significant environmental choices made on a daily basis. These were, not surprisingly, the same categories identified by the UCS study.

Our estimate of the environmental impact of the average Canadian household can be found in Table 2. Spending on homes (household operations and housing) make up 42% of the average Canadian household's contribution to climate change, 39% of common air pollution, 32% of common water pollution and 27% of the impacts on terrestrial habitat. Food consumption is responsible for 78% of household impacts on aquatic habitat (primarily due to withdrawal for irrigation), 54% of land use and

David Suzuki's Nature Challenge

The challenge, for Canadians interested in making better environmental choices is to rethink our relationship to nature as expressed in our daily activities and decisions. This research establishes the priorities for making better choices—choices that will protect nature and improve human health at the same time.

The Science of the Challenge is meant to explain how priority actions in David Suzuki's Nature Challenge were determined. In short they are based on the conclusions of an innovative and comprehensive study done by the Union of Concerned Scientists of the environmental impacts of consumer spending. Our recalibrated Canadian model confirmed that three categories of household expenditures have the greatest environmental impact: home, food and transportation. These three activities combined account for between about 72% to 90% of our total negative effects on climate change, air pollution, water pollution and habitat alteration. In translating these findings to recommendations, we found that some relatively simple changes to everyday lives of Canadians can make a real difference in protecting nature. This is particularly true if the actions of individuals and households already making these changes to their lifestyle were adopted by many Canadians.

David Suzuki's Nature Challenge involves doing at least 3 of the following actions:

Home—Live clean!

- Find ways to reduce your home heating & electricity use by 10% this year.
- Replace chemical pesticides on your lawn, garden, & houseplants with non-toxic alternatives.

- Choose an energy-efficient home and appliances. Check to see if homes meet R-2000 standards and appliances are Energy Star approved.

Food—Eat local and lean!

- Choose at least one day a week to eat meat-free meals in your household.
- Prepare your meals with food from local farmers and producers for one month this year.

Transportation—Go green!

- Check the Canadian Government's Auto Smart ratings for the next car you intend to buy to make sure it's fuel-efficient and low polluting.
- Walk, bike, carpool, or use transit to get to one of your regular destinations each week.
- If you are moving, choose a home within a 30-minute bike, walk, or transit ride from your daily destinations.
- Support alternatives to the car. Contact your local media or government, urging improved public transit and bike paths.

Get Involved, Stay Informed!

- Learn more about conserving nature and share what you've learned with family & friends.

The Science of the Challenge is a technical document explaining the methodology of the study and our findings. For a document explaining how these findings can be applied, please refer to *The Green Guide to David Suzuki's Nature Challenge*.

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Working through science and education to protect the balance
of nature and our quality of life, now and for future generations.