A NEW KIND OF SHARING

WHY WE CAN'T IGNORE GLOBAL ENVIRONMENTAL CHANGE

JUNE D. HALL AND ARTHUR J. HANSON

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Why We Can't Ignore Global Environmental Change

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Preface

We live in a time of great uncertainty, of dazzling political change, and of shifting economic reality. In the twinkling of an eye we have witnessed the fall of the Berlin Wall, the collapse of the Soviet Union, the end of the Cold War, and real progress toward nuclear disarmament. We have seen the settlement of many long-standing civil wars, the first steps toward the dismantling of apartheid, and a new status for the United Nations. But the heralded "peace dividend" may be diverted to brush fires elsewhere, as ethnic rivalries, doused during the Cold War, are reignited.

In Canada, we face the possible breakup of the country, economic malaise, and the decline of our traditional sources of income. We watch the parallel rise to prominence of Pacific Rim countries and the launching of an integrated European economy in 1992. In the midst of all this, it would be tempting to close our eyes to the problems of other regions, and especially to forget about the struggles of developing nations outside the mainstream of our daily thoughts and actions.

In preparation for the 20th anniversary of Canada's International Development Research Centre (IDRC) in 1990, several studies were commissioned on the impact on Canada of change in the countries we have come to call the South. This book is one of the products of this effort. It investigates the rapid and destruc-

tive environmental change that is taking place in the South. It looks at elements of global change in which both Canada and developing nations are participants, and at the beginnings of a global compact on environment and development. The survey is selective, focused on key themes and hypotheses, but it draws on an extensive, interdisciplinary base of up-to-date information and personal experience.

The analysis leads to some compelling conclusions that Canadians cannot afford to ignore. The most important is that Canada cannot insulate itself from the effects of environmental change in developing countries. Indeed, we are a part of the problem and must expect to pay part of the price.

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INTRODUCTION

Chapter 1

Global Environmental Interdependence: Implications for Canadians

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As we near the third millennium, an increasingly interdependent world is at a critical watershed. Never before have we humans as a species, and as individual men and women, had such an opportunity to shape our common future.

DeFries and Malone (1989, p. v)

In June 1992, world leaders met in Rio de Janiero at the United Nations Conference on Environment and Development (UNCED), the "Earth Summit" — the largest summit conference ever organized, and perhaps the most important. To many, the Earth Summit was the last chance for humanity to arrest the planet's downward spiral of environmental degradation, the last chance to reverse the destructive nature of our relationship to planet Earth. Yet whatever the ultimate impact of the meeting and its follow-up, it is the beginning, not the end, of a process.

The year 1992 has a symbolic significance far beyond this promise. It marks the 500th anniversary of Columbus's first voyage to the New World — a watershed of a very different nature. In the 15th century, explorers sought alternative routes to the fabled wealth of the Orient. They were the vanguards of a new era. In their footsteps came Western "civilization": a wave of military might and economic muscle fanning out from Europe,

"a half-millennium of exuberant, exploitive expansion" (Caldwell 1990, p. 6), which has conquered the furthermost corners of the Earth and changed forever the world and its peoples. Aided by technology, this wave has gathered momentum, culminating in the explosive growth of the 20th century. Since 1900, the human population has tripled, the global economy has increased 20-fold, and fossil-fuel use has grown by a factor of 30 (MacNeill et al. 1991, p. 3). Most of this growth has happened since 1950. If United Nations (UN) projections come true, population may not stabilize until the 22nd century, at a level well over 10 billion, while the world's economy could increase fivefold by the middle of the 21st century. Such numbers are incomprehensible if we consider the crisis already facing the planet.

"The basic reality is that the scale of human activity has grown so large that it is disrupting the planetary systems that support life" (Speth 1990a, p. v). Scientific predictions about the destruction of the ozone layer, already frightening, were shown in the winter of 1992 to have been too conservative; global warming is considered a virtual certainty by most experts, although its timing and extent remain a matter of debate; our land, waters, and skies are polluted; tropical deforestation removes over 17 million hectares of trees a year; an unknown number of species have become extinct; and ecosystem diversity and the resource base are being destroyed at a catastrophic rate. Nowhere is this process more obvious than in the countries of the developing world, nowhere are the lives of people more stunted by its effects.

"Third World," "developing world," "the South" — there are many terms used to describe the lands that are home to three-quarters of the world's people. All these terms are flawed, all mask the wonderful diversity and vitality of these nations, all imply a world divided. To lump together Singapore and Mozambique, South Korea and Afghanistan, is plainly foolish, as foolish as placing all the industrialized nations in one category — the North. Yet there are similarities, especially in the relationship of

these countries to the North, and a bond that links them: "their desire to escape from poverty and underdevelopment and secure a better life for their citizens" (South Commission 1990, p. 1).

> We refer to them as the South. Largely bypassed by the benefits of prosperity and progress, they exist on the periphery of the developed countries of the North. While most of the people of the North are affluent, most of the people of the South are poor; while the economies of the North are generally strong and resilient, those of the South are mostly weak and defenceless; while the countries of the North are, by and large, in control of their destinies, those of the South are very vulnerable to external factors and lacking in functional sovereignty. (South Commission 1990, p. 1)

Exceptions spring to mind immediately, but this description was written by a prestigious group of experts from developing countries. It is a view of the South from the South. It emphasizes the ties that bind and the unfavourable position of most developing nations in the global economic system, a system that has spread its remorseless net with ever-increasing power in the last decades of the 20th century.

There is a gap, a widening gap, between rich and poor. Although considerable economic and social progress was made in much of the South in the years after World War II, the inequities between North and South have increased since the mid-1970s and the first oil crisis. The world's economy was thrown into disarray by the costs of the Vietnam War, the Organization of Petroleum-Exporting Countries (OPEC), and the recession of the early 1980s. Yet most countries of the West, along with a select group of rapidly industrializing nations, recovered from this period of turmoil, despite their burden of debt. For most of the South, however, shackled even more by debts recklessly incurred during the heady years of OPEC liquidity and further hampered by declining prices for commodities, recovery was severely constrained. Instability and uncertainty have worsened in many areas, and the economic woes have been mirrored by declines in social indicators such as food availability,

infant mortality, and per capita income. The problem has been much worse in Africa and Latin America than it has in Asia, where some nations made enormous economic strides during the 1980s, although here, too, there are countries with massive problems (UNDP 1990, pp. 33–36).

Since 1982, more money has left the South each year than has entered it: in 1989, net flows to the North totaled over 50 billion United States dollars (USD) (MacNeill and Munro 1991, p. 97). Attempts by international financial institutions to help developing countries fix their ailing economies have often created even greater hardships for their citizens. During the 1980s, the International Monetary Fund (IMF) imposed very stringent conditions, such as currency devaluation, removal of subsidies, and restrictions on wage increases, as a way of achieving short-term improvement in the balance of payments of many countries in the South. There is no doubt that fundamental reforms are essential if the South is to make progress, but this first round of structural adjustment, as it is called, was shaped by the conservative economic philosophy of the Reagan years and was not without social and ecological costs. It has added an additional stress to countries already struggling with the pressures of population, poverty, urbanization, and environmental decline.

We in the industrial North cannot ignore this situation. We are part of its making and are influenced by its effects (Head 1991). Increasingly, the North's governments, multilateral institutions, and multinational corporations dictate the fate of the South. The South is tied economically to the markets of the North, to its lending institutions, and to its policies in a host of areas. Politically, culturally, and economically, there is a trend toward globalization, driven by revolutions in technology, transportation, and communications, and powered by the North. Even though empires have evaporated, the colonial legacy lingers on. More telling, the people of the North, who make up one-quarter of the world's population, a fraction that is rapidly declining, consume more than three-quarters of the resources extracted.

For the dozens of nations that have achieved independence

since World War II, it has been a difficult struggle to establish a national identity. Yet, undoubtedly, there have been grievous errors committed in the design and execution of development policies. There has been a failure to invest in agriculture, for instance, and an emphasis on short-term gain in the way that resources are exploited. Despotic governments have plundered the coffers of many nations, and rising inequities between rich and poor in most countries have helped fuel political and social instability. Corruption is endemic in many regions (Adams 1991).

The end result is a crisis that has spread to encompass all aspects of life in the South. This book is concerned with environmental problems, yet all aspects are intricately connected, all are part of the same picture, and our actions in the North are an essential factor in the equation. We are indeed living in an interdependent world, and it is a world where the notion of sovereignty has lost much of its practical validity. Environmental problems have now reached such a scale that their impact is increasingly regional and even global in scope. The efforts of one country, acting alone, can do little to help. But there is hope. In recent years, there has been a recognition of the environmental crisis, a growing understanding of its origins, and the beginning of a movement to address at least some aspects of the problem.

Two Decades of Learning: 1972–1992

Over the last two decades, our vocabulary has been enriched by many new terms relating to the environment. These additions reflect the increasing attention paid to environmental matters by the media. The world, however, has been slow to understand these new terms, and even slower to respond. The Government of Canada, for instance, bickered over the content and goals of the Green Plan (Canada 1990a), the nation's first major commitment to sustainable development, and there is a fear that the

original financial commitment will be whittled away. We are not alone. Only a handful of countries are developing coherent strategies that address sustainable development, even though the legitimacy and urgency of the issues are well known. Nevertheless, if we look back at changing attitudes over the last 20 years, a global dialogue has clearly been developing.

The United Nations Conference on the Human Environment, held in Stockholm in June 1972, was the first environmental meeting to be held at a global level. It created an awareness of the issues, but no real commitment. Indeed, the meeting took place at the start of a decade-long enthusiasm for megaprojects and unprecedented levels of resource consumption in all parts of the world. Furthermore, there was considerable skepticism on the part of developing nations. They were concerned that their economic and social development would be compromised by environmental policies, and they argued the point forcefully in Stockholm (Clark and Timberlake 1982). Yet there were many lasting effects from the meeting, including the establishment of the United Nations Environment Programme (UNEP), an emerging consensus between nations on subjects such as marine pollution, and a better understanding of what might lie in store if the relationship between environment and development did not improve. Stockholm placed the environment on the world's political agenda, and its principles formed the basis of international environmental law developed in the 1970s and 1980s. In addition, most countries have set up environmental protection bodies.

There have been many influences on our thinking in the interim. The space program, for instance, opened our eyes to the beauty and fragility of "Spaceship Earth" and allowed us to do synoptic research at the global level. The Club of Rome aroused concern and much debate over what it perceived to be imminent resource shortages (Meadows et al. 1972). James Lovelock, a British scientist, floated a new and radical model of the planet, "Gaia," which holds that Earth and life together form a single, self-regulating organism (Lovelock 1979; Myers 1984). President

Carter commissioned a study in 1980 of global environmental problems (Barney 1980), while Willy Brandt, at the helm of the Independent Commission on International Development Issues, painted a stark picture of the inequities of the modern world (Brandt 1980, 1983). Above all, a string of disasters and research findings in recent years has helped to galvanize us into action and to show that the hopes of Stockholm have not been fulfilled. The price exacted in human and ecological terms by these problems is becoming increasingly clear.

By the early 1980s, countries all over the world were tackling many problems of environmental management. Yet such concerns were still considered an "add-on" to the theme of economic development, and action focused mostly on downstream effects such as pollution, on fixing rather than preventing problems. In the South and in Eastern Europe, conditions continued to deteriorate at an accelerating rate. Nevertheless, there was a growing realization that environment and development were closely connected. The 1980 World Conservation Strategy (IUCN 1980), for instance, argued that ecological processes and life-support systems could only be maintained if resources were used sustainably and genetic diversity was preserved. The Strategy, however, paid little attention to the economic and political forces behind the practices that lead to environmental degradation: the effects of colonization, of trade, of government policies, of the realities of power in a society and access to land, of development strategies, and a host of other factors. In addition, it was more concerned with the sustainable use of land and resources than with the satisfaction of basic human needs. Nevertheless, it placed the concept of sustainability on the international political agenda.

The World Commission on Environment and Development (WCED), under the able direction of Gro Harlem Brundtland, took a much broader view. It demonstrated the intricate interconnections between environment and development, and emphasized the absolute necessity of integrating the two at all levels of decision-making, from the actions of individuals to the broadest international agreements. In *Our Common Future* (WCED 1987),

the Brundtland Commission placed the concept of sustainable development on the world's policy agenda. The Commission members defined the term simply and elegantly as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 43).

Our Common Future concluded that the only way to avoid global catastrophe was to press for continued economic growth to provide the capital necessary to remove poverty, improve living conditions, and move to a world with fewer inequities. This was certainly not support of growth for growth's sake, as it has been interpreted in some quarters, but rather an impassioned cry for a better world. Justice and equity, an improved quality of life for the poor, and lifestyles more in tune with the ecological realities of the planet should all be among the measures of growth.

This is a new approach to economics, which has always measured growth in terms of capital investment. Ignoring the depreciation of capital assets is a recipe for bankruptcy in business, and it is becoming apparent that this is the case for planet management as well. Environmental degradation incurs an enormous cost, but it has never been incorporated into national accounts. Neither do the prices of resources and environmental services such as clean air and the protection of watersheds reflect their true value, either to the economy or to society. Even worse, classical economics has not recognized that there are ultimate limits to the Earth's capacity to provide — biological, chemical, and geological limits. We need to live off our interest and not our capital.

This does not, however, mean that development or growth in gross national product (GNP) must be stalled, or that we cannot continue to improve living conditions. But to achieve the five- to tenfold increase in world industrial output suggested by the Brundtland Commission "by the time world population stabilizes some time in the next century" (WCED 1987, p. 213) surely cries out for radical changes in our economic decision-making, in the structure of society, and in the distribution of resource use. Defining sustainable development in practical terms will not be

easy. It is a concept that will have major ramifications not only on our economic development but also on our whole relationship to the Earth, its resources, and its peoples.

By 1990, the message of *Our Common Future*, and the cumulative effects of a string of disasters, had penetrated the consciousness of citizens and their leaders virtually everywhere. Clearly, we have embarked on a new wave of environmentalism, a wave that has grown to encompass nations in North and South alike. It is unthinkable that a Brazilian minister would have criticized Canada's treatment of its old-growth forests 10 years ago, or that thousands of Canadians would have contributed to the care and protection of the rain forests of tiny Costa Rica. Yet such is the reality of the 1990s.

Professor Lynton Caldwell of Indiana University has likened this change of heart to a second Copernican revolution (1990, p. 3). Copernicus removed the Earth from the centre of the universe, and we are finally recognizing that humanity is not the centre of the biosphere but merely one of its parts, albeit a part with an immense capacity to destroy. For Western civilization, this is a fundamental shift in the way that the relationship between humans and nature is viewed. But this new ecological understanding has not necessarily been reflected in action. Old assumptions, outdated practices, and sclerotic institutions continue to rule the world, despite the spring-green gloss of rhetoric washing over us. The realities of power, the vested interests that must be mollified and compensated, the conservative bias and short-term focus of most Western governments are likely to continue. These realities exist at least in equal measure in developing countries.

The Earth Summit was proposed by the Brundtland Commission as a follow-up to the 1972 Stockholm Conference. The hope for the Earth Summit was that it would place the environment at the very centre of the economy and provide an agenda for action well into the 21st century. Ideally, this action plan would include not just principles but solid targets and the instruments to carry them out.

The Earth Summit addressed, in one way or another, virtually every issue that has any relevance to the relationship between the Earth and humanity. Besides the obvious topics of atmospheric change, biodiversity conservation, pollution, and human health and living conditions, many cross-cutting development concerns were included, concerns such as poverty, population, and patterns of consumption and economic growth, although not all of these were on the official agenda. As the largest gathering of world leaders in history, the Earth Summit had, in theory, "unprecedented power to make the fundamental decisions required to safeguard our common future" (Strong 1991, p. 7).

Plainly, the task set for the Summit was daunting. Indeed, its long and difficult gestation was often marred by acrimony, and many participants feared that little would be accomplished. Nevertheless, by the close of the meeting, there were several tangible results: the Rio Declaration, a statement of 27 principles for sustainable development; Agenda 21, a complex action plan many hundreds of pages in length; a statement of principles on the management, conservation, and sustainable development of all types of forests; and conventions on climate change and biodiversity, which were signed by over 150 countries. Lacking, however, were the solid targets, timetables, and funding so devoutly desired by the planners.

Sustainable Development in South–North Dialogue

In both substance and symbolism it is significant that the 1992 Summit was hosted by Brazil, one of the most troubled countries of the South in terms of its economic, social, and environmental problems, but also an important storehouse of biological diversity. Indeed, it was Brazil that led Third World resistance at the Stockholm meeting. Developing nations have plainly come to realize that it is vital that they take part in these international negotiations.

Yet the Earth Summit highlighted as never before the growing split between North and South. In general, developing countries come to the table with a set of perspectives that is very different from those held by the North. Industrialized nations tend to be preoccupied with issues of environmental protection such as the double threat of global warming and ozone depletion, tropical deforestation, ocean pollution, the loss of biodiversity, and so on. The South has far more pressing economic concerns that it feared would be submerged if the focus of the Earth Summit remained fixed on the environment.

First and foremost is the right to development and, a fear expressed in Stockholm, the worry that environmental standards set by the North may not be appropriate for conditions in the South. The North, after all, built up much of its wealth precisely because of its access to cheap resources and its unfettered ability to pollute. Now it is the South's turn for economic development, the South's turn to pollute the atmosphere with the gases that accompany development. In this, they defend the sovereign right of states to use their resources. To a few, the very concept of a common heritage or a global commons smacks of attempts by the North to perpetuate its access to the South.

Indeed, it is only fair that the North should pay compensation to the South, both to cover the damage caused by the North's past pollution, such as sea-level rise, and for development foregone if the South cuts its greenhouse gas emissions dramatically. Revenues will be lost, for example, if the South protects its rain forests rather than logging them or turning them into agricultural fields.

Behind the world's inequities lie the international financial and trading systems. Debt loads and structural adjustment have played a major role in hastening resource depletion and environmental degradation in the South. Trade, too, is skewed in favour of industrial nations; for example, the prices of many agricultural commodities have declined sharply in recent years. Some countries in the North have turned the screw by restricting market access for many processed products from the South, thus forcing

developing nations to depend on greater volumes of lower value commodities, rather than on labour-intensive exports.

For the South, the environment has become an enormous bargaining tool: without the cooperation of developing countries, the downward spiral of degradation will inevitably continue. Yet cooperation can only be bought at a price. The South argues that it can only hope to move to a sustainable future if it receives massive new infusions of financial assistance from the North, has free access to scientific information, and is able to obtain environmentally sound technology at preferential and noncommercial rates. These are key components of the bargain that must be struck between North and South. The tactic has already been used, with some success, during negotiations on the Montreal Protocol on Substances that Deplete the Ozone Layer (see Chapter 4).

In the future, sustainable development will be used by both the North and the South as a tool for guidance and negotiation. This is undoubtedly the most difficult question that has ever faced humankind. Tensions between North and South are bound to escalate. Canada, like other countries of the North, will form alliances on particular issues and will link sustainable development with trade and development assistance policies, treaties for environmental protection, and negotiations involving human rights. In this process we will be vulnerable if our record at home appears weak.

Environmental Dimensions of Interdependence

This pivotal year is an ideal time to look at Canada's relationship to change in the South. Why can't Canadians ignore the changes taking place in the world around them? In other words, why not live and let live? The thesis of interdependence advanced in this study rests on three arguments.

1. Even if we try to insulate ourselves from the problems of others, we do so with considerable moral discomfort.

Life is threatened and conditions iniquitous for many in developing areas and among indigenous peoples everywhere. Our sense of integrity and justice demand a better world. As Stan Rowe, Professor Emeritus of the University of Saskatchewan, has written: "National selfishness in a small world is a time-bomb — potentially the most explosive issue threatening the whole human enterprise" (Rowe 1990, p. 327). These concerns are a powerful driving force behind Canada's development assistance program; we already make a significant commitment of funds and human talent to help the South. To make this a wise investment, we need to understand the role environmental change plays in development.

There are many other moral questions. In the past, our investments in the South have often failed because we ignored the principles of sustainable development. In our own lives, we have used a disproportionate share of the Earth's resources and polluted to the same degree. This raises questions about our long-term liability to nations of the South and our moral responsibility to be careful stewards of one of the largest and most diverse environments in the world, in short, to set a good example for the rest of the world.

2. We want access to resources and environments in other parts of the world to satisfy our own needs.

Canadians use environments in the South directly in many of their jobs, through family ties, for recreational and educational purposes, and for various forms of business investment. In our daily lives, we depend on a wide range of tropical commodities. We thus have a selfish economic stake in the integrity of environmental conditions in the South and tangible reasons for working toward peace, prosperity, and security in areas that might otherwise be caught up in strife and destruction. Increased

prosperity in the South will also mean more sales for Canadian products. Trade, however, is a double-edged sword: the North's exploitation of resources in the South has been one of the most critical elements in the destruction of environments in the South.

3. We cannot be insulated from global environmental problems or from the effects of a global economy.

No place is immune. Acid rain falls on temperate and tropical forests alike. The detritus of ships, of oil spills, of urban garbage, of careless logging washes up on beaches all over the world. In the Arctic, summer brings a haze of pollutants in the air and toxic chemicals are concentrated in the fat of many mammals, including human milk. The possibility of nuclear winter or of widespread radioactive fallout as a result of warfare, accident, or sabotage cannot be discounted. The ocean currents and winds that carry pollution also mix and distribute the gases involved in climate change. The role of developing nations in these problems, once small, promises to increase markedly in the years to come.

Not only are we connected physically, but Canada is also a vital part of an increasingly global marketplace. As trade barriers come down, we are being thrown more and more into competition with producers in developing nations. This may have direct impacts on Canada's prosperity at home.

Many environmental issues are now recognized as security concerns. Environmental degradation has been a direct cause of conflict for thousands of years. The worsening situation in many developing countries, even without the effects of climate change, can only exacerbate this problem. Canada cannot expect to remain insulated from upheaval in the South; its effects spill over into the North in many ways. The environment as a weapon of war, or as an instrument of blackmail, was brought home forcefully to us by Saddam Hussein.

Most of this book is devoted to making these abstract arguments real, to showing how our lifestyles and well-being are

influenced by our connections to environmental conditions in developing countries, both now and in the future. To set the stage, however, we need to gain a better appreciation of our current environmental role in the world. Are we leaders, followers, or defenders of the status quo?

Canadian Leadership in Environmental Management

In the first document released for public consultation during the development of the Green Plan (Canada 1990b), Lucien Bouchard, then Minister of the Environment, noted that

> Since the mid-1980s, Canada has taken the leadership in the definition and the application of sustainable development. In the 1990s, the Government of Canada is determined to consolidate this leadership role in the field of environment. Ultimately, our goal is to unite Canadians in a great common cause:
> **To make Canada, by the year 2000, the industrial world's most environmentally friendly country.**
> [emphasis as in original]

No such language is found in the final document. In its place is a much milder although still significant statement:

> The Government of Canada is prepared to show leadership on environmental matters. The Government will continue to define policy on national environmental issues and to advance Canada's environmental interests in the international community. Canada's role on such issues as ozone depletion, acid rain and global warming is indicative of the approach the Government of Canada will take in responding to the call for government leadership. (Canada 1990a, p. 17)

Caution is often said to be part of the Canadian psyche, but this wavering of ambition between March and December of 1990 goes far deeper than that. It signals a real ambivalence over the conflict between environment and economic development, an ambivalence that has definitely affected our performance in

seeking and implementing environmental standards. The struggle to balance forestry earnings and jobs against environmental quality and nontimber uses for our forests is one of the most obvious examples, but there are many others. Our past performance leaves little room for complacency. On a per capita basis, Canadians use more energy and produce more garbage than citizens of any other country. Our land-use practices are among the most devastating found anywhere. Our harbours and waterways are polluted, and the Atlantic fishing industry is in a state of crisis.

This state of affairs has not gone unnoticed. Our forest practices, especially in the rain forests of British Columbia, have come under increasing attack in recent years. Our profligate use of energy is roundly criticized. Animal-rights activists (especially in Europe) have had a devastating effect on the livelihoods of people in the north, who depend largely on the fur trade. Canada is also in the spotlight over its treatment of indigenous peoples. The James Bay II hydroelectric project (see Chapter 9) wraps up most of these concerns in one neat package and has become the target of enormous opposition both in Canada and the United States.

Yet, despite the manifold problems, many countries expect Canada to be a leader in the environmental field, for the following reasons:

- Our experience (including both successes and failures) in developing and managing the world's second or third largest natural resource base;

- Our determination over issues of regional environmental significance, such as Great Lakes clean-up and acid rain negotiations;

- Our middle-power status, which places us in a less threatening position than that of the superpowers in bilateral and international negotiations over environmental issues — Canada also shares concerns with developing nations: a good

example is the protracted negotiations over the Law of the Sea;

- Our support of scientific research into global environmental change and our important role in many international research and policy organizations in the field of environment and resource management; and

- Our past role in helping to establish a global dialogue on environment and development; the list of initiatives and individuals is long and continues to grow.

Canada has played host to a number of major environmental meetings at the global level. These include the United Nations Conference on Human Settlement in Vancouver, 1976; the meeting that resulted in the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987; the Conference on the Changing Atmosphere, Toronto, 1988; and Globe '90 and '92, both of which combined a scientific conference and an international trade fair promoting practical solutions for sustainable development. The Canadian government has also set up the International Institute for Sustainable Development in Winnipeg.

Worldwide, Canadians are involved in a great many non-governmental organizations (NGOs). Canada is the birthplace of Greenpeace, for instance, and the World Council of Indigenous Peoples was founded here in 1975 and has its headquarters in Ottawa.

Canadian individuals have played a major role at the international level. Maurice Strong was the dynamic Secretary General of both the 1972 Stockholm meeting and the Earth Summit, and the first Executive Director of UNEP; Jim MacNeill was Secretary General of the World Commission on Environment and Development; David Munro is a former Director General of IUCN, the International Union for the Conservation of Nature and Natural Resources, and shepherded both the 1980 and the 1991 world conservation strategies to their delivery. As well, the eloquent messages delivered by Canadian writers and broadcasters, such

as David Suzuki and Farley Mowat, have a powerful influence on people far beyond our shores.

Canada also assumed an active and progressive stance in the Earth Summit process. The government set up a very high-level committee, bringing together the efforts of over 20 government departments and agencies. Many Canadian proposals received serious consideration at the negotiation table. At home, thousands of NGOs held meetings, wrote reports, and liaised with officials. Youth, women, native peoples; organizations representing environment, development, peace, and business interests; these and many others took part. For Canadians, then, the Earth Summit was an educational experience, and an understanding of the linkages between North and South was advanced. Our aim is to extend this understanding.

This Book

In this book, we have chosen aspects of three broad topics to illustrate the interdependence of Canada and environmental problems in the South: global atmospheric change, forests, and the rights of people, especially indigenous peoples, affected by changes in their natural environment. Wherever possible, we have tried to place these concerns in the far wider context of development in general. Our choice of topics is not arbitrary; these are critical themes for humanity and for the planet's health. Yet we have neglected several equally worthy themes, such as urbanization and local industrial pollution, and have only touched on agriculture, all of which are matters of interest to Canada. We have, however, tried to provide an in-depth analysis of our chosen themes, to point out the nature and extent of our interdependence, and to demonstrate at least some of the consequences of not responding to the current crisis of development in the South. To do this in the confines of a single volume, focus is necessary.

In most of the chapters, we have tried to draw parallels

between conditions in the South and in Canada; a discussion of trade in tropical timber, for instance, would be incomplete if we did not examine our own massive industry and some of its problems. We also discuss a selection of international initiatives that address problems of environment and development, and Canada's participation and effectiveness in these initiatives. Here, our choice is arbitrary. There is an enormous range of organizations, treaties, and public interest groups now engaged in these topics at the international level.

The book is divided into five parts: two introductory chapters and a concluding section flank the three major topics, each of which is introduced in a short overview. In the second of the two introductory chapters, we discuss some of the manifestations of environmental change in the South and give some idea of the underlying causes.

The most uncertain, and potentially the most serious environmental threat facing the world, other than nuclear war, is global atmospheric change, the subject of Part II. In Chapter 3 we outline the science of global warming and ozone depletion and look at some of the impacts that these phenomena might have on the South and on Canada. Although the North has been responsible for most past emissions of the gases implicated in global change, industrial growth, deforestation, and other factors are likely to tip the balance toward the developing world over the next decade or two. In Chapter 4, the thorny topics of the politics, economics, and policy dimensions of global atmospheric change are tackled. These are the major imponderables of an impossibly complex subject.

Part III deals with various aspects of forests, selected because they illustrate the relationship of Canada to deforestation both here and in the South. In Chapter 5, we deal with trade in tropical timber and other commodities grown on lands cleared of forest in the developing world. This is discussed in the context of Canada's own forest industry: we are the world's leading exporter of wood and wood products, and our forest management practices have come under increasing attack over the last few years.

In Chapter 6, we discuss Canada's wider involvement in tropical forest issues: business interests, including the Canadian nature tourism industry, the growing involvement of NGOs, and our official development assistance (aid) policies in the sector. Again, the picture in Canada is just as fascinating: our forests are increasingly coming under foreign control as part of the process of globalization.

In Chapter 7, we narrow the focus to look at two conservation concerns: trade in endangered species and the plight of our migratory birds, which are threatened by development pressures throughout the Americas. Our main concern is Canada's compliance with international agreements aimed at conserving biodiversity. As yet, there are no binding international agreements that specifically target forests, but the success or otherwise of conservation treaties already in force may provide some ominous signals that many of the agreements reached at the Earth Summit will be difficult to enforce.

Part IV looks at the human face of environmental degradation, at the rights of people to land and resources. Increasingly, people are fleeing degraded lands, although often the immediate trigger is war, famine, or disaster. These "environmental refugees," discussed in Chapter 8, may well put more pressure on Canada not only for immigration but also, and perhaps more significantly, on already overburdened development assistance budgets. We examine two case studies: El Salvador and Ethiopia.

Chapter 9 is concerned with the growing power of indigenous peoples. Development in both the North and the South has been at the expense of indigenous culture and systems of resource management. Scattered as they are in small communities, often in remote places, these people were unable in the past to press their views in a united fashion. Today, however, indigenous peoples in many areas of the world, and especially in Canada, are finally organizing to press their claims over land and resources. Their struggles are being recognized in the UN and assisted by a network of NGOs, both native and non-native. Sophisticated tactics are being used. Settlement of their claims may well lead

to changes in the way resources are managed over large areas of land, and have impacts on dominant societies in North and South alike.

One thread ties together the chapters of this book, even if only loosely. This thread is the rapidly disappearing rain forest, which, to many Canadians, is the most fascinating habitat of all. Moist forests play a part in each of the sections of this book: their destruction is a major factor in global warming, their products are traded at bargain-basement prices, their flora and fauna are in danger, their indigenous peoples dispossessed. To some extent, this explains the tropical focus of most of the chapters, and our neglect, for instance, of the Southern Cone countries of Latin America. As Canadians, we have a powerful interest in forests, in their preservation and wise use, as we argue over the liquidation of the last remnants of our own primary forests in British Columbia and the North.

Conclusion

Throughout this book, we show again and again how very difficult it is to make progress on environmental matters. The stakes involved are so high that it is usually easier to ignore problems or to downgrade their actual or potential significance than to act. Yet, as noted in *The Economist*,

> At one time environment ministers and their officials stayed at home and worried about dirty rivers and smoky air. No longer. These days they jet from city to city, haggling far into the night over clauses and sub-clauses, just like defence experts or trade ministers. (*Economist* 1990)

The issue of sustainable development is now recognized as part of the nation-state's economic well-being and security. It will be on the political agenda for decades to come and will, over time, become as important as any in the dialogue between rich and poor nations. But the concerns to be discussed in this volume will not go away with benign neglect, nor are there any easy or

permanent solutions. They are fundamental problems related to the adjustments required for a huge and growing population to survive on this planet, problems that stem as much from the inequitable distribution of wealth as they do from population growth. In a world that has been transformed from a multitude of tribes, villages, and small city states into Marshall McLuhan's "global village" in just a few centuries, we are all involved, each of us dependent on the other. It is essential that we recognize this interdependence and seek solutions that are satisfactory to people and nations everywhere, even as we worry about our own well-being.

The world set itself a punishing and perhaps unrealistic timetable in its preparations for the Earth Summit. It was almost a foregone conclusion that the Summit would disappoint the enormous expectations that were laid at its door. Yet much was achieved and many valuable steps were taken, even if we might have hoped for more. The basic premise remains: for there to be any hope for the generations to come, there must be a new global partnership between North and South, East and West, rich and poor. This will require great courage of vision, fundamental changes in the policies and institutions that shape our world, and even a redefinition of the very concept of sovereignty.

With the manifold problems in Eastern Europe and the former Soviet Union and our own political and economic turmoil, we in Canada already have more than enough to hold our attention. Do we, then, have the political will to make the right decisions, to change forever the path of our development? The Earth Summit, and the negotiations that follow it, may well determine whether the governments of the world are willing to bite the bullet. The chief fear is that the agreements reached will be hollow vessels, unenforceable and unenforced.

Chapter 2

Environmental Change in the South

> *Environmental degradation, first seen as mainly a problem of the rich nations and a side effect of industrial wealth, has become a survival issue for developing nations. It is part of the downward spiral of linked ecological and economic decline in which many of the poorest nations are trapped.*
>
> WCED (1987, p. xi)

Canada is tied inextricably to the tropical world. It is connected by the forces that shape our climate, by the Earth's great wind systems, by ocean currents, by the cycles of chemical elements. Yet only in recent years have scientists begun to understand the full impact of these region-to-region linkages that serve to remind us of our mutual vulnerability. Indeed, our knowledge of the functioning of global climate systems and of the ecological processes of the biosphere is still far from complete.

In this chapter, we discuss some of the least understood and most poorly monitored ecosystems on Earth, those of the developing world. Our main focus is the rapid and massive environmental change that has resulted from the pressures of development, change that is leading to a decline in resources and ecological support functions and to great human misery.

What Distinguishes the Environments of the South?

Countries of the developing world are not easily classified either by their environmental characteristics or by the stresses on their ecosystems. The snows of Kilimanjaro and the Himalayas are more akin to the Arctic than to the deserts and jungles of the lowland tropics. The Southern Cone countries of Latin America are almost entirely outside the tropics. Nations like China and India span both temperate and tropical latitudes and harbour a greater array of ecological conditions than do Canada or Western Europe. The tropics, where much of the world's development assistance is spent, include both areas that are virtual biological deserts and ecosystems with the richest biodiversity, the tropical rain forests and coral reefs. Small island nations, landlocked states, and the arid zones all demand exacting management skills just to maintain marginal production systems. Yet in the developing countries are also some of the most admired and productive agricultural systems on Earth, such as the elaborate home gardens and irrigated rice fields of Southeast Asia.

Life in the tropics has evolved without the disruption of glaciation. Heat, moisture, and time have brought a wild exuberance of plant and animal life and, for humans, a plethora of pests and diseases. Perhaps three-quarters of all the world's biological diversity is found in these regions. Tropical rain forests alone are thought to contain at least half of all species on just 7 percent of the Earth's surface. Eleven of the world's 12 "megadiversity countries," which between them account for 60 to 70 percent or more of the world's biodiversity, are in the South: Brazil, China, Colombia, Ecuador, India, Indonesia, Madagascar, Malaysia, Mexico, Peru, and Zaire (McNeely et al. 1990, p. 88). Some of these countries have high numbers of endemic species, found nowhere else. Many developing countries thus have a species diversity that far exceeds Canada's, often in quite small areas (Table 1). Madagascar, for instance, has five times more tree

Table 1. Plant and animal species in high-diversity developing countries and in Canada.

Country	Mammals	Birds	Reptiles	Angiosperm plants[a]
Brazil	428	1 622	467	**55 000**
China	394	1 195	278	27 000
Colombia	359	**1 721**	383	45 000
Indonesia	**515**	1 519	600[a]	20 000
Zaire	409	1 086	280	10 000
Canada	147	394	45	3 100

Note: Values emphasized in bold type represent the highest diversity of any country in the world.

Source: For developing countries, McNeely et al. (1990); for Canada, Statistics Canada (1986), Scoggan (1979), and Cook (1984).

[a] Approximate numbers.

species than are found in all of North America, and more bird species in just one park of 2 thousand square kilometres than in all of North America (Lean et al. 1990, p. 133).

The enormous diversity and productivity of some tropical ecosystems, however, masks their great fragility and the essential infertility of most soils. In tropical rain forests, for instance, virtually all nutrients are tied up in living material. The forest floor is covered by a thin layer of roots and fungal mycelia that efficiently recycle fallen leaves; there is little or no humus. Once stripped of this cover, most forest soils oxidize to a hard lateritic shell, erode, or even turn to sand. Other environments, such as mountainsides, may be just as vulnerable if treated carelessly. In some places, the damage is more subtle: a gradual breakdown to a lower productivity level or a loss of species diversity. In others, there may be catastrophic impacts: massive landslides such as those in Thailand and the Philippines, wind erosion in western India and the African Sahel, destruction of waterways in most countries, and changes in coastlines.

Humans have adapted to these constraints in many ways. There is a large array of practices, developed by a great diversity of cultures, that determines how resources are used. Frequently,

small areas are cleared, cultivated for a few years until soil nutrients decline and weeds become unmanageable, and then abandoned for years or decades. Such fallow periods allow soil nutrients to regenerate so that the area can be cleared again. Indeed, a surprising amount of the world's so-called "virgin" forest is managed in this way. To the untutored eye, it stretches serene and untouched, but such forests may actually be mosaics of different-aged vegetation. Shifting cultivation, when practiced by small populations, can be an entirely sustainable use of resources and has allowed humans to live in a wide range of ecological conditions. In more arid regions, a variation on the theme is pastoral nomadism, in which animals are moved in tune with the seasons. This type of response to adversity, however, is crumbling under the onslaught of growing populations and the grasping reach of the global economy.

Population and Environment

Human population growth is one of the most striking characteristics of developing nations. No problem is more threatening or seems more intractable. The balance of the world's population, moreover, is shifting rapidly. In 1960, developing countries accounted for 69 percent, or 2 billion, of the world's population. By 2025, they may account for 84 percent of a greatly expanded total, probably in excess of 8 billion. More telling, 93 percent of all new births are now taking place in the Third World (UNDP 1991, p. 80) and, although the rate of increase may have slowed in recent years, the absolute increase each year continues to grow. In 1990, the total rose by more than 92 million. Furthermore, the very youth of the South means that there remains a huge potential for future population increase. Over the last few years, UN predictions have become increasingly pessimistic. The 1992 report of the UN Fund for Population Activities predicted that world population is likely to reach 10 billion or more as early as 2050, with little chance of stabilization for a century or more beyond that date (UNFPA 1992).

In the developing world today, more than 1 billion people live in absolute poverty, unable to satisfy their basic needs. A further billion experience conditions that are little better. Poverty was once spread diffusely throughout much of the South, but the picture has changed in recent decades (Leonard 1989). In many of the most fertile and accessible areas, agricultural production, and thus average income, has risen with the introduction of Green Revolution techniques, commercialization, and the development of infrastructure (although smallholders and tenant farmers are often pushed from the land and thus do not benefit). In many other regions, agriculture has stagnated and poverty has increased. In Africa, for instance, per capita production has declined steadily since the 1960s. Lack of access to land is a major part of the problem in most regions. Indeed, "according to recent estimates, 13 per cent of all rural households in developing countries are landless, and almost 60 per cent have too little land to subsist" (Leonard 1989, p. 13).

Survival is thus the most important issue for a large portion of those living in the South. Increasingly, the poorest of the poor are being forced onto marginal land, much of which is ecologically fragile and has little agricultural potential. Others choose to move into squatter settlements on the fringes of rapidly growing urban areas, which have their own acute environmental problems. By the year 2000, almost 2 billion people will live in the cities of the South (UNDP 1990, p. 6). Thus, poverty has become geographically concentrated in parts of the developing world, creating a downward spiral of degradation that will be hard to break (Leonard 1989, p. 5). The rural problem can be seen most dramatically in sub-Saharan Africa, in the altiplano region of the Andean republics, in northeastern Brazil, in Central America, and in the southern countries of Asia; these are all areas that are suffering environmental degradation. By far the largest number of the world's poorest live in Asia, half of the total in South Asia alone, in Bangladesh, India, Nepal, Pakistan, and Sri Lanka.

There is no doubt that population growth is doing irremediable harm to the planet's capacity to sustain life and seriously undermining the efforts of these nations to improve living conditions for their people. In some regions, the limits have already been reached; in others, the situation is critical. But the relationship between population and environment is far from straightforward. The environmental problems that afflict the Third World are not merely the result of human numbers, but rather the product of a complex web of cause and effect. Just as crucial are the social, religious, cultural, and political structures in each society and their interaction with the larger global scene.

Why is it that so many people have such little access to the resources needed to support them? As we will show over and over again, environmental degradation can be blamed on the inequities in and between nations, on international debt, on national and international business approaches, on faulty agricultural and resource policies, on war, on extreme poverty, and on gross inequalities in the distribution of land, all of which force people to use resources unwisely in a desperate quest for survival, or encourage them to mine resources for profit. Traditional land-tenure systems, particularly those with communal rights and customary rules governing resource use, are crumbling under a host of external pressures, leaving resources open to exploitation. Ill-advised attempts to help have often been just as destructive. Many development projects, including some roads, dams, agricultural, and irrigation projects, indeed an almost endless list, have worsened already desperate situations (Adams and Solomon 1985). In addition, greed and corruption reign supreme over land and sea.

Resource Exploitation Pressures

Population is not merely a problem of the South. In the North, the rate of population growth has slowed and depends largely on immigration. But each child born in the North consumes far more resources during a lifetime than does a child born in the South,

and thus has a much larger impact on the environment. The North's complex economy and profligate use of resources involves it in an immense amount of trade with other countries. The net result is a "phantom population effect" in which the land and resources of one nation support the economic activities and consumer needs of another. The Netherlands, for instance, touted as a wonder of productive efficiency, is only able to sustain its high standard of living because it imports huge quantities of fossil fuel, agricultural commodities, fish meal, and so on. This is true of most industrial economies, including Canada. Indeed, "skyrocketing consumption is the hallmark of our era" (Durning 1991, p. 154), and the ethos is spreading rapidly in the South and in Eastern Europe, where consumption levels have historically been far lower. What has clearly emerged is a pattern in which some of the worst impacts of such trade are being felt in tropical regions. Much of the loss is indirect, as people are forced to farm marginal areas when the best land is allocated for export crops.

Echoing the demand from the North is the urgent need of the South to earn foreign exchange. Natural resource capital is an obvious target because it can be drawn down quickly, with little of the investment needed to set up secondary manufacturing industries. The way in which resources are exploited to feed both local demand and the export trade is of enormous importance for the environment. It is becoming clear that the patterns of resource exploitation promoted in the North are largely unsustainable. When transferred to the South, their effects are magnified even further. Temperate-zone theories and practices are often completely inappropriate for the tropics, and countries in the South lack the ability to invest enough in management and maintenance. Corruption frequently compounds the problem and the net result is terrible inefficiency and waste.

Flawed government policies and a lack of control have hastened the pillage of resources. In the case of the tropical timber trade, these include the granting of short-term concessions, failure to set or collect adequate taxes, subsidies for roads, land clearance and processing plants, and poorly written or enforced

forest agreements (Repetto and Gillis 1988). Since governments capture so very little of the "rent" or profit gained from the sale of resources, companies are able to reap huge rewards, with little thought given to sustainable development.

Another problem is the growth of export markets for low-grade crops such as cassava. This root crop is exported to European Community countries for use as cattle feed, although in the tropics it is a valuable food for people. Indonesia and Thailand have cleared forest areas specifically for this low-value food item. To make matters worse, as more and more countries in the South promote such commodities, prices have become unstable and, indeed, have often collapsed, leading to a need to export ever larger volumes.

Mangroves are an example of tropical ecosystems rapidly crumbling under such pressures. Intact, these coastal fringe forests have great value, protecting shorelines and acting as a nursery for many marine organisms. To importing countries such as Japan, their wood can be used as pulp and the lands they occupy can be cleared for shrimp pond aquaculture. In the past decade countries such as Ecuador, Indonesia, Thailand, and the Philippines have reaped great short-term profits from the combination of mangrove cutting and chipping, offshore trawling for shrimp, and aquaculture development. This is an export-driven development effort, and the costs now remain to be paid. These costs include the loss of traditional livelihoods, a host of environmental impacts, and significant new sources of social tension.

Environmental Problems in the South

Whatever the causes of the growing environmental crisis in the South, the effects become more obvious every day, although the extent of the problem is difficult to gauge. Many changes are insidious, data are unreliable and incomplete, and detailed research often reveals how little we know. A good example is "reckless deforestation" in the Himalayas, widely proclaimed as

the direct cause of siltation and much of the flooding in Bangladesh. However, recent studies have challenged this view (Ives and Messerli 1989; Ives 1991). They suggest that more natural causes such as torrential rain, steep slopes, erosion-prone rocks, and seismic activity may be to blame and that farmers may actually reduce, rather than increase, the number of landslides, at least in Nepal. The studies do, however, emphasize the rapidly developing crisis in that country and the need for more research.

In this section, we briefly sketch some of the significant environmental problems of the South. This discussion is intended merely to set the stage for the chapters that follow, to give some idea of the dimensions of the problem. The complexity of the topic is hard to overstate and the categories are artificial: the problems in reality form a continuum, a part of the web of cause and effect.

Deforestation

Deforestation has been a part of human history since preagricultural times. In most temperate regions, forest area has stabilized to a large extent, although pollution and overcutting are taking a toll in many areas. Today, tree loss is most acute in the developing world, which holds just over half the world's forests, and the rate of loss appears to be accelerating. A 1980 estimate by the Food and Agricultural Organization of the United Nations (FAO) reported that 11.4 million hectares were disappearing each year (Lanly 1982); by 1990, the UN put the figure at 17 million hectares. The World Resources Institute (WRI) has reviewed studies done during the 1980s and suggests that as much as 20.4 million hectares of tropical forest (roughly the size of Ghana) may be cleared each year. It is, however, remarkably difficult to measure deforestation and these figures can be used only as rough guides.

Large differences in data from year to year in the 1980s partly reflect Brazil's changing policies toward development in the Amazon; in 1987, as much as 8 million hectares may have been

burned in a last-minute rush by landowners to cash in on tax credits, which have since been canceled (WRI 1990a, pp. 102–103). All these figures measure only the conversion of forest to other uses and do not include the far greater degradation of open forests and savannah regions. Apart from Brazil, other major countries that clear large areas of closed forest are India, Indonesia, Myanmar, and Thailand. On a percentage basis, however, the highest rates of deforestation occur in smaller countries. Costa Rica, for instance, is estimated to be losing almost 8 percent of its forests each year (WRI 1990a).

Deforestation has three immediate causes (WRI 1990a, pp. 7–8). Permanent conversion to agricultural land is the first. In many countries, government policies encourage the settlement of new lands and the establishment of cash crops or ranches. Often, title is only acquired if much of the land is first cleared; in this process, customary rights to land are usually ignored. Government-sponsored colonization is undertaken as a way of relieving population pressure in other areas, thereby avoiding land reform and establishing sovereignty in border regions. Usually, little attention is given to the sustainability of the new land. Cattle ranching has been a particularly destructive influence in Latin America.

The second major cause is the demand for fuelwood and other forest products. Indeed, about 43 percent of all wood cut in the world is used as fuelwood or charcoal in developing nations (FAO 1990). Already, 1.3 billion people are consuming fuelwood at a faster rate than it can be replaced (Lean et al. 1990, p. 7). In dry tropical regions, such as the African Sahel, the mountainous areas of Latin America, parts of India, and in an expanding ring around many cities such as Ouagadougou in Burkina Faso, this is leading to serious land degradation and causing considerable human suffering. This is the real energy crisis in the South and it can only get worse.

Logging in tropical moist forests, which we discuss in Chapter 5, is the last factor, particularly in West Africa and Southeast Asia. Almost nowhere is this carried out sustainably, nor do local

people benefit. Even more damaging than the logging itself, however, is often the flood of migrants who use logging roads to gain access to previously impenetrable areas.

Land Degradation

Land degradation, a major problem all over the world, is most serious in developing countries. All over the South, traditional systems of crop rotation are being shortened or eliminated. Agriculture is being extended onto lands more suitable for grazing, forcing pastoralists into even more arid areas. In forests, shifting cultivation, or slash-and-burn agriculture, is carried out unsustainably, often by new settlers, who lack the traditional knowledge so necessary for sustainable production. As vegetation is cleared in vulnerable areas, a cycle of degradation is set in motion. Plants help to bind soil and their removal leads to erosion, increased rainwater runoff, and flooding downstream. The situation is worsened as people turn to manure and crop residues as sources of fuel, thereby stripping soils of nutrients and organic matter. Hillsides and watersheds are being seriously damaged in many areas; aerial shots of Madagascar and Haiti, for instance, reveal unimaginable moonscapes. Erosion rates in several Central American countries, where soil is washed from denuded mountainsides, are estimated to have reached 500 million tonnes per hectare per year. For comparison, the average annual rate in the United States is about 18 million tonnes per hectare (WRI 1990a, p. 190).

Land is also ruined by faulty irrigation practices; waterlogging and high concentrations of salt reduce productivity and often lead to abandonment. Asia has by far the largest area under irrigation (140 million hectares compared with 29 million hectares in North America) and three countries — China, India, and Pakistan — account for most of the irrigation water withdrawn (WRI 1990a, p. 172). In these countries, many millions of hectares of productive land have been abandoned. Egypt, which depends

on irrigation for most of its agriculture, has suffered diminished crop yields on about half of its irrigated land (Postel 1990, p. 44).

Desertification

Desertification is the natural extension of the processes of land degradation, the culmination of a long process of destruction, although the term is usually restricted to dryland areas. Eventually, land becomes so degraded that it is difficult if not impossible to restore its productive potential. The areas of the world most under threat include the Middle East, northwestern India, northeastern Brazil, the southern (former) Soviet Union, and Australia. Africa, with its fragile soils and frequent droughts, is particularly endangered: the Sahel was once able to support higher human populations. UNEP estimates that about 3.3 billion hectares of productive land are endangered by desertification, while 6 million hectares become wasteland each year. Careful assessment of this and other studies, however, reveals that far too little is known about the extent of the problem and how reversible the process is, and far too little is known about the relative importance of natural fluctuations in climate and the influence of humans and their domestic animals (Nelson 1988). As a result of the Earth Summit, a convention on desertification will likely be negotiated by the mid-1990s.

The Food Crisis

Over the last two decades, there have been huge increases in global food production, brought about by the spread of modern agriculture and the Green Revolution. Yet the number of hungry people is growing and one in three children in the South suffers from serious malnutrition (UNDP 1990, p. 27). Hunger is caused in large part by economic and social factors, especially poverty, and by uneven distribution of food. Global figures conceal stark regional disparities.

Many worldwide trends give additional cause for alarm. Most of the easy gains of the Green Revolution appear to have been

made already. Land degradation, as we have seen, is leading to reductions in agricultural productivity; pollution is also playing a part. A large amount of land is lost for nonfarm purposes, such as buildings and roads, but there are few new croplands left to develop, except in those countries like Brazil, where inequities in ownership have left huge areas unfarmed. For Africa, where the crisis is most acute, and more than 100 million people already have insecure supplies of food, FAO has estimated that agricultural production could be reduced by one-quarter between 1975 and 2000 (Brown and Young 1990, p. 60).

The result of all these factors is most easily seen in grain production. About half of the calories consumed in the world come from cereals. Between 1950 and 1984, world grain production soared by a factor of 2.6, outstripping population growth. In the late 1980s, however, progress slowed and widespread droughts in 1987 and 1988 revealed the great vulnerability of global food stocks. The harvest of 1989, a year with near-normal weather, fell 18 million tonnes short of the projected global consumption of 1.685 billion tonnes (Brown and Young 1990, p. 59).

Urbanization and Industrialization

Survival in the countryside has thus become very difficult in many areas of the South. Migration to urban centres appears to be inevitable and is happening at a pace that is without historical precedent. Much of the growth is occurring in major centres, in megacities such as Cairo, Lagos, Mexico City, New Delhi, São Paulo, and Shanghai. By 2000, there will be 50 cities in the South with populations greater than 4 million, and 18 with more than 10 million (UNDP 1990, p. 85).

The rate and degree of urbanization varies from region to region. Latin America had a head start on the process. By 1990, 72 percent of its people lived in cities; by 2025, 85 percent may do so. Mexico City's population, now 19 million, is projected to rise to 24.4 million by the year 2000; São Paulo's, to 23.6 million

(WRI 1990a, pp. 39–40). Growth rates, however, are higher in Africa, where the urban population may double between 1985 and 2000 (UNDP 1990, p. 85). But it is in Asia where the greatest absolute growth is occurring. Already 41 percent of the world's urban population lives in Asian cities; by 2025, the proportion will rise to 50 percent, or 2.2 billion people. In many Asian and Latin American cities, most of this growth will come from natural increase of the very young urban dwellers; in Africa, rural–urban migration will continue to provide more than half of the increase.

This rapid increase severely taxes the ability of cities to provide basic services. Most urban poor lack access to clean water, sanitation, health care, and adequate housing. Many live in extremely precarious situations on land prone to disaster: on hillsides surrounding Latin American cities, on river floodplains in Asia, and in the shadow of factories wherever they occur.

Industrialization compounds the problem. Western technologies have been adopted without the safeguards, such as they are, that have been developed in the West in recent decades. Even in advanced industrial societies with strictly controlled effluents, hazardous wastes continue to accumulate in alarming quantities. In the South, only a few countries have large industrial sectors, but effluents are mostly unregulated and unmonitored, so that water, land, and air pollution easily reach levels that are dangerous to human health. Particulate matter in the air, for instance, exceeds World Health Organization (WHO) standards by as much as five times in Beijing, New Delhi, Shanghai, and Xian, to name just a few cities (French 1990, p. 100). Mexico City is an extreme example. Situated in a valley where pollutants are trapped by air inversions, 36 thousand factories and 3 million vehicles pour out 5.5 million tonnes of contaminants each year (WRI 1990a, p. 40). Seven out of every 10 babies born in Mexico City have lead levels in their blood above WHO standards (French 1990, p. 100).

Rivers, estuaries, and coastal zones are often heavily polluted by industrial effluent and sewage and their biota contaminated. Less than 2 percent of sewage in Latin American cities is treated (WRI 1990a, p. 67). In some areas, such as in and around

Bangkok, the groundwater has been severely depleted by pumping and is also threatened by pollution. Acid rain can damage surrounding forests, already denuded by demands for timber and fuelwood. Chemical spills, industrial accidents, and uncontrolled dumps add to the list. Other sources of pollution in the South include fertilizer runoff, pesticides, and mining wastes.

But even though pollution is a serious problem in some areas, it is well to remember that it is still primarily the countries of the North that are responsible for the bulk of industrial effluents in the world. Above all, Eastern Europe and the former Soviet Union have unimaginable levels of pollution and unimaginable waste and inefficiency in they way they use resources (IMF 1991). Cities are massively polluted by industrial effluents and the countryside by pesticides and chemical fertilizers. Chernobyl's deadly rain of radiation provided just one more insult to the health of people in the region. The Aral Sea has been declared an ecological disaster beyond human control by the Soviet Union. Shrunken to half its former size, it has supported no fish for almost a decade, while salt and dust from the dried seabed scour cotton fields, already drenched with pesticides and herbicides.

Water

Water problems are not only an urban phenomenon. About half the people of the South do not have access to clean drinking water; about three-quarters have no sanitation (Lean et al. 1990, p. 29). In some countries, the problem is much greater than in others. In Sierra Leone and Swaziland, for instance, 93 percent of rural people lack clean water. The amount of water is as critical as its quality. Water shortages are chronic in 80 countries worldwide and the crisis is worsening. The pumping of groundwater has been encouraged in drylands in North and South alike, especially for agricultural purposes. Water tables are falling rapidly in many areas: in Tamil Nadu, India, the water table has fallen 25 metres in 10 years (Lean et al. 1990, p. 57), placing it out of reach for all but the wealthy.

Many countries are embarking on megaprojects to provide water and hydroelectric power. Most, if not all, will have major social and ecological impacts, often involving other countries. Libya, for instance, is undertaking a 27 billion USD project to mine the ancient aquifers of the Sahara (Pearce 1991, p. 38). India plans to build over 3 thousand dams and barrages on the Narmada River and its tributaries over the next century, displacing more than a million people (Gokhale 1991, p. 77). Disputes over shared water resources are common all over the world. In the Middle East, it is a particularly volatile issue. Control of the Nile is the extreme case.

Fisheries Resources and the Oceans

Eight of the world's biggest fishing countries are in the South and the fisheries have become a valuable source of foreign exchange. But many near-shore waters are becoming fished out, particularly in South and Southeast Asia and in some areas around East and West Africa. Much of the exploitation results from increased local consumption, and many poor fishers resort to dynamiting reefs and waters to increase their catch (Lean et al. 1990, pp. 159–160). In some areas, exploitation by foreign fleets, particularly from Japan and Europe, is far more important. The coastal zones are also vulnerable to destruction from a host of sources: from pollution, from siltation associated with agriculture, mining, and logging, and from dredging and construction.

Militarization

Militarization in the South has had striking effects on the environment, both directly and in the adverse implications it has for development. Since 1945, there have been about 120 armed conflicts in developing countries, with a combined death toll of at least 20 million people (Renner 1989, p. 35). Most are civil wars, and many of the struggles have continued intermittently for years and even decades. Arms imports into countries of the South have been encouraged by the superpowers, who have been

involved, on the sidelines, in many of the conflicts. Sales to the South, although merely a fraction of global arms production, increased from 1.1 billion USD in 1960 to almost 35 billion USD in 1987. Total military expenditure in the South reached 160 billion USD in 1986 (UNDP 1990, pp. 76–77).

The environmental costs of war are manifold. Kuwait, with its burning oil wells, extreme air and water pollution, and large areas made uninhabitable by land mines, is unique but different only in degree from other battlefields. Scorched-earth tactics have been a part of warfare for thousands of years; modern equipment merely compounds the problem. The human costs are also beyond count. Rebels in Mozambique, a land of great agricultural potential, have terrorized rural areas to such an extent that agriculture has become impossible and famine is inevitable.

Disease

Human health is closely related both to the level of development in a country and to its environment. All of the problems discussed here have grave implications for people in the South, but, in addition, the tropics have afflictions of their own, a collection of parasitic diseases that thrive in hot climates. These are of course exacerbated by poverty, malnutrition, and overcrowded and unsanitary living conditions. Population pressures also force people to live in areas with known problems.

Four-fifths of disease in the South is water related. Diarrhoeal diseases kill about 4 million children each year. Cholera, the deadliest of them all, is endemic in many developing countries, is on the rise in Africa, and spreading like wildfire in Latin America. Many parasitic diseases are also water related. Malaria threatens about half the world's population and is endemic in 102 countries. Despite massive campaigns in the 1950s and 1960s, it has rebounded, in part because mosquitoes and parasite have developed resistance to chemicals. Perhaps 100 million people contract the disease each year (although only 10 million cases are reported) and 1 million die. About 80 percent of reported

cases occur in sub-Saharan Africa (UNDP 1990, p. 40). Malaria thrives where population growth, warfare, and environmental degradation force people without immunity into new areas. For example, there has been an explosion of malaria cases in the Amazon in recent years. It is encouraged where development results in uncontrolled breeding sites, such as irrigation canals.

In the South, air pollution adds to the burden of respiratory disease, already high because of cramped housing and malnutrition. Sixty percent of Calcutta's population is affected, and deaths from lung cancer in Chinese cities are four to seven times the national average (UNDP 1990, p. 8). Pesticide poisoning in developing countries kills 10 thousand people each year and affects almost half a million.

The net effect of disease and malnutrition is to curtail production and to stunt human lives and potential even further. For a child, the legacy of famine can include severe mental retardation. However, the greatest danger of all probably lies in AIDS, acquired immune deficiency syndrome, which mostly affects young adults and children. WHO estimates that by the year 2000, out of a cumulative world total of 30 to 40 million, more than 90 percent of people infected with HIV (human immunodeficiency virus) will be in the South (Mickleburgh 1992). In East Africa, AIDS has already reached crisis proportions; in parts of Asia and Latin America, infection rates are exploding. The spread is rapid and deadly, and may be exacerbated in these communities because the immune systems of many people are already impaired by parasitic disease and malnutrition.

Loss of Biodiversity

The last and potentially most significant of all the issues we discuss in this chapter is the loss of biological diversity. Throughout the world, habitat alteration, overharvesting, chemical pollution, human population increase, and introduced species are acting in concert to dramatically reduce ecosystem diversity, species diversity, and genetic variability within species. Nowhere

is this more urgent than in the South. The plight of tropical rain forests is well known, but many other valuable and diverse ecosystems, especially coral reefs, are equally under attack.

In *Conserving the World's Biological Diversity* (McNeeley et al. 1990), there are numerous tables documenting this problem. In the most densely populated and ecologically stressed countries, for instance, little wildlife habitat remains: in Ethiopia, 30 percent; in Sri Lanka, 17 percent; in Rwanda, just 13 percent; in Bangladesh, a tiny 6 percent (McNeeley et al. 1990, pp. 46–47). Yet, shocking as they are, these figures conceal the far greater habitat destruction in parts of these countries. Large areas of Ethiopia, for instance, have never been suitable for human habitation and thus are little disturbed, but in the rest of the country the forests have been stripped to almost nothing.

Species loss is most critical on islands and in small discrete ecosystems, especially those that have been isolated for long periods of time. Madagascar, with its exceptional number of endemic species and devastating rates of land degradation, is a perfect example. The Amazon Basin, a symbol of biodiversity under assault, is still relatively intact, although some regions have been massively altered. The richness in plant species of the Amazon is, however, rivaled by far smaller areas in Central America, the northern Andes, and especially the Atlantic coast forest of Brazil, where deforestation is almost complete (Henderson et al. 1991). Other "hotspots" or particularly endangered areas are in Borneo, Cameroon, Hawaii, Sulawesi, and the mountains of Tanzania (McNeely et al. 1990, pp. 86–87).

Loss of diversity has grave implications for humanity. We have depended on the genetic wealth of species in the wild and on local crop varieties for millennia. With biotechnology, we now have the potential to tap the riches of a far wider range of species, to develop resistance to pests and disease in our crops, to raise productivity, and to develop new products; but if the cupboard is bare, such potential can never be developed.

Perspectives on Nations of the South

This brief snapshot has revealed a devastating picture of life in the South. There is, however, enormous diversity in these nations, both in their resource endowments and in their level of development. There are still countries that have some hope for the future, still vast tracts of primary forest, still large areas of fertile soil capable of supporting future generations. Change can also occur at an astonishing rate if the money and determination for action are present.

The environmental state of each nation is a function of many factors, as we have shown. A simple model would include the following variables:

Environmental impact = f (resource base, population size and growth rate, domestic consumption, resource export, industrialization strategy)

These variables are in turn influenced by the economic, cultural, and political climate of each country, especially as they affect people's access to land and the security of their livelihoods. In particular, government policies toward almost every aspect of life significantly affect the way people interact with their local environments. Yet, from this great variety of nations, certain groups of countries inevitably stand out in any study of developing countries and environmental concerns.

The Big Three

Because of their size, population, and resource endowments, three developing countries have the potential to have a powerful effect on the world's environment and thus to play a pivotal role in international negotiations on the future of the Earth: Brazil, China, and India.

China and India together account for almost 40 percent of the world's population. In India, despite birth and death rates that are relatively low for very poor countries, population continues to climb at a rate of 2 percent per year and is expected to surpass

1 billion by the year 2000. China's one-child policy has faltered, especially in rural areas, and the current rate of increase (1.3 percent) poses an enormous challenge for a country already stretched to the limits, already with the most intensive land-use practices anywhere in the world (UNDP 1990, p. 168).

Both China and India have high rates of deforestation and desertification, although China also plants far more trees than any other country in the world; both desperately need more water and are planning enormous hydroelectric and irrigation schemes; both have very high levels of air and water pollution in some regions yet wish to expand their already large industrial sectors with coal as the major source of energy. China and India are now, respectively, the fifth and sixth largest producers of greenhouse gases in the world (WRI 1990a, p. 17).

Brazil controls the future of much of the Amazon, the world's largest intact block of tropical forest. Faced with criticism over its bungled development strategies in that region, by urban and industrial blight, and with the economic and social consequences of heavy debt, Brazil has begun to examine options for a more environmentally sound pathway to economic growth. But sections of Brazilian society, especially the military, vigorously defend Brazil's right to use its resources in whatever way it sees fit. The country has also become a vocal critic of development policies in the North.

Midsized Developing Nations

Some midsized developing countries are comparable to Canada in terms of natural resource wealth and, perhaps, potential political significance. Some of these countries, such as Indonesia and Nigeria, have worked aggressively to convert their natural capital in the name of economic development. Some have cooperated closely with Canada on environmental matters because they have shared interests. The Law of the Sea negotiations are one example. Indonesia and Canada share an interest in the archipelagic principle, which allows a nation to exert control over all of the

ocean region in which its islands are set. Indonesia is also becoming a leader in efforts to incorporate sustainable development ideas in national planning.

Very Poor Nations

Bangladesh, El Salvador, Ethiopia, and Haiti are all prime examples of poor nations in danger of exceeding their carrying capacity. Carrying capacity, however, is a remarkably difficult measure in reality. It relates to a nation's ability to meet the basic needs of its people. Ecological conditions, economic strategies, and political stability all play a part. Arguably, even countries as rich in natural resources as Cambodia, Myanmar, and Uganda could slip into this unfortunate state through a combination of mismanagement and repression.

Future Directions

In almost every country in the South, environmental change has been dramatic, even startling in the years since Stockholm. Developing nations are struggling to comprehend the impacts of these changes and to design environmental protection and management strategies. For a Minister of the Environment in the South, the challenges are immense. First and foremost is the problem of rapid population growth and the long-term sustainability of development. Then there is the constant struggle to improve the quality of life for people in both rural and urban areas; to provide access to clean drinking water and sanitation, for instance. Many countries are also engaged in a desperate fight to build a base of protected areas before key habitats are destroyed.

A major problem for decision-makers is the great lack of data. Two decades ago, few countries, especially in the South, knew much about environmental conditions within their borders. Indeed, the incomplete and usually brief accounts provided in country papers at the Stockholm Conference give a measure of

how little was actually known. During the 1980s, however, many nations and NGOs initiated State of the Environment reporting, while development agencies (especially USAID, the United States Agency for International Development) embarked on similar country studies. By the end of the decade, the number of such reports was doubling every 4 years (WRI 1990b). Developing countries are building this base of knowledge because they recognize that "sound development planning must be based on a thorough assessment of [a] country's natural resources and their potential for sustaining economic growth" (WRI 1990b, p. 157). In recent years, there has been a move toward the creation of national environmental action plans and regional initiatives. Many countries of the South have also begun to reappraise their development strategies in light of *Our Common Future* (WCED 1987). The national reports prepared for the Earth Summit will give a great boost to this process.

Yet a Minister of the Environment in the South, as in Canada, must still face a skeptical cabinet when it comes to investing in environmental protection. In most nations, it is almost impossible to deal with problems that have their roots in land ownership or involve special privileges. Success is more likely in establishing environmental standards for projects such as a new dam or industrial park, although here, too, there are many dilemmas. For countries faced with staggering debt burdens and with the need to put every last unit of investment into productive and quick-yielding enterprises, the cost of financing environmental management and the question of monitoring and enforcement are heavy burdens.

Nevertheless, some nations in the South have begun to implement sophisticated planning techniques such as environmental impact assessment (EIA) and risk analysis. These techniques have become popular worldwide, but they are very burdensome for developing countries. Indonesia, for example, discovered that a strict application of the country's new EIA regulations would mean that more than 5 thousand projects would have to be screened — an impossible task. It is no wonder

then, that countries in the South, as well as the North, often move ahead with projects without a full consideration of their environmental and social risks.

Canada has supported these fledging attempts to institute environmental management in the South. The EMDI project (Environmental Management Development in Indonesia), for instance, is CIDA's largest capacity-building project; Canada helped to design Pakistan's National Conservation Strategy and to fund an International Cooperation Council for Environment and Development in China; the Purple Martin Fund (named for a bird that flies between Brazil and Canada) supports environmental initiatives in Brazil. Yet these efforts seem very limited in the face of the needs of the South.

What is the bottom line, then, for a Minister of the Environment in the South? Can he or she ever expect to halt the rate of destructive change or deal with countries of the North on any kind of equal footing at the negotiation table? The essential conclusion is that success is unlikely unless there is far more support from governments in the South, an enormous amount of new investment, and a concerted effort on the part of the international community. Yet the local and regional problems we describe in this chapter are but the tip of the iceberg. Perhaps as threatening are the potential impacts of global atmospheric change, the theme of the next chapter.

PART II

GLOBAL CLIMATE CHANGE AND OZONE DEPLETION

Overview

No issue stands out more clearly than global climate change when we examine ecological interdependence among nations. No issue could so profoundly affect our economic base or could so destabilize our social and ecological systems.

The atmosphere is no respecter of political boundaries. It receives and mixes a host of trace gases that for centuries have caused local and regional pollution problems, but now are threatening to alter the stability of the world's climate and the integrity of its shield against harmful ultraviolet light. Every country contributes in its own way to emissions of these gases and all could suffer from negative and even catastrophic effects during the next century and beyond. But regional impacts will vary greatly and will bear no relation to the source of the problem. The industrialized countries of the North are overwhelmingly responsible for most emissions in the past, but economic development in the South is rapidly altering this picture. The development path that is followed in the South could thus become as important as our own actions in the North. Indeed, the disparities that exist between rich and poor countries are an integral part of the problem.

The impacts of global change will add yet another burden to the South's human and environmental woes, a burden that it is quite incapable of assuming. In Canada, these changes will effect

almost every sector of the economy in one way or the other. They will be long term and progressive: it will take the Earth decades and perhaps centuries to reach a new plateau, even if we slash emissions today. This new plateau may not be to our liking. A long-term perspective is thus essential: this is a question of intergenerational equity, of sustainable development, like no other.

In Chapter 3, we give a brief introduction to global warming and ozone depletion, look at past and future sources of the trace gases involved, and discuss some of the possible impacts that global change will have on Canada and the developing world. These topics are technical and fraught with uncertainty and some aspects are highly speculative, but it is essential to grasp the complexity and dimensions of the problem if we are ever to solve it. The potential impacts are so great and the lead time required for action so long that inaction could exact a terrible price.

Global change is as much a political as a scientific problem. Indeed, it is the ultimate example of decision-making in the face of uncertainty and, as we discuss in Chapter 4, it may well dominate the international agenda during the next decade. Already, we are seeing the development of linkage politics as nations fight to promote their interests. The South, in particular, is adamant about its right to economic development, while conservative forces in the United States and elsewhere reject the need for any action. Yet decisions in the name of climate change, affecting the economies of all countries, will be made, in one way or another, in the decade ahead. At stake are hundreds of billions of dollars in investment, the rights of industrial and developing countries to pollute the atmosphere, and the livelihoods of millions of people.

Chapter 3

The Global Atmospheric Experiment: Everyone's Environmental Problem

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Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war.

WMO (1988)

Global warming...threatens the very survival of civilization, and promises...only losers over the entire international socio-economic fabric.

Woods Hole Research Center (1989, p. 1)

The Earth's climate is influenced by many natural factors. These include variations in the sun's intensity and in the Earth's orbital path, continental drift, volcanic action, and changes in the composition of the biota, the atmosphere, and the oceans. Nevertheless, the average temperature of the Earth's surface has remained remarkably constant, hovering near 15°C for many thousands of years. Even quite small deviations from this figure can have dramatic effects on the world's climate. We are still recovering from the last ice age, which ended some 10 thousand years ago, in which average global temperatures were only about 5°C cooler than today. Periodic "little ice ages," the last of which ended less than 200 years ago, differ only slightly from the average.

Evidence is rapidly accumulating, however, that human activity may be causing large changes at the global level, changes that are expected to accelerate during the 21st century and beyond. There are major difficulties involved in forecasting the exact results of these changes. Global systems are enormously complex and interact in ways that cannot be predicted with our current level of knowledge. Even when changes do occur, it may be hard for us at first to distinguish them from the "noise" of the considerable natural variation of the world's climate over space and time. Two changes do, however, appear inevitable at the global level: depletion of the ozone layer and a general warming. To these may be added many problems such as smog, acid rain, and prolonged drought, which are already apparent at regional and local levels.

The Threat of Ozone Depletion

In 1985, scientists from the British Antarctic Survey published an astounding report. They found that springtime stratospheric ozone concentrations over that continent had decreased by 40 percent between 1977 and 1984 (Farman et al. 1985). It had been suspected since 1974 that chlorofluorocarbons (CFCs), halons, and certain other synthetic organic compounds (including carbon tetrachloride and methyl chloroform) had the potential to harm the ozone layer, but models had not predicted such a rapid deterioration. These remarkably stable compounds are used in a wide range of industrial and domestic settings as refrigerants, foam-blowing agents, aerosols, fire extinguishers, solvents, and more. Their inert nature allows them to drift gradually up to the stratosphere, where they break down under the influence of ultraviolet (UV) light, releasing highly reactive chlorine or bromine atoms, each of which can destroy up to 100 thousand molecules of ozone over a period of up to 100 years.

Since 1985, the hole in the ozone layer has become larger and more persistent. In the spring months of 1987, 1989, and

1990, indeed, almost all the ozone was destroyed in the stratospheric cloud region over Antarctica at altitudes between 15 and 23 kilometres (Kerr 1990). Scientists fear that this is now the normal situation. Processes over the Arctic are different and, although no dramatic hole has been found as yet, some scientists speculate that such holes could appear during the 21st century (Austin et al. 1992). More frightening, there seems to be a general thinning of the ozone layer beyond the poles. Satellite data released by the US Environmental Protection Agency (EPA) in 1991 show that the ozone layer over the globe as a whole is decreasing by 2.3 percent per decade. Over the United States, it is declining at a rate of 4 to 5 percent per decade, with higher figures in the winter months (Kerr 1991). The evidence grows more ominous each year.

The ozone layer is all that protects life from the harmful effects of UV radiation. This portion of the sun's radiation has far-ranging effects on biological tissue, damaging both protein and DNA, the carrier of our genetic code. Many gases, including methane and nitrous oxide, are implicated in the destruction of ozone, but the major culprits are CFCs. The concentrations of all of these gases are increasing, with CFCs at a rate of at least 4 percent per year. The chief danger is that the gases can take years to reach the stratosphere, so that today's ozone depletion reflects yesterday's emissions. Canada is responsible for less than 2 percent of global production of CFCs; on a per capita basis, however, Canadians are among the heaviest users.

Politicians have responded with unprecedented action. The Montreal Protocol, which aims to limit emissions of ozone-depleting gases, was formulated, ratified by many countries, and has subsequently been strengthened (see Chapter 4). The problem is, however, of the industrialized world's making. In 1985, less than 3 percent of CFC production worldwide and 16 percent of consumption was in the South (Arrhenius and Waltz 1990, p. 6). Yet these nations are reluctant to forgo the many benefits that CFCs could bring and are insisting on financial and technical

assistance before they will agree to the terms of the Protocol. Even the new terms of the Protocol, however, appear to be too weak.

A decrease of only 1 percent in stratospheric ozone concentration can lead to an increase of about 2 percent in the amount of UV-B light that reaches the Earth's surface. Much remains to be learned, but it is clear that a continued thinning of the ozone layer will have far-reaching effects on the world's ecosystems and on human health. A report by UNEP (1989) reviews research in this field. The greatest depletion in the ozone layer has been over Antarctica in the spring; however, it has been calculated that a much smaller depletion over tropical and temperate areas will have comparable effects on the ground on clear days in the summer months because UV-B radiation received at surface level is normally much higher.

Effects on Human Health

Skin cancer rates will rise in tandem with UV-B light transmission. Nonmelanoma cancers are expected to rise 3 percent for each 1 percent depletion in ozone. The greatest danger is for fair-skinned individuals who are sunburned in their early years. UV-B has also been implicated in suppression of the immune system, so that increases in infectious diseases, parasitic infections, and cancer incidence have been suggested. Vaccinations may also become less effective, making prevention more of a problem. The eye is particularly susceptible to ultraviolet light, so eye disorders, such as cataracts, may increase in humans and domestic stock alike. The UNEP report predicts that each 1 percent decrease in ozone will result in the blinding of an additional 100 to 150 thousand people.

Effects on Plants

Since they lack a protective outer covering, phytoplankton are easily damaged by UV light. Phytoplankton are the primary producers of the oceans and account for half of the carbon dioxide fixed globally each year; therefore, ozone depletion could

have long-term consequences on the global carbon budget. Satellite photos have revealed a global picture of explosive blooms of phytoplankton, particularly in the spring and in the southern ocean surrounding Antarctica, precisely where ozone depletion is greatest (Lewis 1989). If only 10 percent less carbon dioxide was taken up by the oceans each year as a result of the damage of plankton, it "would leave about the same amount of carbon dioxide in the atmosphere as is produced by fossil fuel burning" (UNEP 1990, p. 46). The whole marine food web could be thrown into disarray, particularly since fish larvae and many other small animals also appear to be susceptible to damage. More than one-third of animal protein consumed by humans comes from the sea.

The growth and reproduction of land plants may also be affected, so crop and forest yields could decrease. Although there are many technical difficulties involved in doing experiments in the field, it appears that there are great differences in the way that plants respond. Agricultural productivity could decline and there is a risk of change in the composition of our ecosystems. In rice paddies, most of which are in the tropics, nitrogen is fixed by highly sensitive cyanobacteria and blue-green algae. Destruction of these microorganisms would have grave implications for food production in the South.

Effects on the Atmosphere

Increases in UV-B light transmission can be expected to increase tropospheric pollution as a result of photochemical reactions. The production of reactive radical molecules will rise, in both rural and urban areas, resulting in higher levels of ozone and other potentially harmful molecules. This would have damaging effects on human health and both plant and animal life.

Effects on Materials

Many common synthetic materials, such as plastics, paints, and window glazing, are degraded by ultraviolet radiation. Rubber,

wood, and textiles are also affected. Substantial economic costs are possible. The effects may be worst in the tropics, where plastics are popular building materials, and heat and stronger sunlight already inflict damage.

Global Warming

Most gases in the atmosphere do little to alter the Earth's energy balance. Some, however, are transparent to incoming solar radiation, yet absorb the long-wave radiation re-emitted by the Earth, thus trapping escaping heat. These "greenhouse gases," although present in very small quantities, are absolutely essential for the maintenance of life on Earth; without them, the Earth would be 33°C colder than it is today (Schneider 1989, p. 70). Of the 40 or so greenhouse gases, the most important are water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and CFCs. Because they occur in such small amounts, it is relatively easy to change their concentrations, disturbing the atmosphere's dynamic balance.

In 1990, Working Group I of the UN-sponsored Intergovernmental Panel on Climate Change (IPCC), which then consisted of 170 leading scientists from 25 countries and was the most authoritative voice on the topic, agreed that increases in these gases will lead to global warming. Indeed, ice-core analysis has shown that atmospheric concentrations of carbon dioxide and methane can be correlated to climate change over the last 160 thousand years (Watson et al. 1990).

Under current conditions, carbon dioxide accounts for more than half of this "enhanced" greenhouse effect. The other trace gases occur in much smaller amounts, but molecule for molecule they are far more potent absorbers of infrared radiation. CFCs, for instance, are present in truly minuscule concentrations in the atmosphere but, if the Montreal Protocol is not successful, their relative contribution to global warming will increase substantially. In addition, the length of time that the gases stay in the

atmosphere varies from hours to centuries, depending on the gas, so that emissions can have potentially long-term effects. Methane, for instance, is a far stronger greenhouse gas than carbon dioxide, but it disappears from the atmosphere in a few years.

The significance of each gas thus depends on its concentration, its potency, and its residence time in the atmosphere (Table 2). During the 1980s, carbon dioxide was responsible for about 55 percent of the greenhouse effect; CFCs, 24 percent; methane, 15 percent; and nitrous oxide, 6 percent (IPCC 1990a).

The Major Greenhouse Gases

Water vapour is the most important greenhouse gas, but it seems to be less susceptible to direct human interference and so will not be included in most of the following discussion. It will be seen, however, that huge uncertainties about water, in all its states, are hampering the efforts of scientists to assess the future impacts of global change (Chahine 1992).

Table 2. The key greenhouse gases.

Gas	Concentration in air[a]		Current rate of increase (percent)	Residence time (years)	Climate effect[b]
	1800	1990			
CO_2	280 ppmv	353 ppmv	0.5	50–200	1
CH_4	0.8 ppmv	1.72 ppmv	0.9	10	21
N_2O	288 ppbv	310 ppbv	0.25	150	206
CFC-11	0	0.26 ppbv	4.0	65	12 400
CFC-12	0	0.44 ppbv	4.0	130	15 800

Source: Watson et al. (1990, p. 7).
[a] Units: ppmv, parts per million by volume; ppbv, parts per billion by volume.
[b] Effect on climate change of one gas molecule relative to carbon dioxide (Shine et al. 1990, p. 53).

Carbon Dioxide

Carbon dioxide is by far the most abundant of the other greenhouse gases. Careful measurements since 1958, combined with other methods, show that the concentration of CO_2 has increased by about 26 percent since preindustrial times. Estimates of future levels of carbon dioxide and of their effects are hampered by our lack of information about the exceedingly complex global carbon cycle. The oceans and the biosphere act both as sources and as sinks, and not enough is known about either. Scientists are puzzled, for instance, by the fact that the rate of increase in atmospheric carbon dioxide appears to be much smaller than their estimates of emissions would imply (Watson et al. 1990, p. 17).

We do know that the burning of fossil fuels, deforestation, cement manufacture, and soil destruction are major reasons for the increase in carbon dioxide, although the amount of the gas that is added to the atmosphere through human activity appears minuscule when compared with global carbon stores, or even with the annual flux of about 200 billion tonnes of carbon. In 1988, about 5.7 billion tonnes of carbon was produced worldwide from the burning of fossil fuels (Boden et al. 1990). There is, however, disagreement about the amount deriving from deforestation. Estimates of 1 to 2 billion tonnes are usual, but biomass burning could account for as much as 40 percent of total annual global emissions of carbon dioxide (Levine 1990, p. 511).

Methane

Methane is the next most important greenhouse gas. It is formed in conditions of organic breakdown where oxygen is excluded. Its concentration in the atmosphere has roughly doubled since preindustrial times. This rise is largely linked to changes in land use, although only rough estimates are possible. Natural sources include wetlands and organic soils, especially peat bogs, which account for about 50 percent of wetland emissions (Ehrlich 1990, p. 402). More significantly for this study, methane is released

from rice paddies and the intestines of mammals, especially ruminants. Cattle produce about three-quarters of ruminant emissions (Ehrlich 1990, p. 404). Methane is also released in coal mining and natural-gas transportation, in biomass burning, and in landfill sites, all of which are associated with human activity. Even emissions from termites could be increasing in step with the removal of vegetation.

Nitrous Oxide

Nitrous oxide has many sources, but even less is known about their relative importance than is known about methane. Nitrous oxide forms from microbial action in soils and is a product of fertilizer use; deforestation and the intensification of agriculture may thus be the most important human activities involved. Fossil fuels and biomass burning were once thought to be significant sources, but their role has been downplayed in recent research (Watson et al. 1990, p. 26). The rate of increase of nitrous oxide may be small, but its long residence time in the atmosphere means that even if emissions stopped rising today, a steady state would not be reached for perhaps 200 years (UNEP 1987, p. 19).

Chlorofluorocarbons

CFCs, well-known for their role as destroyers of the ozone layer, also act as highly potent greenhouse gases with long lifetimes. CFCs did not exist until the 1930s, but their rate of increase has been faster than any other greenhouse gas. They now account for about 24 percent of the human-induced greenhouse effect.

Ozone

Ozone acts as a greenhouse gas at lower levels of the atmosphere, where it appears to be increasing. Complex chemical reactions between atmospheric pollutants such as carbon monoxide and methane, in the presence of sunlight, are responsible for this rise. The visible evidence is photochemical smog, present over many urban and industrial areas of the world. Ozone is also important

indirectly as a leading cause of forest dieback in, for example, Europe. Its importance as a greenhouse gas cannot be accurately quantified as yet, so it is not included in Table 2.

The action of the greenhouse gases is by no means straightforward. The atmosphere is very much a "chemical soup." The gases spewed out by human activity interact in complex ways, with multiple effects. The hydroxyl radical, for example, acts as a "detergent" in the atmosphere, reducing many of the greenhouse gases. Carbon monoxide, a product of both fossil fuel and biomass burning and not in itself a greenhouse gas, acts to reduce hydroxyl levels and thus affects the levels of methane and other gases in the atmosphere. Aerosols, made up mostly of sulphur compounds, which are also products of fossil fuels and implicated in acid rain, are thought to affect the amount of heat radiated from clouds, leading to a cooling effect that could dampen greenhouse warming over heavily polluted areas (Hansen and Lacis 1990, p. 716). Ozone-layer depletion almost offsets the warming of the CFCs that cause it (Ramaswamy et al. 1992). This interweaving of cause and effect for a whole range of atmospheric problems is an important consideration in designing policy responses.

Regional Sources of Greenhouse Gas Emissions

Emissions of most greenhouse gases are intricately tied to population increase and embedded in our very way of life. Until the mid-20th century, deforestation in temperate regions and the rapid spread of agriculture across the globe was the most important factor. Since about 1950, however, the major culprit has been the use of fossil fuels, although changes in land use and CFC use are also involved. Increasing tropical deforestation, biomass burning, many forms of food production, and lifestyles dominated by high levels of consumption and waste are all to blame.

Table 3. Sources of carbon emissions (percent) from fossil fuels, 1950 and 1980.

Region	1950	1980
North America	44.7	26.7
Western Europe	23.4	16.5
Eastern Europe and (former) Soviet Union	18.0	24.2
Developing world	5.7	12.2
Japan and Australia	2.8	5.8
China and communist Asia	1.4	8.5
Others	3.9	6.0
Total (billions of tonnes)	1.62	5.55

Source: UNEP and Beijer Institute (1989, p. 4).

The industrialized countries have been overwhelmingly responsible for carbon dioxide emissions from fossil-fuel burning, the largest and most easily measured source of greenhouse gases. Only a quarter of humanity lives in the North, yet it is responsible for approximately 70 percent of emissions today. If we include historical emissions, the North commands a far, far greater share. But this picture is changing. Table 3 shows what has happened in recent decades. Although each region has increased the amount of fossil fuel that it consumes, the shares have changed dramatically. Centrally planned and developing countries have made considerable gains in recent decades; Western Europe and North America have declined in importance.

Growth in fossil-fuel emissions over the last 20 years has been far from even. Most industrial countries responded to the oil shocks of the mid-1970s and early 1980s with increased efficiency, although growth resumed in the late 1980s. Canada, for instance, increased its emissions of carbon dioxide by 6.6 percent in 1988 alone (Boden et al. 1990, p. 111). If expansion had continued at the pre-1973 rate, annual global emissions of carbon dioxide by 1990 would have been almost 3 billion tonnes higher (Flavin 1990, p. 18). The centrally planned economies of

Eastern Europe, however, shielded their citizens and industries from shifts in the market, so that there was little incentive to improve efficiency. Moves toward a market economy may well improve energy efficiency, but increased prosperity, if it ever happens, could bring larger houses, more automobiles, and thus far higher total carbon emissions (Flavin 1990, p. 20).

Emissions depend to some extent on the choice of fossil fuel. Coal and synfuels derived from coal are by far the greatest polluters. Indeed, for the same amount of useful energy, oil emits 38 to 43 percent more carbon dioxide than does natural gas; coal emits 72 to 95 percent more (MacKenzie 1988, p. 9). Emissions from synfuels are two to three times those of natural gas, although the significant leakages of methane that occur in the mining and transmission of natural gas may well negate its advantages. East Bloc countries and China depend to a large extent on coal, and between 1971 and 1986 global emissions from the burning of coal and natural gas each rose by 2.4 percent per year, while emissions from oil use stayed almost constant (Mintzer 1988, p. 221).

Just as significant is the efficiency with which the fuels are used. Emission rates per capita and per dollar of GNP vary widely and do not depend solely on the wealth of a country or the degree to which it uses other sources of energy. Japan, which imports all its fossil fuel, has worked vigorously to become a model of efficiency. North Americans, on the other hand, are profligate users of these resources. The countries of the defunct Warsaw Pact were producing three times more carbon dioxide for each dollar of output in the late 1980s than were the countries of the West (Subak and Clark 1990, p. 89).

Canada is undoubtedly a leader in the field of greenhouse gas emissions. Canadians use more energy per person than any other nation, and every sector of our economy depends on fossil fuels, although there are big regional differences in the type and amount of fuel we use. We share with the United States the distinction of being the largest per capita consumers of CFCs and our only competitors as emitters of methane are several small

Persian Gulf countries that flare gas (WRI 1990, pp. 346–347). In 1988, each Canadian added 4.6 tonnes of carbon to the atmosphere through his or her use of fossil fuel. Of all industrialized countries, only the citizens of Luxembourg, (former) East Germany, and the United States have worse records (WRI 1990). Ivan Head (1991, p. 93) has painted a startling picture of what this means for the atmosphere. If the annual carbon emissions from fossil fuel of just one day's visitors to Parliament Hill (4 900 people on average) were placed in a block on the House of Commons lawn, it would occupy a space half the size of the Peace Tower.

In sum, Canadians are responsible for about 2 percent of global emissions of greenhouse gases. Or are we? The Canadian Gas Association quotes much lower figures for natural gas pipeline leakage, which is our major source of methane, than those given by the World Resources Institute, the most-quoted source of information on greenhouse gas emissions (Standing Committee on the Environment 1991, pp. 55–56). Whereas resolving this particular question will do little to change our status as polluters, a host of similar uncertainties is likely to spark many arguments both in and between nations as we begin negotiations over climate change.

Several attempts have been made to measure national contributions to the greenhouse effect. Since so little is known about the sources and sinks of most gases, only crude estimates are possible. The great variation in different studies reflects this situation. WRI, for instance, has ranked countries according to their total and to their per capita net emissions of carbon dioxide, methane, and CFCs (WRI 1990, pp. 14–18). In this list (Table 4), 3 of the top 10 countries are in the South. When it comes to per capita net emissions, many developing countries with high levels of deforestation, such as Costa Rica, Côte d'Ivoire, and Laos, jostle with the North for spots in the top 50. By comparison, a major study by the Stockholm Environment Institute gives startlingly different figures for national carbon dioxide emissions in many cases (Subak and Clark 1990, pp. 74–76).

Table 4. Major contributors to global warming.

Rank	Country	Percent of total	Per capita net emissions (tonnes)
1	United States	17.6	4.2
2	Soviet Union (former)	12.0	2.5
3	Brazil	10.5	4.3
4	China	6.5	0.3
5	India	3.9	0.3
6	Japan	3.9	1.8
7	West Germany (former)	2.8	2.7
8	United Kingdom	2.7	2.7
9	Indonesia	2.4	0.8
10	France	2.1	2.2
11	Italy	2.1	2.1
12	Canada	2.0	4.5
13	Mexico	1.4	0.9
14	Myanmar	1.3	2.0
15	Poland	1.3	2.0
16	Spain	1.3	1.9
17	Colombia	1.2	2.3
18	Thailand	1.2	1.2

Source: WRI (1990).

But WRI's list has been vehemently attacked by some in the South. It is described as "environmental colonialism" and as a way of shifting much of the blame to the South. To these observers, WRI's report is based less on science and more on politics. It ignores history, equity, and justice. It ignores the role of trade, which moves huge quantities of produce from South to North. It combines statistics of very different reliability, using estimates of deforestation that are "extremely questionable." Arguments such as these offer a foretaste of the bitter fighting that is likely to surround the whole topic of global warming in the years to come. We return to this topic in Chapter 4: such rankings have the potential to become political dynamite.

Role of the South in Greenhouse Gas Emissions

The role of the South in the emission of greenhouse gases is a mirror of its rapidly shifting social and economic structures. Each country has its own unique mix of traditional and modern sectors, its own pattern of greenhouse gas emissions. Yet, for the South as a whole, the most important factor has undoubtedly been the carbon dioxide released from biomass burning. Wood and other forms of vegetation are used for fuel, while forest and grassland alike are torched to prepare for agriculture and cattle ranching. Despite the critical situation that satellite imagery has revealed in recent years in the Amazon, Africa is probably the largest contributor from burning: roughly three-quarters of its grasslands are burned each year, although it is unclear how much of the carbon lost is quickly resorbed by vegetation (de Groot 1990, p. 30). Soil breakdown associated with burning, agriculture, and erosion also releases unknown quantities of carbon dioxide into the atmosphere.

Table 5 demonstrates the overwhelming importance of land-use change, particularly deforestation, to carbon emissions in tropical countries (although, admittedly, we have used WRI as our source of data) (WRI 1990). In Brazil, for instance, which has an advanced industrial sector and a large population, much more carbon comes from deforestation than from fossil-fuel combustion, although 1987 was a year of exceptionally high levels of burning in the Amazon.

There are obvious connections to the problems discussed in Chapter 2: to population pressures, poverty, the fuelwood crisis, trade in tropical commodities, desertification, and the lack of options that drive people to degrade their environments. Methane, for instance, is of great interest in the study of connections between North and South. Agriculture in the South is an especially significant source of methane and rising levels of the gas can be linked to increasing global demand for meat, to the Green

Table 5. Estimated carbon emissions (millions of tonnes) in Canada and selected tropical countries, 1987.

Country	Change in land use	Fossil fuels	Total
Brazil	1 200	50	1 250
Indonesia	220	33	253
Myanmar	150	1	151
Colombia	120	13	133
Thailand	94	14	108
Côte d'Ivoire	100	1	101
Laos	85	<1	85
Philippines	68	9	77
Nigeria	58	15	73
Malaysia	38	10	48
Canada	0	108	108

Source: WRI (1990).

Revolution, and to development policies that have supported deforestation, cattle ranching, and dam building in such areas as the Amazon. Even European support for tsetse fly eradication in the African savannah has been a small factor in this equation, as it has increased the range of cattle on that continent (Bunyard 1988, p. 202).

Increases in greenhouse gas emissions in the South are occurring in part because of rapid population growth and in part because the model of economic development adopted in many countries has stressed industrialization and thus increasing energy consumption. City dwellers have come to depend on commercial energy sources. The result has been an explosive growth in fossil-fuel consumption in the South — much of it, imported oil. Huge debt burdens and massive social, economic, and political impacts followed on the heels of the OPEC-driven oil price increases, as many nations tried to maintain high economic growth rates. In many countries, pressure on natural

resources has increased in the struggle to reduce dependence on imported oil and expand exports to help service debts. Brazil, for example, has encouraged the expansion of coal production, the use of charcoal in industry, and huge plantations of sugarcane, which is used to make methanol for automobiles.

Other developing countries have large coal deposits that they wish to use. China and India, with their huge populations, have the greatest potential for expansion. Already the largest user of coal, China's prodigious reserves could last a thousand years at current rates of consumption. But China envisages a fivefold increase in consumption by 2020. The increased carbon dioxide emissions from this source alone would add nearly 50 percent to today's global emissions, swamping any reductions that could be made by industrialized countries (Grubb 1990, p. 75). This growth will still, however, be addressing basic needs; the average Chinese household uses 36 times less energy than a typical American household. Although China has dramatically increased its efficiency over the past decade, improving energy intensity by 4.7 percent per year while the economy grew by perhaps 10 percent, there is still a gross lack of pollution control, creating a local, regional, and global environmental hazard (Chandler et al. 1990, pp. 125–126).

Many other countries wish to pursue policies of rapid industrialization. Fast-growing economies such as South Korea have been particularly important in the expansion of fossil-fuel use: in 1988, South Korea emitted 93 times more carbon dioxide than it did in 1950 (Boden et al. 1990, p. 128). Between 1973 and 1980, energy consumption in the developing world, apart from China, grew at 6.2 percent per year; over the same period, growth in the industrial countries slumped to a mere 0.5 percent per year (Commonwealth Secretariat 1989, p. 27). This rate slowed somewhat in the 1980s, as many developing nations recoiled under heavy debt burdens, but the potential for growth remains (Flavin 1990, p. 20).

The relative amounts of carbon emissions in the South may be more significant than the absolute amounts. There is great

inefficiency in the way that fuel is burned in most of these countries, at every level from the simplest home stove to heavy industry. Waste and terrible pollution have been the result. China, for instance, far outstrips most other countries in the carbon it produces from fossil fuel for each dollar of GNP. Egypt, India, and Mexico also have high rates of carbon emissions per unit of GNP (Flavin 1990, p. 19). Thus, although per capita emissions from fossil fuel in the South have risen strikingly between 1950 and 1986 to about one-eighth of those in the North, this has not necessarily been translated into improved living conditions. Furthermore, the average disguises huge differences between countries. One American uses as much commercial energy as 6 Mexicans, 13 Egyptians, 37 Indonesians, or 98 Sri Lankans (WRI 1992, pp. 316–317).

Whatever the current situation, it is likely that the South will overtake the North in emissions of greenhouse gases within decades. By the middle of the next century, or earlier, it could also be contributing over 50 percent of the carbon dioxide emitted from fossil fuels (Woods Hole Research Center 1989, p. 11). "Already, just three developing countries — China, India and Brazil — emit more CO2 from burning fossil fuels than all of Western Europe" (Kats 1990, p. 25). Estimates of the crossover time vary widely and depend on assumptions about the state of the economies of these nations. A major imponderable must remain the fluctuating cost and availability of fossil energy supplies. Events in the Persian Gulf have demonstrated yet again how fragile a dependence on imported energy sources can be.

Fossil-fuel use is not the only area of concern. The rapidly growing populations of the South must be fed. Greenhouse gas emissions from fertilizers, domestic animals, rice growing, and fuel used in transportation and mechanization must be expected to rise in step with population unless agricultural methods change substantially. This, too, could largely negate any reductions in fossil-fuel use by the North. Emissions resulting from slash-and-burn clearing in primary tropical forests must

ultimately diminish as forests shrink, but burning of savanna and scrub will continue.

The net result for the South of greenhouse gas increases has been a perverse bargain. Some countries have certainly made huge strides in the modern sectors of their economies and the standard of living has improved for tens of millions. Yet the huge inefficiencies in the use of both fossil fuels and natural resources have meant waste and pollution. Development has been bought, for many, at the cost of debt and political instability, while the energy needs of most people in the South, who depend on biomass-derived fuels, remain unmet. Continued growth along this pathway will do little to satisfy the demands of the poor, will require vast amounts of foreign exchange for some countries, and will result in even greater pollution.

Scenarios of Global Climate Change

What then are the most accepted scenarios for global change? The outcome depends both on the answers to a vast array of scientific questions and on humanity's current and future activities. Determining the extent and consequences of warming is enormously difficult. Over the last two decades, scientists have developed a hierarchy of mathematical models in their research into atmospheric chemistry and climate processes. These range from simple zero-dimensional models, useful in the study of chemical reactions, to extremely complex three-dimensional models, known as general circulation models (GCMs), used to study climate changes. GCMs are based on a grid system. The sides of each cell are typically 4 to 8 degrees of latitude and 5 to 10 degrees of longitude, and average climate figures for each cell are fed into the model. This introduces a large amount of inaccuracy, but is necessary because of the limitations of the computers available. Although trillions of calculations are made in just one run of a model, the system is still quite crude.

Another problem lies in huge uncertainties about the many complex feedback mechanisms that respond to and, in turn, influence changes in the climate system. If there is less snow cover in a warmer world, for instance, more solar radiation will be absorbed by the Earth. This will raise temperatures further, melt more snow, and so on. There are huge gaps in our knowledge about the ocean's capacity to retain and transport heat and to absorb carbon dioxide; about the behaviour of water vapour, clouds, and ice; about the effects of albedo (the reflectivity of different surfaces); and about many aspects of the biosphere. We know even less about how these phenomena will react to global warming. In many cases, scientists cannot even tell if a particular feedback will enhance or diminish warming. Differences thus arise in predictions of precipitation, winds, soil moisture, and regional temperatures. Perhaps the greatest uncertainty exists over what is known as "surprise" — the occurrence of extreme or unexpected events. The hole in the ozone layer may be an ominous warning that the atmosphere can be exquisitely sensitive to perturbation.

We do know that the oceans act as a huge heat sink and that this will delay global warming by decades, although it is not known just how large the time lag will be. It is clear that most of the warming built into past emissions has yet to occur. There is general agreement that the Earth has warmed by about 0.5 Celsius degrees over the last century, although the rise has not been smooth (see, for example, Jones and Wigley 1990). This concurs with the lowest levels predicted by GCMs for that period and is perhaps confirmed by the warming of Canadian lakes and permafrost and the retreat of inland glaciers (Houghton and Woodwell 1989, p. 38). Although this rise is still in the range of natural variability, it is certainly tempting, although possibly foolhardy, to believe that the record global temperatures of 1990, and the six other exceptionally warm years that occurred in the 1980s, are a preview of things to come.

Scientists continue to refine the models of global change. Almost every week brings fresh controversy and new results

(Wigley and Raper (1992), for example, provide an updating of the IPCC scenarios). The popular press (and the White House) have pounced with glee on the arguments of naysayers, and since this small number of dissenting scientists seems to have an influence in political circles far out of proportion to their numbers, their views are important (for example, George C. Marshall Institute 1989; Lindzen 1990).

The greatest concern of the skeptics is that there is a serious potential for inaccuracy in the way that water, in all its phases, is treated in most GCMs. There is reason for this concern. Our lack of knowledge about the dynamics of clouds worries some climatologists: merely changing the way that models treat ice crystals, for instance, has been shown to alter results dramatically (Mitchell et al. 1989). To some oceanographers, the extreme simplification of oceans in the models puts the whole modeling exercise into doubt, since oceans play such a critical role in the Earth's climate. Other workers question the apparent rise in average global temperature this century, because of what they see as problems with sampling methods. If this is true, then current models are probably exaggerating the amount of warming that can be expected, particularly since most models undergo quite a bit of "tuning" to bring them into line with today's climate.

The wrangling among scientists does not help policymakers. It is, nevertheless, essential that they obtain some idea of the impacts that are possible, since response depends on the perception of danger. One tool that is frequently used is the development of various scenarios, using the outputs of GCMs as inputs into socioeconomic models. In most scenarios, carbon dioxide or equivalent greenhouse gases are assumed to have doubled in the atmosphere ($2 \times CO_2$) by around 2030 or 2050. These are not predictions and although probabilities cannot be measured they do provide a picture of what could happen, which is a useful tool for policymakers. Most scenarios do not attempt to consider what will happen if greenhouse gas levels continue to rise; the burning of all known fossil-fuel reserves, for instance, could quadruple today's concentrations of carbon dioxide (Lindzen 1990, p. 288).

In addition, it has not been possible for most models to provide a picture of what will happen during the time carbon dioxide emissions are doubling, the so-called transient response.

Impacts of Global Warming

How much warming can we expect? Estimates of the average amount of global warming to be expected with a doubling of carbon dioxide or equivalent gases vary widely, usually within the range of 1.5 to 4.5°C. In 1990, Working Group I of the IPCC came to a consensus that global mean temperature will rise by about 1°C by 2025 and 3°C before 2100, and that the rise will not be steady. They think it likely that by the middle of the 21st century, the Earth will be warmer than at any time in the past 150 thousand years. These estimates are based on their "business-as-usual" scenario, in which little is done to halt increases in greenhouse gas emissions, but they do not include the feedback mechanisms noted in the previous section. The IPCC feels these are likely to raise temperatures even further (IPCC 1990a).

The warming will probably not be spread evenly, but will increase with distance from the equator and will be greatest in high northern latitudes in winter, when warming could be 50 to 100 percent greater than the global average. There will, however, be substantially less warming over Antarctica, the northern North Atlantic region, and over areas of sea ice in the summer. Most of Canada, then, will see larger changes than will occur in developing countries.

Wind and precipitation patterns and ocean currents could shift in unpredictable ways as a result of these changes and there are likely to be more hot days in most places. Global precipitation is likely to rise, although some areas may become drier, particularly in the midlatitudes such as the western plains of North America. Sea ice should decrease and sea levels will probably rise as glaciers melt and oceans warm and expand. The apocalyptic scenarios painted some years ago have, however, been toned

down considerably. It is now thought that the West Antarctic Ice Sheet, the greatest potential source of meltwater for the world's oceans, is unlikely to contribute to sea-level rise in the short term (several centuries) (Warrick and Oerlemans 1990). The IPCC report predicts increases of roughly 20 centimetres by the year 2030 and 65 centimetres by 2100, with significant regional variations. But since sea levels will continue to rise long after greenhouse gas concentrations have stabilized, this is an impact that will continue to affect our descendants for many generations to come.

Added to these broad effects will be the interactions of global change and other environmental problems. For example, both higher temperatures and depletion of the ozone layer will speed the formation of tropospheric ozone, already at critical levels over many cities in both the developed and the developing world. Links also may be made between global warming and the amount of acid rain and its effects on the ground (Durman 1989, pp. 23–24). Areas already under threat of desertification may further deteriorate.

Above all else, however, the harm that could befall all living things from the possible destruction of the ozone layer must be kept in mind. The combined effects of air pollution, global warming, and ultraviolet light are unknown, but provide the worst-case scenarios for the biosphere. In addition, it must be remembered that global change and its effects are progressive and adaptation is not a once-and-only event.

When we try to predict the exact regional effects of global climate change, all the problems of complexity and uncertainty inherent in global circulation models are multiplied many times over. Scientists do not agree on the amount of warming, let alone its distribution, and there is even less consensus on future rainfall and soil moisture levels. Nevertheless, studies are being carried out in many parts of the world in an attempt to forecast future change, studies that, although speculative, provide valuable information for policymakers. In the discussion that follows, the use of the word "will" must be viewed in this light.

Impacts in the South

For the South, global change promises to intensify the many social, economic, and environmental problems that were described in Chapter 2. The people and economies of these countries are highly dependent on natural resources and agriculture for their survival and are already sensitive to even small changes in climate. Yet, despite growing levels of interest and concern, research has barely begun on the effects of global change in the South. The limited knowledge base for a host of relevant environmental factors makes regional study even more daunting than it is in developed regions.

Most work to date has focused on the impacts of sea-level rise and changing storm patterns on coastal communities. Nearly one-third of humanity lives within 60 kilometres of the sea, and many of the world's largest cities are on its shores. For countries of the South that have densely populated areas within a few metres of high-tide levels, the inundation of wetlands, estuaries, fresh water resources, coastal plains, and communities will be very costly in human terms. The crowded deltas of the South, with their fertile land and increasing populations, are especially vulnerable. Bangladesh, for instance, could lose 20 percent of its farmland if sea levels rise by 1.5 metres (IPCC 1990b, pp. 2–31). China, Egypt, Guyana, Indonesia, and Thailand are other countries that could lose much of their richest agricultural land. For many small island states, this is surely a matter of survival. The Maldives have become a symbol of the destructive power of global warming, but that country is just one of many in the developing world that could suffer absolutely catastrophic damage because they have no high land.

Sea-level rise, no matter how small, may be compounded by environmental degradation. Bangkok, for instance, pumps its groundwater so fast that the land has subsided as much as 13 centimetres in 1 year (Milliman et al. 1989). The destruction of mangroves and coral reefs throughout the tropics has greatly increased the damage to coastlines from storm surges. To make

matters worse, coral reefs all over the world appear to be dying, perhaps as a result of the heat of the late 1980s and a rise in ocean temperatures, or perhaps for more local reasons. Thus, although some scientists feel that coral growth may be able to keep up with a slow rate of sea-level rise, that may be irrelevant.

Countries in the South will be able to do little to stem the rising tides. The net effect could eventually be the displacement of tens of millions of people, who will flood into already overburdened cities, or cause tensions and additional ecological damage as they spill into other areas in their own or other countries. There will be great pressure on the industrialized nations to accept at least some of these refugees.

The impacts on agriculture are more uncertain. We cannot tell what the exact effects of increased temperature, UV light, carbon dioxide, and altered moisture levels on living organisms and thus on food security will be. Laboratory experiments suggest that increased carbon dioxide levels will boost photosynthesis and, thus, yields in many of the world's major crops — the "carbon dioxide fertilization effect" — and that water will be used more efficiently in some plants. But these results must be treated with caution, since little is known about the reaction of plants in the field.

As large temperature increases are not forecast for tropical areas, it will be changes in the timing and amount of rainfall that are likely to be most critical, at least at first. Even relatively small changes in the distribution of rainfall can have large effects. The regions most at risk may be precisely those marginal areas already vulnerable to climatic extremes, such as the arid and semi-arid tropics of Africa, parts of eastern Brazil, and the humid areas of Mexico and Central America (IPCC 1990b, pp. 2–5). Rain-fed agriculture, for example, has evolved many mechanisms to cope with drought, but these are now crumbling under an onslaught of pressures. Pastoralism, carried out in areas such as sub-Saharan Africa, has also become a threatened way of life. In the humid tropics, the sensitivity of rice to changes in rainfall patterns is a major concern, as are the effects of UV-B light.

Where climates are drier, there will be a reduction not just in soil moisture but also in the availability of irrigation water. Shifts in monsoon and typhoon patterns could have disastrous effects. In some areas, increased rainfall could lead to more flooding. Where river basins are shared, tensions between countries are bound to increase.

Temperature changes are also important. Crop calendars are finely tuned to the seasons, so that even a 1°C rise could bring substantial changes to countries such as Thailand and Sri Lanka. Wheat, a temperate crop, may have to move further from the equator, possibly disrupting agriculture in areas such as northern India (IPCC 1990b, pp. 2–12).

It will be difficult to separate climatic effects from other factors; agricultural production has declined in Africa over the past two decades partly because of political instability and faulty government policies, both at the national and international levels. The current advantage in food supplies will remain with the developed countries (Sinha et al. 1989, p. 180). If grain production falls in the major exporting nations, particularly the United States, the amount available for export or food aid may decline, further compromising global food security. In addition, agriculture accounts for a large share of most Third World economies and declines could be economically catastrophic. Much of the damage would be borne by women, who grow most of the South's food. A major study, commissioned by the USEPA and released in 1992, confirms the gloomy prognosis of severe consequences for the developing world (*Economist* 1992).

Water resources will be affected in many ways by changing temperatures and precipitation patterns. Where agriculture is dependent on irrigation or groundwater already overexploited, a decrease in moisture availability could be disastrous. Southeast Asia, with its unregulated rivers, is particularly vulnerable to flooding.

The fisheries of developing countries are also vulnerable to global change. The sensitivity of marine organisms to temperature was graphically demonstrated by the major El Niño event of

1972 and 1973, when the anchoveta fishery off the coast of Peru collapsed. Changes in ocean circulation and areas of upwelling could also affect productivity. The effects of UV radiation on phytoplankton may even disrupt the entire marine food web (UNEP 1989).

Unmanaged ecosystems, in particular tropical forests, may also be victims of global warming. Canopy forests and those in arid and semi-arid areas are particularly threatened. Tropical moist forests are typically dependent on only small variations in annual temperature and on high annual rainfall. Today's massive deforestation already threatens to change regional climates by altering moisture cycles. Feedbacks could be set up whereby deforestation becomes both a cause and effect of global change (Barbier 1989, p. 28).

The impact of global warming on human settlements and human health could also be considerable. Heat stress, increased air and water pollution, the spread of tropical disease vectors, and reduced availability of water and fuelwood are some of the many factors that are probable in some areas (Woods Hole Research Center 1989, p. 9). The most vulnerable people are the lower income groups, the poorest of the poor, who live in urban slums and areas exposed to natural hazard. Many adaptations will be required of humanity. Changes in diet, agricultural practices, energy-use patterns, and a host of factors associated with our daily lives could be forced on most of us. There will be changes in industry associated with changes in the availability of raw materials. Thus, the competitive position of countries is sure to change, with impacts on international trade.

Effects in Canada

Most Canadians joyously welcome the prospect of warmer weather. Simple temperature rise will not, however, be the only result. Much of the work on this topic has been carried out by the Canadian Climate Program, a branch of Environment Canada. The Program commissioned a series of studies based

mostly on computer simulations of a doubling in greenhouse gases, simulations that reflect the state of climate modeling in the early to mid-1980s. Summaries are found in issues of the *Climate Change Digest*, beginning in 1987, published by Environment Canada. The studies are dated, but provide the most comprehensive overview of the topic. Most looked only at the immediate impacts on a specific sector or area, but it is not difficult to imagine the cascade effects on our economy that could result if change is rapid.

In general, warming will be much greater in the North and far greater in winter than in summer. The scenarios assumed that most of southern Canada might warm by about 4°C, but the Far North could experience winter temperature increases of up to 10°C. Wind and precipitation patterns are expected to move north and, although the models differ, the North will be wetter and most of the midlatitudes will be drier. In 1990, Environment Canada published maps illustrating the dramatic shifts that could occur in the country's ecoclimatic zones by 2030 (Rizzo 1990). What such maps cannot provide, however, is an accurate picture of how ecosystems will respond. Plants are influenced by daily fluctuations and microclimate, soil conditions, and interactions with other living things. Each species, each variety, will react in its own way, so that our ecosystems are bound to change substantially. Loss of diversity and far higher rates of extinction of both plants and animals are almost certain, particularly in areas where species are close to the edge of their range and in small, isolated communities such as mountains and islands.

Canada is so dependent on its natural resources that changes to sectors that are already stressed could have major socio-economic repercussions. Five major areas of interest will be briefly described, but these are by no means the only effects we will feel. Before discussing the mostly negative impacts expected from global change, however, it should be noted that increased warmth will have one major benefit — a reduction in the use of energy. Even now, differences between a mild and a severe winter

can result in a 50 percent variation in the revenues earned by the Canadian energy industry (Commonwealth Secretariat 1989, p. 62); this has spinoffs throughout the economy, although the effect on the energy industry is hardly benign.

Perhaps the sector most at risk is forestry. During the Pleistocene, trees advanced northward at about 20 to 25 kilometres per century, and forest tree species can probably migrate no more than 50 kilometres per century (Heil and Hootsmans 1990, p. 70). But climate belts will be displaced northward by about 100 kilometres for every Celsius degree of warming. The rate of warming could thus be too fast for trees to respond with ease. The boreal forest and the areas where one forest type shades into another are particularly endangered (Mendis 1989, p. 4). On the southern borders, plants will be weakened and their reproduction impaired. Trees will become prone to the insect and disease pests that may thrive in the warmer temperatures and have no trouble at all migrating. Wildfire, particularly in the many areas where soil moisture is reduced, may become a major problem.

At the northern limits of the boreal forest, plant advance will be very slow, hindered by the rate of seed dispersal and the mostly impoverished soils. One pessimistic study predicts that in the prairie provinces and the Northwest Territories, the southern boundary will retreat by 250 to 900 kilometres, being replaced by grassland in less than 100 years; the northern border will eventually advance only 80 to 700 kilometres (Wheaton et al. 1987). In this region, the boreal forest could largely disappear. Other forests that are now stressed by pollution and acid rain will also be vulnerable. In southern British Columbia, Douglas-fir, a mainstay of that province's economy, could be vulnerable at altitudes below 300 metres (Standing Committee on Environment 1991).

This is a frightening prospect for a country whose economy depends so heavily on forestry. Tourist revenues will also decline. There will be unknown but certainly deleterious effects on wildlife. The boreal forest is a storehouse for about one-sixth of the

world's aboveground biomass and one-fifth of the below-ground carbon store; its destruction could further fuel global warming (*Options* 1989).

Forestry poses great management problems; decisions must be made with incomplete information because of the very long time frames involved. Which species are to be planted if we do not know what conditions will be like at the end of the cycle? With billions of dollars at stake, "robust and flexible strategies are needed to reduce the levels of risk for these massive financial investments" (Maini 1988, p. 205).

Impacts on agriculture are sure to be mixed. Some crops are sure to benefit from a longer growing season and perhaps from carbon dioxide fertilization. But moisture stress could cancel this in many parts of the country, particularly where this is already a problem, such as in the dry interior of British Colombia and the western Prairies. Pests will certainly thrive in warmer and wetter areas.

A study of Saskatchewan showed that the frequency and severity of droughts were likely to increase (Stewart et al. 1988). The catastrophic effects of an extreme drought year are far more likely to be damaging than a general warming, and, even now, over 70 percent of Saskatchewan's economic base is dependent on weather (Wheaton 1990, p. 175). Furthermore, soils in areas of the northern Prairies that will become warm enough for agriculture are unsuitable for anything other than low-value forage crops (Arthur 1988, p. 10). The fertile valleys of the Peace and Mackenzie rivers are possible exceptions, but the thin soils of the Canadian Shield are severely limited.

Modern agriculture, however, is innovative and dynamic, so that adaptation may be possible, although there would have to be large changes in infrastructure and management. Changes in the crops grown may offset some of the negative effects: for example, grain corn could be grown in northern Ontario; southern Ontario and Quebec would become suitable for horticulture and fruit growing (Smit 1987; Singh 1988); winter wheat could replace spring wheat on the Prairies (Mendis 1989, p. 4). New

crop varieties could be developed. But many political and economic factors act on agriculture, encouraging farmers to continue practices that are clearly unsustainable, practices such as farming drought-prone land. The emphasis on short-term profits and the provision of disaster aid reinforce this bias (Smit 1989a, pp. 200–201).

Our success in world trade depends on conditions elsewhere. One study that considered only temperature rise showed that Canada could improve its comparative position in world wheat trade (Smit 1989b). But if drought becomes more frequent in North America, there may be serious effects on world grain stores. World output decreased by about 76 million tonnes in 1988 as a result of the drought in North America and China (Strong 1989). Uncertainty must remain the watchword in considerations of the future of agriculture under global warming. To quote Barry Smit (1989a, p. 201), of the University of Guelph: "The knowledge base is meager, the uncertainty is great, the potential benefits are modest, and the potential risks are significant."

Water resources in general, and the Great Lakes in particular, could be affected by lower precipitation over much of southern Canada. There will be a shortage of irrigation water and much less runoff, so that water levels in the Lakes could fall by as much as 2 metres (Sanderson 1987; Bolhofer 1989). Outflow through the St Lawrence could be reduced by as much as 21 percent. Pollutants will be concentrated, harming water quality and the fisheries, and increasing the need for harbour dredging. There could be major changes in the mix of fish species, with unknown economic effects (Commonwealth Secretariat 1989, p. 50). Competition for water resources for agriculture, hydroelectric generation, domestic use, and industry will increase. Warming will also bring benefits as there will be less need for electricity, so that Ontario Hydro could save 61 to 92 million (1984) Canadian dollars (CAD). Eleven months of ice-free shipping will be possible, but lower water levels will bring higher shipping costs, at least for the four major cargoes (Sanderson 1987, p. 1).

The Canadian North may find that a warmer climate is a boon to tourism and settlement, although the effects on indigenous society could be negative. There will be more precipitation and thus more snow, but the season will be shorter, perhaps with increased spring flooding. Shipping will benefit from the reduction in ice. Our fragile arctic ecosystems, however, are vulnerable to change; mammals, for instance, may find their migration patterns disturbed (Lonergan 1989, p. 466). Inuit hunting and fishing, a major economic activity in the North, could be harmed. Warming of the permafrost will damage roads, foundations, and pipelines, and bring erosion and landslides. Its disintegration could release massive amounts of methane and carbon dioxide, which would fuel the warming process even more (Houghton and Woodwell 1989, p. 43).

Changes to our oceans could bring many problems. If sea levels rise, low-lying parts of cities such as Charlottetown and St John could be flooded, harming docks, roads, causeways, waste dumps, and residential areas (Martec Ltd 1987; Lane 1988). Wetlands, the nursery of some of our fisheries, will be inundated, although some degree of adjustment may be possible if the rise is slow and the land flat. Water supplies will be harmed by saltwater intrusion into water tables and aquifers. As beaches are eroded, tourist revenues will fall, as indeed they will in our forests and on our ski slopes.

The effects on fish yields of changes in ocean circulation and temperature are uncertain. The crisis in the Atlantic fishery has shown how vulnerable this resource is to lack of knowledge, political interference, and international rivalry, without even factoring in environmental change. Changes in the distribution of species and in the timing of their life cycles must be expected. Aquaculture could benefit from warming if pollution problems are handled. Thus, some communities could benefit while others will lose (Stokoe et al. 1990). One positive change will be lower costs for navigation; ice-breaking currently costs 15 to 20 million CAD per year in Atlantic Canada alone (Stokoe 1988).

The Continental Context

Many large studies have been carried out on potential impacts in the United States, particularly by the EPA. Several areas of concern to Canada stand out. Chief among them are changes to precipitation patterns across the continent. If, as feared, much of the West becomes more arid and experiences drought more often, then dramatic shifts in agriculture may be necessary. Corn is very susceptible to heat and drought and much of the western corn belt may no longer support the crop. Although domestic food supplies are unlikely to be harmed, the possibility exists that grain exports from the United States could slow to a trickle in some years, placing the world's hungry in further peril (Brown 1989, p. 121). Increased demands for irrigation water are possible in many areas. California, for example, which has the world's largest system of water reservoirs, depends on specific timing for its domestic and agricultural water. Less snow and earlier spring melt, combined with population growth and reductions in groundwater, could mean large shortages (Smith 1989). The net result could be heightened political pressure on Canada for access to our water. Indeed, there were calls during the scorching summer of 1988 to divert water from the Great Lakes. The forests of the United States, many already severely stressed, could suffer in much the same way as Canadian forests, leading to continental shortages of wood products and disruptions to international trade.

Conclusions

Canadians will probably be worse off as a result of climate change; GNP and per capita disposable income could fall, living costs will probably rise, and regional differences could widen because of damage to our resource base (Ireland 1989, p. 40). These are serious possibilities, but Canada is a wealthy country, able, perhaps, to bear the costs without economic or social breakdown. Not so for the nations of the South. For them, the

effects of global change will be superimposed on problems that are today staggering and will almost certainly escalate in the coming decades. Few have the financial, managerial, or technical capabilities to adapt to further change. Thus, although the northernmost countries, such as Canada, will experience the greatest degree of warming, the developing world may suffer most from the impacts of global change. The biggest losers, as always, are likely to be those already living in marginal conditions, already exposed to the ravages of natural disaster, ill health, and malnutrition.

These nightmarish regional impacts must remain warnings, not predictions. In this chapter, we have tried to impart a sense of the unique difficulties of the global change issue: its irreversibility, its long-term nature, its complexity, and, above all, the great uncertainty of the scientific data and the possible impacts. This uncertainty is not likely to be resolved in the near future. Yet decisions will be made over the next few years that will affect the rate of change. The task is daunting. Global warming, more than any other issue,

> epitomizes the idea that everything relates to everything else.... It is rooted in industrialization, technological change, dependence on energy, striving for economic growth, and the many other aspects of a human population that aspires to improve its quality of life. The buildup of greenhouse gases is a result of normal, not aberrant, human behavior and is a product of innumerable independent decisions by individuals, industries, and governments in daily life all over the globe. (Skolnikoff 1990, p. 81)

Chapter 4

Scorching Political Winds: Presage of Global Climate Change

> *Of all the pressing large-scale environmental problems facing society, global climatic changes appear to have the greatest potential for provoking disputes, worsening tensions, and altering international relations between developed and developing countries.*
>
> Gleick (1989, p. 338)

Policymakers today are faced with decisions for which there is little precedent. The results of their deliberations over the next decade or so may well, however, determine how fast global change occurs and how severe are its consequences. Not only is extreme uncertainty a problem, but the time scales involved are far beyond the usual political horizon, although well within the framework of decisions in areas such as transport, forestry, and water resources. For governments concerned about re-election and mounting deficits, the risks are great; the costs are in the present, the benefits are uncertain and in the future. To complicate matters, decision-making is typically fragmented and influenced by powerful vested interests.

Yet, however difficult the problem facing national governments, it is multiplied a thousand times at the international level. Each country has its own perception of the danger, and a host of political philosophies and regional animosities further muddies

the waters. Yet this is truly a global concern, and global consensus must be reached if policies to slow the rate of change are to be effective.

As we have seen, the distribution of effects will be uneven and will bear little relation to the source of the problem. Even though countries of the North should experience the greatest warming, the most serious impacts may well occur in the South. This imbalance in cause and effect has not escaped the notice of people in the South. They feel strongly that "having caused the major share of the problem and possessing the resources to do something about it, the industrial countries have a special responsibility to assist the developing countries in finding and financing appropriate responses" (Woods Hole Research Center 1989, p. 11).

The developed world is responsible for the major share of carbon emissions, and their economies depend on resources in the South. Southern politicians thus see many contradictions in the approach of the North and are reluctant to forego the advantages that they feel rapid modernization and industrialization can bring. They feel that it is only fair that they too should have "drawing rights" on the atmosphere; they too should have a chance to develop.

The issue has become highly politicized. Many in the South argue that climate change is being used as a pretext by the North to perpetuate existing gaps between North and South, to divert attention away from the real causes of the problem, which stem from the profit-oriented production systems of the capitalist world. After all, many of the environmental problems of the South are the direct responsibility of the North, historically through colonialism, but continuing today through resource extraction and consumption patterns, the promotion of modern technologies, faulty development strategies, and domination of the world economic system.

Arguments such as these lie behind the acrimony that has characterized the international politics of the environment in recent years. There is enormous resistance by the South to naive

calls to reduce deforestation or fossil-fuel use. In international negotiations, the South is uniting to hold the North to ransom with a very powerful bargaining tool: the threat that they will do nothing to stem their emissions of greenhouse gases without significant help from the North. Nor will they act until the North itself makes dramatic cuts.

A huge infusion of finance and technical assistance will certainly be needed. Yet money and technology alone cannot begin to address the development crisis in the South, which is at the heart of the problem. Climate change is, after all, but a symptom of the failure of humanity to live in harmony with the Earth's life-support systems. This is why many are calling for "an all-encompassing, unprecedented, North–South compact on sustainable development" (Krause et al. 1989), using climate change as a lever to address a range of broader economic and social issues such as debt relief, trade imbalances, and global inequities. Without true partnership, there can only be a continuing decline in living standards, rising political instability, and a complete inability to deal with rising greenhouse gas emissions in the South.

In this chapter, we briefly discuss policies that address global warming and the costs that may be incurred. We look at progress toward international agreement on global change and the growing confrontation between North and South, a confrontation that may shape the political arena for years to come. Lastly, we consider Canada's role at home and abroad.

Policies to Reduce Global Warming

How great is the challenge? The IPCC has calculated that merely to stabilize the composition of the atmosphere, there must be immediate cuts of over 60 percent in carbon dioxide emissions, 75 to 80 percent for nitrous oxide, 70 to 85 percent for CFCs, and 15 to 20 percent for methane.

These figures suggest nothing less than an enormous restructuring of the global economy and dramatic changes in personal behaviour. Yet fossil-fuel use continues to increase, even if the current recession has had a dampening effect. In the transport sector alone, there is an inexorable growth in the number of vehicles worldwide, especially in developing countries. Only slow progress is being made toward fuel efficiency. How, then, to reverse these trends?

Policies that specifically target global warming fall into two categories: limitation and adaptation. Prevention is thought to be both politically and scientifically impossible, since we are already committed to change. Our major aim must be to limit the warming to a level that is manageable and a duration that is short. Based on the ability of ecosystems to respond to change, the Stockholm Environment Institute has set us another goal: a maximum rate of increase of 0.1°C per decade and an absolute ceiling of 1 to 2°C degrees over preindustrial global mean temperature (Jäger 1990, p. 5). This target must be compared with IPCC predictions of 0.3°C warming in each and every decade of the 21st century.

Strategies that limit change include the following:

- *Slowing population growth* — This is the most important strategy, since it is extremely unlikely that the Earth can support the many billions of people that may eventually inhabit it.

- *Reducing fossil-fuel use* — Improvements in energy efficiency and the development of alternative sources will drastically cut carbon dioxide emissions.

- *Switching to fuels that emit lower levels of carbon dixoide* — Natural gas, for example, is a better choice than coal.

- *Reducing pollution* — Less pollution means reduced ozone levels in the troposphere as well as reductions in smog and acid rain.

- *Slowing deforestation* — We must recycle paper, plant trees, and conserve what forest now remains.
- *Moving to less energy-intensive agriculture and away from meat* — Animals, especially ruminants, are heavy producers of methane; their role in agriculture must be reduced.
- *Phasing out ozone-destroying chemicals* — Chemicals that destroy the ozone layer must be replaced by substances with little or no greenhouse potential.

Adaptation will also be necessary. Improving the resiliency of society to change in general is the most sensible approach, since extreme events such as droughts, floods, and storms will continue to cause the most disruption, even in a greenhouse world. The highest priority should go to strategies that help to solve more than one problem, such as increasing the flexibility of the global food security system and of water supplies. Yet, as ecoclimatic zones shift and sea levels rise, more specific strategies will be needed. There is a wide range of options available. Included are shifts in agricultural production and the development of new crop varieties, protection from sea-level rise, and land abandonment.

A detailed examination of the many possible strategies may be found in the large and growing literature on this topic (for example, Krause et al. 1989; UNEP and Beijer Institute 1989; Fisher 1990; Leggett 1990). Although progress in all areas is essential, it is clear that energy policy must be the backbone of any approach. Conservation remains a relatively easy option and it does not have to impede economic growth. Cost–benefit studies have shown over and over that policies that improve the efficiency of energy production and end use are beneficial even if climate change is ignored (Chandler 1989; Lovins 1990). Money is saved, the linked problems of acid rain and air pollution are attacked, and industrial competitiveness is improved. There is enormous scope for saving energy using existing technology. Indeed, the Worldwatch Institute has estimated that there could be an annual saving of 3 billion tonnes of carbon emissions by

2010 (Flavin 1990, p. 23). For Canada, there is no other policy that holds such promise; conservation is our biggest reserve.

Such actions are unlikely in themselves to be sufficient, however, and beyond a certain point they become prohibitively expensive. There are difficult trade-offs involved in other options. Renewed calls for the accelerated development of nuclear energy, for instance, downplay the enormous costs, the risk of accident, terrorism, and weapons proliferation, and the problems of waste storage. Hydroelectric power involves huge investments and often brings unacceptable social and environmental costs. Other sustainable energy sources are limited, at least now, although dramatic progress is being made, especially in photovoltaics. Thus, we appear to be committed to fossil-fuel use in the short run, however uncertain its supply. Eventually, of course, we will be forced to move to alternative sources, since fossil fuels are finite resources. The earlier we begin this transition, the less painful the process will be.

The nations of the South will need help. As we have seen, about half of the South's consumption comes from biomass-derived fuels such as wood and dung, which are burned inefficiently and contribute to land degradation. The modern sectors of these economies consume ever-increasing quantities of fossil fuel, adding to the debt problems of many nations and spawning horrendous pollution. Nevertheless, energy consumption must rise in developing countries if living conditions are ever to improve. Paradoxically, global climate change can be viewed as an opportunity. Many countries have barely started on the path of modernization and could adopt clean and efficient technologies from the start.

> If today's most energy-efficient technologies were adopted in developing countries, then only about one kilowatt per capita used continuously — roughly 10 percent more than is consumed now — would be sufficient to raise the average standard of living to the level enjoyed by Western Europe in the 1970s. (Reddy and Goldemberg 1990, p. 111)

Such "technological leapfrogging" would avoid many of the problems that have plagued attempts to modernize, but could only be done with extensive technical and financial help. The ability of individual countries to make changes will vary greatly.

The other major area of concern is land use. It is essential to reverse deforestation and halt soil degradation for many reasons, not the least of which is the need to feed the people of the world and to provide for their fuel and industrial needs on a sustainable basis. Reforestation is the most cost-effective way to reduce carbon dioxide, but it has limitations. An area roughly the size of the United States would be needed to offset current carbon dioxide emissions for the next 40 to 50 years (WRI 1990a, p. 29). Forestry projects, moreover, require care and a sensitivity to social concerns. We must ask where the huge areas of "waste land" for plantations are to be found, and what drives people to clear land in the first place.

The solutions to global change are political, not technical. The technologies required to slash energy use, eliminate CFCs, and feed and clothe the world's people in a sustainable fashion already exist, or will soon exist. In a thousand ways, however, government policies work against their adoption. The United States, for instance, subsidizes conventional energy sources at every step of the way, from research and development to waste disposal, to the tune of more than 40 billion USD each year. Canada spends about 4 billion CAD in the same way. Coal is heavily subsidized in such countries as China, Germany, and India (MacNeill et al. 1991, p. 37). Perverse market interventions also distort agriculture and resource extraction the world over, reinforcing unsustainable practices.

If allowed to work, the market can be a powerful ally. The response of OECD (Organisation for Economic Cooperation and Development) countries to the oil shocks of the 1970s and 1980s, combined with structural changes in industry, showed that energy use does not have to rise in step with economic growth. The US economy, for instance, grew by 40 percent between 1973 and 1988, yet energy demand remained roughly constant.

Canada, however, attempted to shield its consumers. As a consequence, it realized fewer efficiencies in fossil-fuel consumption than any other developed country (Ireland 1989, p. 18). We now produce about half as much GNP for each unit of energy as Japan does. This factor alone gives the Japanese a cost advantage of 5 percent on imports into Canada (MacNeill 1990a, p. 54).

But market forces, while of great importance, cannot be depended on to lower emissions enough, or to safeguard social equity, long-term interests, or the environment (Reddy and Goldemberg 1990, p. 118). A judicious mix of regulation, taxes, and incentives will be needed to cut emissions. Each country will have to concoct its own particular recipe to suit local conditions and great care will have to be taken to ensure that the poor do not suffer. Economists are developing a wide range of instruments, such as emissions trading between polluters, to apply to environmental problems. "Carbon taxes" on fossil-fuel use are already a fact in several European countries such as Finland and Norway. Such taxes are proportional to the amount of carbon dioxide emitted; natural gas, for instance, is taxed at a lower level than coal. This influences both choice of fuel and efficiency of end use.

Most governments, however, will act only when they have a clear idea of the costs of alternative actions, including the cost of "business as usual." This poses many problems for the economist. Environmental changes and impacts may be gradual and not easily quantified; cascade effects are likely to spread from small alterations in climate, and the need to consider future generations poses a moral dilemma. Economic costs are thus even more of an imponderable than scientific uncertainty, and poor decisions could be calamitous.

One thing, however, is certain. Global change will be expensive and the longer we delay action to limit greenhouse gas emissions, the greater the price will be. An example is the cost of protecting coastlines from sea-level rise. The USEPA, in a draft report to Congress in 1988, estimated that the cost of shielding only densely developed areas of the United States against a

sea-level rise of 50 to 200 centimetres could range from 32 to 309 billion USD (Broadus 1989, p. 130). Attempts have also been made to quantify the effects of sea-level rise in Bangladesh and Egypt under various scenarios. Again, the sums involved are astronomical, both in human and financial terms. Indeed, to quote an editorial in *Nature* (1990a, p. 371): "The cost of either adaptation to or avoidance of the excess greenhouse effect may well amount to a substantial fraction of the world's total stock of social capital."

Several studies have shown that the up-front cost of limiting emissions in industrialized countries at 1990 levels by the year 2000 should not exceed 1 percent of GNP. This is a sizeable sum, but one that would bring net benefits through energy efficiency. To achieve the IPCC goals, however, is another thing altogether, especially if the deepest cuts must be borne by the North. A major revolution in Western lifestyles, in the workings of our economic and financial systems, may well be necessary. Attempts to estimate the costs of such radical change have only just begun. Of necessity, they are highly speculative.

Jim MacNeill, Pieter Winsemius, and Taizo Yakushiji, in their invaluable book *Beyond Interdependence*, review several studies of both short-term targets and long-term structural change in various nations (MacNeill et al. 1991, pp. 90–100). Preliminary estimates of the annual cost of long-term change in industrialized countries range as high as 5 percent of GNP. Included in costs to the North, however, must be payments to help the South combat global warming. MacNeill et al. (1990, pp. 95–96) suggest that as much as 20 to 30 billion USD would be needed each year, "assuming use of the lowest-cost measures available." Compared with the global expenditure on arms of about 1 trillion USD per year, or even on energy subsidies, this is "not beyond reach." Indeed, if the alternative is global catastrophe, it is a small price to pay.

Whether any of this is politically feasible, however, remains to be seen. The United States and several other major polluters are proving to be increasingly recalcitrant in their reluctance to

make real commitments to reduce emissions themselves and to provide financial aid to less advantaged countries. A very real and paralyzing fear is the possibility that unilateral action will destroy a country's competitive advantage on world markets.

The International Process

The last few years have witnessed a bewildering array of meetings on the subject of global change. Politicians at the highest level have responded to a rising tide of passionate public concern over environmental matters. Scientific institutions and programs have proliferated. A veritable avalanche of publications has been released. This unprecedented level of attention reflects not only the economic and social nature of the problem but also the realization, at last, that global environmental change is a matter of security that rivals nuclear war in its potential for harm.

Although the diplomacy of global change is in its infancy, there has been one success story — the Montreal Protocol, which has become "a prototype for an evolving new form of international cooperation" (Benedick 1991, p. 3).

The Montreal Protocol

In March 1985, the Vienna Convention for the Protection of the Ozone Layer was signed, creating a framework for international cooperation in monitoring and research. Only 20 countries signed at first and, in keeping with conventions of this nature, there were no specific obligations on the signatories. "Nevertheless, this was a very historic document because, for the first time, states agreed in principle to tackle a global environmental problem before its effects were felt or its scientific foundations firmly proved" (Rowlands 1991, p. 105).

Obligations are often spelled out in "protocols" to conventions and are negotiated separately. Scientific confirmation of damage to the ozone layer followed hard on the heels of the Vienna Convention and lent a sense of urgency to the international effort. The Montreal Protocol was signed in September

1987. Yet, despite the ominous danger signal given by the ozone hole, the Protocol was a classic case of compromise; its delicate negotiations reflected in clauses dealing with "the special circumstances of several states" (Rowlands 1991, p. 106). Although its provisions aimed initially to halve consumption of five CFCs by 1998 and freeze consumption of three halons by 1992, a 10-year grace period was given to most developing countries. Furthermore, existing producers in the European Community, Japan, and the United States could produce up to 10 percent more if their additional production was exported to the South, so as to discourage the establishment of new CFC factories in the South. So, even with 100 percent compliance, global production would continue to increase and chlorine levels in the stratosphere could reach a level almost 20 times higher than natural levels by 2100 (Benedick 1991, p. 130).

In the months that followed, it became apparent that ozone depletion was dramatically worse than scientists had predicted and that the Protocol needed strengthening. Fortunately, its authors had built in provisions for regular review and adjustment. At the second review meeting of the Protocol, held in London in June 1990, the signatories, who now number about 80, agreed to phase out CFCs and halons by the year 2000, with cuts of 50 percent by 1995. Many more chemicals, including carbon tetrachloride and methyl chloroform, were included in the revised Protocol.

Some countries have set more ambitious targets. This is especially true in Europe, which is responsible for 50 percent of all CFC production. Germany will phase out the domestic use and production of CFCs by 1995 (Toro 1990). Canada has adjusted its target date several times in response to new scientific findings. In March 1992, Canada pledged to ban CFC production and importation by the end of 1995. Horrifying new data released in February 1992 by NASA, the National Aeronautics and Space Administration in Washington, DC, however, signal the need for an even tighter schedule.

One reason for the relative success of the Montreal Protocol has been the response of industry. Dominated by a handful of multinational corporations anxious to retain control of the sector, it has vigorously accelerated the development of substitute compounds. These substitutes, however, are more expensive to produce and some are powerful greenhouse gases. Their use must, therefore, be transitional.

The road to success was far from easy. In the North, Japan, the former Soviet Union, and the United States fought against earlier deadlines. The position of developing countries has changed over the years. Many, only now embarking on plastics, refrigeration, and electronics industries, rejected the proposals from the start. China and India were particularly vociferous. At a conference in London in March 1989, China called on the developed world to make the first dramatic cuts and to set up an international fund to finance research and technology transfer. It insisted that restraints on developing countries be tailored to levels of economic development and to progress in finding substitutes.

The refusal of the United States and several industrial countries to contribute to a fund was a major stumbling block, but, in June 1990, the US agreed to participate in a fund worth 160 million USD over the first 3 years, plus 40 million USD each for China and India when they sign. This will help developing nations cope with the changes called for in the Protocol. The fund is administered by a secretariat in Montreal, with funds controlled by the World Bank. In 1991, China ratified the agreement.

The Montreal Protocol, limited as it is, offers valuable insights for future agreements. Paramount are scientific consensus, international cooperation, the need to mobilize public opinion, flexibility, and the inclusion of equity issues. But many questions remain about the Montreal Protocol, questions relevant to all areas of global change. The early refusal of the US to participate in any funding mechanisms to help developing countries reflects their fear of setting a precedent for the strikingly more difficult topic of climate change. Questions of process also remain. Who

will provide these countries with the more expensive substitutes? How will they be provided? The details of technology transfer are by no means resolved.

Global Warming

Progress in the fight to save the ozone layer has been possible because the danger is clear, only a few manufacturers are involved, and substitution appears likely for most uses. But climate change is infinitely more complicated than ozone depletion. It will be enormously difficult to overcome the inertia of existing policies and investments and to reach international consensus on firm targets. Nevertheless, the first steps toward a global bargain have been taken.

A scientific conference at Villach, Austria, in 1985, and meetings at Villach and Bellagio in 1987, came to the conclusion that global warming will occur and that it is a serious threat to the human race. The issue quickly moved to the top of the political agenda. The Toronto Conference on the Changing Atmosphere, in June of 1988, was the first major international gathering on climate change to address all aspects of the problem: scientific, economic, social, and political. Organized by Environment Canada and attended by delegates from 46 countries, its Conference Statement was an historic declaration of good intentions, calling for a wide range of actions, including

- Work toward an action plan for protecting the atmosphere, financed by a World Atmosphere Fund;
- Reduce carbon dioxide emissions by 20 percent of 1988 levels by 2005; and
- A comprehensive global convention on the protection of the atmosphere, to be ready for consideration at Rio in 1992.

A rapid-fire series of meetings followed Toronto. As well as almost weekly scientific conferences, many political fora have addressed global change. In eight months of 1989 alone, the Hague Declaration, issued by more than 20 carefully selected

leaders (including Canadian Prime Minister Brian Mulroney), called for a new international agency to monitor world pollution and to penalize polluters; at the Group of 7 (G-7) meeting in Paris, 19 of the 56 resolutions were on environmental matters; Commonwealth leaders issued the Langkawi Declaration on global warming; and, in November, the first meeting of environment ministers specifically to discuss carbon dioxide emissions was held in Noordwijk, the Netherlands. By that time, clear political positions were emerging and the goal set at Toronto of 20 percent cuts by 2005 had plainly been abandoned by most countries. Opposition from Japan, the Soviet Union, the United Kingdom, and the United States at Noordwijk resulted in a final, vague statement that "industrial nations agree that...stabilization should be achieved by them as soon as possible" (Noordwijk 1989).

A theme common to all meetings has been a call for more research. Late in 1988, the IPCC, an initiative of UNEP and the World Meteorological Organization (WMO), was set up to assess research on global warming. As the major intergovernmental body in this field, it has won wide acceptance. Over a thousand experts on development, climate change, and environment, from all regions, have been involved. Three working groups reviewed the scientific evidence, assessed the social and economic impacts, and evaluated national and international policy options. A fourth group, concerned with the participation of developing countries, was established later. After little more than a year, a major report was issued in time for the Second World Climate Conference (SWCC), held in Geneva in November 1990 (IPCC 1990b, c, d).

An amazing degree of consensus was reached by the many hundreds of eminent scientists who worked for IPCC or attended the SWCC. Political interference, however, marred the work of Group III, which was chaired by the United States. Indeed, an international outcry by environmentalists greeted its recommendations, which, if implemented, would merely slow the rate of growth in carbon dioxide emissions and would not even vaguely approach the 60 percent reduction called for. At the SWCC,

however, the scientists concluded that many industrial countries could achieve the Toronto target of a 20 percent reduction in carbon dioxide emissions by 2005. Again, there was no agreement on targets by the 137 countries present at the SWCC, although the conference statement urged countries to act on their own.

In the lead-up to the SWCC, however, many industrialized nations made pledges to slash their greenhouse gas emissions. Australia promised to stabilize emissions by the year 2000, with reductions of 20 percent from 1988 levels by 2005. New Zealand bravely aims to cut carbon dioxide emissions by 20 percent by the year 2000, provided that the country's competitive position is not unduly harmed. Japan, which initially opposed setting a target because of its already high degree of energy efficiency, agreed to stabilize per capita and total emissions by the year 2000 (*Climate Alert* 1991).

The main thrust for change, however, has come from Europe. There, public concern is resulting in the election of politicians who seem prepared to act. The European Community as a whole has agreed to freeze carbon dioxide emissions at 1990 levels by the year 2000. The European Free Trade Association has set the same target. Several countries are more ambitious. Germany, in particular, with a huge potential to improve energy efficiency in the East, hopes to cut total carbon dioxide emissions by 30 percent by 2005 (MacNeill et al. 1991, p. 97).

By the end of 1990, 22 countries, including a tardy Canada, had announced greenhouse targets, although few had done anything concrete. Among OECD countries, however, the United States remained faced off against the others. In the international arena, it has been supported by the former Soviet Union and the OPEC Gulf States, notably Saudi Arabia. Their power to hinder progress should not be underestimated; the battles have only just begun.

Progress on the Legal Front

Ultimately, there must be an effective, binding agreement between nations. There are several shapes that this could take. The most ambitious thinkers favour a Law of the Atmosphere, comparable to the Law of the Sea. This would be an all-inclusive instrument aimed at protecting the atmosphere and would seek to fill the many gaps in existing international agreements (Siddiqi 1988; Lammers 1989). The obstacles, however, are formidable. The extreme difficulties and frustrations experienced with the Law of Sea — the huge time frame, the intransigence of so many important nations — make a much more complex Law of the Atmosphere truly a "Mission: Impossible" (Tolba 1989, p. 305).

The global community has embarked on a different course. At the SWCC, participants agreed to start work immediately on a convention on climate change, to be ready for signing at Rio in 1992. A daunting challenge, to say the least! The Montreal Protocol apart, experience has shown how difficult it is to reach agreement on atmospheric pollution. Over the years, there have been some successes in transboundary disputes; but, in general, progress has been excruciatingly slow and the results far from perfect. All too often, the dynamics of the least ambitious program rule the day and, for many countries, the temptation to free-ride cannot be resisted.

In 1991, the Intergovernmental Negotiating Committee (INC) began its monumental undertaking. Representatives of well over a hundred countries, dozens of NGOs, and various UN agencies and intergovernmental bodies attended the six long negotiating sessions. Progress was halting and the complex draft document included dense thickets of brackets around words, phrases, and even whole articles on which consensus could not be reached until the final hours of discussion in early May 1992. This did not bode well for an effective convention. Indeed, as a concession to US President Bush, the vaguely worded Framework Convention on Climate Change finally signed by more than 150 nations at Rio includes no concrete targets or timetables: indus-

trial nations agree merely to reduce greenhouse gas emissions to "earlier levels" by 2000 and to report periodically on their progress. The European target of freezing carbon dioxide emissions at 1990 levels has become a voluntary goal, although there was a strenuous attempt by Austria and others at Rio to press for a "like-minded countries" declaration of intent. For the time being, developing countries are exempt from all obligations except those of measuring emissions and designing policies.

Work on specific targets may well take years. As we discussed in Chapter 3, so little is known about the sources and sinks of the gases that it will be hard even to agree on base-line figures, let alone decide on quotas for each country. To factor in past emissions, as developing countries demand, makes the task seem overwhelming. Scientists are attempting to develop a weighting system ("global warming potentials") to compare greenhouse gases (Grubb et al. 1991). This is both a political and a scientific mine field. Not only is the science fraught with uncertainty, but also enormous financial and political consequences will follow even small changes in the way gases are treated in such equations (Victor 1990).

The Role of the South

The role of the South is paramount in these negotiations. From the Montreal Protocol in 1987 and attempts to block the UN resolution to convene the Earth Summit in 1989, developing countries have actively promoted their interests at meetings on global change. Indeed, a group of developing countries convinced the UN to move the treaty process out of UNEP, which had steered the Montreal Protocol, into the UN General Assembly, where one country equals one vote and the South far outnumbers the North (Anderson and Aldous 1991). Within INC, the Group of 77 (G-77) often represents the South, although there are differences between nations. For instance, the Alliance of Small Island States, a coalition of 35 countries who fear for their very survival, split from the G-77 in December 1991 to call for

immediate action from the North to stabilize their carbon dioxide emissions at 1990 levels by 1995 or earlier (AOSIS 1991).

A major demand of the South is "new, adequate and additional financial resources and transfers of and access to environmentally safe and sound technology on most favourable, concessional and preferential terms" (G-77 and China 1991). The questions of technology transfer and financial resources are key issues in all negotiations on environment and development, issues that will not soon be resolved. There is, for example, "no universally accepted definition or precise means of judging whether or not a technology is environmentally sound" (NGLS 1991). As our knowledge grows, so does our understanding: CFCs were long thought to be benign substances. Technology, too, implies a whole system of associated skills and infrastructure. It is remarkably difficult to introduce new technologies into societies that are not prepared for them. The South is littered with the remnants of past attempts. Even so simple a task as designing a small, efficient wood stove that is both affordable and acceptable has confounded aid workers and inventors for several decades. This is why the Canadian delegation to the Earth Summit promoted what is known as "best practice" technology, tailored to the individual needs of each area, and why aid policies increasingly emphasize capacity building in education, institutions, and so on, in developing countries.

These are underlying problems. At the negotiation table, the chief issues have to do with intellectual property rights, with patents, and with the technicalities of transfer. Undoubtedly, the private sector will continue to be the main conduit for technology. The job of governments and international agencies must be to provide the right policy climate, to act as catalysts. For this to work, "most favourable and concessional terms" may indeed be needed.

Funding promises to be an intractable problem. The tentative, and certainly understandable, response of the West to Russia's desperate pleas gives a taste of what lies in store. The stance of the US alone guarantees a rocky road. Yet developing

nations are demanding "new and additional" finances over and above current aid flows for development, enough to meet the full incremental costs of any agreements on the environment. This they regard as compensation.

Many proposals have been made of ways to raise and administer the large sums that will be needed (MacNeill et al. 1991, p. 100). The world is very new at this game and there are many lessons to be learned. The World Bank, for instance, is experimenting with a Global Environment Facility, which, as a result of the Rio Earth Summit, promises to become a major source of funding; the Montreal Protocol Multilateral Fund, however, has been slow in getting under way. There is a need to be creative and flexible, to use existing mechanisms wherever possible, and to avoid duplication. Whatever the outcome, the institutions that administer such funds must be democratic and transparent, and developing nations must have an equitable voice in their operation.

The potential of developing nations to swamp any reductions in greenhouse gas emissions made in the North should give them considerable clout in climate change negotiations. The role of China and India, with their huge populations and vast coal reserves, is especially significant. Indeed, any serious international control effort must include the active, committed support of these two countries. Without such support, an absolute reduction in global emissions of fossil carbon or even a greatly reduced rate of increase is highly unlikely.

Yet real progress is unlikely in the short run and new finances may not be forthcoming. MacNeill et al. (1991) argue strongly for a parallel process, in which the problems are cut up into manageable bites, perhaps with limited goals and between small numbers of players. Such small "bargains" are suited for agreements between selected developed and developing countries. Although considerable political obstacles lie ahead, "a Grand Global Bargain could be the sum of 1,000 small bargains" (MacNeill et al. 1991, p. 108).

Eastern Europe and the republics of the former Soviet Union must be part of this bargain, since they are responsible for roughly a quarter of carbon dioxide emissions from fossil fuels. In these countries, industry will have to be completely restructured to combat extremes of pollution and inefficiency, and to provide much needed consumer goods. Yet the prospect of economic and political chaos makes the possibility of action seem remote.

One area where nations do agree is the need for more research. For the politician, it can be a useful stalling tactic; it is often easier to find money for research than it is to take aggressive action on environmental matters. The US, for instance, appropriately spends more on research than does any other country. Its Mission to Planet Earth is an international, 25-year program of satellite surveillance that should fill in many gaps in the knowledge base. Japan, too, has made climate-change research a national priority. It has launched an impressive hundred-year plan for sustainable development and is especially interested in the development of environmentally friendly technologies.

Canada and the Science of Global Change

Canada has a long record of climate-related research. The Canadian Climate Centre, a branch of the Atmospheric Environment Service, oversees the Canadian Climate Program, which was established in 1979 to integrate research on climate fluctuations and climate change and to improve access to climate data. The Program's board has input from federal and provincial agencies, universities, and the private sector. Among its many activities, the Centre has carried out a series of studies on the possible impact of climate change on various sectors of the Canadian economy. It has developed a "second-generation" general circulation model with a more sophisticated treatment of many climatic factors, including the oceans; it is regarded as one of the best in the world.

The Canadian Global Change Program was established by the Royal Society of Canada in 1985 as a broad, multidisciplinary network for coordinating research and communicating results to the policy community. Its goal "is to ensure that the Canadian national program for research into Global Change is cohesive, comprehensive and responsive to national needs and international initiatives" (Sutter 1990). Much of the research on climate change in Canada is carried out in universities and government agencies, many funded by NSERC (the Natural Sciences and Engineering Research Council of Canada) and various federal departments.

Canada is increasing its support of scientific research in this field under the Green Plan. In August 1991, Ottawa pledged 15.8 million CAD to boost our ability to study and monitor the Arctic ozone layer, and 9.2 million CAD to help speed the phasing-out of ozone-depleting substances (Feschuk 1991). In January 1992, the government announced a 6-year, 85 million CAD Global Warming Science Program. More than half of the money will support climate research and prediction, including further development of Canada's GCM (*Dalhousie News* 1992).

Canada is an active participant in a broad range of international research programs on global atmospheric change. Indeed, a quarter of the new funding will go to support large-scale international experiments. Many of these programs are run by UN agencies such as the WMO, UNEP, and Unesco, the United Nations Educational, Scientific and Cultural Organisation. For instance, Canada has archived and published world ozone information for WMO since 1966. The Human Dimensions of Global Change Program, which hopes to integrate social sciences into the climate-change scenario, has its home in Canada.

Canada and the Politics of Global Change

Canada is also a significant player in the politics of climate change. We have hosted several important conferences, including Montreal, Toronto, and a follow-up workshop meeting in

Ottawa of legal and policy experts in February 1989. Canada has been a leader in the fight to save the ozone layer, is an active member of IPCC, and pressed for the development of a convention. CIDA's budget now includes a large allocation for projects aimed at sustainable use of resources in developing countries. Yet we have been slow to translate this concern into concrete domestic policies.

Between 1984 and 1990, government funding for research, development, and demonstration of alternative energy sources and efficiency projects in Canada was dramatically slashed. Yet research monies and subsidies still support oil megaprojects that will dump millions of tonnes of carbon dioxide into the atmosphere. The Hibernia oilfield off Newfoundland, if it goes ahead, will be developed at an initial cost of 5.2 billion CAD. As in the case of the planned Point Aconi coal-fired power plant in Nova Scotia, politics and regional unemployment still prevail over scientific and even economic concerns. Nevertheless, the federal government has pledged that Canada will stabilize carbon dioxide emissions at 1990 levels by the year 2000, and the Green Plan promises a range of initiatives that will increase funding for research and development, improve energy efficiency, and encourage a move to alternative fuels and renewable energy sources. For Canada, with its rapidly dwindling supplies of conventional light oil and increasing oil imports, this makes sense in more ways than one.

Yet, as the Green Plan acknowledges, "the measures outlined...are, of themselves, unlikely to realize Canada's stabilization target," although provincial and municipal governments are urged to "give serious consideration to other possible measures" that might help (Canada 1990a, p. 109). The provinces have made a tentative start in this direction. Ontario leads the way with a 6 billion CAD program of energy conservation for the 1990s (Canada n.d., pp. 20–38).

Just as governments have been slow to act on energy issues, so have this country's land-use policies failed in many ways. There has been far too little support for research into organic

farming or for farmers who wish to try it. Our forestry policies, too, are only now beginning to address the question of sustainable development. As stewards of a major global store of carbon, we have a responsibility to manage our forests in ways that will reduce the impact of global warming (Duinker 1990, p. 132).

Conclusions

Politics is all about the management of uncertainty and the balancing of conflicting interests. For policymakers, global change presents the ultimate challenge. Scientific certainty may be many years away, yet to delay action is to court disaster. Policymakers have no choice but to act before the answers are in. They will need vision and courage.

Solutions will not be easy. As we have reiterated, greenhouse gas emissions are so intricately tied to human behaviour that to address the problem at all requires a broad brush. Ultimately, unless there is a concerted international effort to solve the development debacle of those nations struggling for their short-term survival, an effort to address the social, economic, and environmental crises facing them, there is no hope that global change can be averted. The daunting, and perhaps impossible, challenge is to move to a sustainable future that both decouples economic growth from the destruction of the world's resources and stabilizes the composition of the atmosphere at a desirable level.

If we factor in social equity, we must address the thorny question of how to cut global emissions, yet still work toward an improvement of living standards for the world's impoverished. The answers may well include strong medicine indeed for the industrialized countries and a much more equitable sharing of "atmospheric rights" between nations both in the immediate future and for generations to come. If greenhouse gas emissions are to rise in the South, the North must be prepared to make large reductions.

Canada portrays itself as a strong supporter of the aspirations of developing countries. It has, for instance, been a major source of travel funds for developing countries at the INC meetings. At the third session in September 1991, the Canadian delegation made a "clear statement of our intent and our commitment" to recognize "the need for appropriate new financial flows and improved flows of beneficial technology...to assist developing countries address their priorities, address global environmental problems, and meet the defined and agreed incremental costs associated with Convention goals and obligations" (Canada 1991).

True support, however, will only come when Canadians are prepared to make sacrifices in their daily lives; when governments are prepared to make tough policy choices. Canada must do far more than "stabilize greenhouse gas emissions at 1990 levels by the year 2000" — a modest goal that we may well have trouble reaching with our current policies.

Much, then, depends on the willingness of rich nations to change their lifestyles and to transfer financial resources and technology to the Third World. Much, too, depends on leadership in the South; without strong measures to curb population growth, reform land tenure, help the rural poor, adopt energy-efficient technology, reduce deforestation, and so on, little progress will ever be made (Speth 1990b, p. 18). Currently, the political will to accomplish this is lacking in most major players, in North and South alike.

The task facing negotiators is "nothing less than the creation of an equitable framework for the management of the Earth's resources" (*Nature* 1990b). Yet, even if we do achieve an effective convention, implementation will not be easy. In Chapter 7, we discuss international conservation treaties. The difficulties involved in the enforcement of these relatively simple agreements make prospects for the infinitely more complex negotiations on climate change seem daunting. Yet, if conventions are not respected, then the current scenarios for climate change will unfold inexorably (MacNeill 1990b, p. 23).

PART III

CANADIANS AND TROPICAL FORESTS

Overview

In recent years, concern over the fate of tropical forests has spread to people all over the world. The stakes are high: developing countries desperately need the foreign exchange and new agricultural lands that forest clearance can bring. The North, which needs and eagerly consumes tropical products, is demanding an end to tropical deforestation so as to preserve the astonishing biodiversity of these habitats and delay the onset of global warming. As we discussed in Chapter 4, there is considerable skepticism on the part of tropical countries about the motives of these critics in the North. Temperate nations have often managed their own forest resources badly and through their consumption patterns are directly responsible for at least some of the environmental degradation of the South. Nevertheless, as we showed in Chapter 2, tropical forests are shrinking at an alarming rate. The worldwide concern for their future is thus justified, but will not be particularly helpful until it can be translated into meaningful action.

Canada is a towering giant among wood-exporting nations. Our exports dwarf global trade in tropical hardwood. Yet Canada is affected by what happens in other corners of the global market. As we describe in Chapter 5, Canada is not a large importer of tropical wood, but our products compete with those of developing nations. In today's volatile and crowded market, our forestry

industry is being forced to adapt as countries jockey to grab a share of expanding markets. Canada's competitive position in pulp and paper, for instance, could well be affected by the explosive growth of plantations in the South.

This view of the forest as a source of logs and timber products, however, represents but a small part of our trade interests in tropical forest lands. We depend on a wide range of tropical commodities that are grown on lands cleared of forest, such as rubber, cocoa, and tea. We also take part in less orthodox kinds of trade: in street drugs such as cocaine from the deforested mountains of Peru and Colombia; in live birds from the jungles of Latin America and Southeast Asia; in the skins of lizards, pythons, and crocodiles for our shoes and handbags. It is not easy to gain an accurate picture of this trade, particularly when it comes to endangered species or processed products, but in Chapters 5 and 7 we use official statistics to gain some idea of the phantom pressures exerted by Canadians on tropical lands.

Yet Canada's relationship with tropical forest management issues is much more complex than a simple tallying of trade figures. Indeed, we might think of it as a mosaic or tapestry of interlinked but sometimes conflicting interests, some of which we describe in Chapter 6. Business is involved in many ways: direct investment in activities that affect tropical forests, such as oil exploration; the small but rapidly growing sector of the travel industry that targets Canadians who want to see tropical forests for themselves; the foresters and engineers employed in "development." We spend more than 100 million CAD a year on international forestry assistance; projects are managed by NGOs, consultants, and universities. Thus, our concern is rooted as much in self-interest as it is in meeting the needs of the South.

Even declines in the biodiversity of these ecosystems can be shown to have potential impacts on the Canadian economy; our migratory birds may be threatened, our monarch butterflies in peril. Canada is a signatory to several international wildlife treaties (the topic of much of Chapter 7), but we are also active participants in other more recent initiatives which, in theory,

acknowledge the complex causes of deforestation and target the wise use of forests. The halting progress of these initiatives is discussed in Chapter 6.

We have chosen to concentrate on tropical forest lands, including those converted to export crops, rather than examining the general issue of sustainable agriculture in the tropics. Our reason is simple. Tropical deforestation is so rapid, so devastating, that only remnants of these forests will remain in a few years if current trends continue. The need for understanding and action is thus very urgent.

In this debate, Canada has a large stake. Custodian of 10 percent of the world's forests and the leading exporter of wood products, this country is being caught up in the increasingly sophisticated global debate on forest practices. A host of new and often conflicting demands is being placed on our shrinking forests: conservation, recreation, the settlement of native claims. Ecologists and philosophers alike are questioning the methods and rationale of our forest industry and emphasizing the need for sustainability. Film documentaries on "The Amazon of the North," visits by members of the European Parliament, accusations by the President of Brazil, and clashes between environmentalists and foresters are all colouring perceptions of Canada, both at home and abroad. Thus, whatever is decided about tropical forests will have important repercussions for us and for the way we treat our own forests. With our expertise and experience, we should be world leaders in this field.

Chapter 5

Choices in the Harsh World of Trade

> *We are standing at the intersection of two historic global movements: towards greater freedom of trade and towards more stringent protection of the environment. The reverberations of that collision are only now beginning to be felt.*
>
> *Globe and Mail* (1991)

In Chapter 2, we briefly explored some of the major causes of tropical deforestation: the poverty, deprivation, and unequal access to land that force people in the South to practice shifting cultivation; fuelwood gathering, particularly in the drier regions of Africa and continental Asia; government-sponsored colonization programs; dam building, mining, and industrial development; cattle grazing and plantation agriculture; and logging with its associated infrastructure. A driving force behind much of this degradation is the enormous pressure exerted on developing countries by the need for foreign exchange, the need to produce marketable goods for export, and the answering drive by business to mine resources in the South for profit.

In this chapter we discuss the role of trade in tropical deforestation and describe Canada's imports of wood and agricultural commodities from these lands. Our starting point is the international trade in tropical timber, the most obvious link between the greed of the North and deforestation in the South. Even more disastrous, however, are the environmental and social impacts of the vast trade in agricultural commodities that

originates in the South. As we shall see, Canada is a relatively minor player in the tropical timber trade, but it has built up a considerable dependence on a wide range of agricultural commodities grown on once-forested lands.

Just as we contribute to deforestation in the South, our own forests are affected by trends beyond our control. Canada has traditionally relied on its seemingly limitless stands of timber and until recently gave little attention to the careful management necessary to ensure future harvests. But the global market is in transition as dwindling areas of old-growth forest are harvested. Increasingly, Canada is being forced to cut on marginal lands and use species once regarded as useless. Imposed on this changing world is the development of a single, more liberalized global market, or, alternatively, the ominous spectre of protective regional blocs. A host of pressures threatens this country's competitive position. More and more, Canada will be affected by developments in other parts of the world, by the ruthless dictates of big business, by policies enacted by other governments, and by the biology of distant ecosystems.

Tropical Forest "Development"

There is an enormous diversity of tropical forests. Those in drier regions are acutely threatened everywhere, assaulted as they are by large and growing human populations and a host of development pressures. Until recently, however, vast areas of the world's tropical moist forest (TMF) had remained relatively untouched, especially in the Amazon Basin, much of Southeast Asia, and in Central Africa. TMF comprises about 42 percent of the world's forest area (Braga 1991, p. 2). These forests are now under attack, often at the hands of loggers, and form the major focus of this chapter.

There are many hundreds of different ecosystems that could be called tropical moist forest. They occur on flatlands and mountain slopes; in the silt of coastal margins and among the

clouds; in regions of year-round rainfall and areas with seasonal drought. Most of these forests are blessed with a vast wealth of biodiversity: hundreds of tree species, most of little or no commercial value, jostle for space in a crowded landscape. Historically, this posed a considerable obstacle for loggers, who concentrated their efforts on a handful of highly prized species such as mahogany.

Not all TMF, however, is as uninviting to commercial foresters. Huge swathes of Southeast Asia and parts of Africa have more uniform stands of timber or consist of closely related species. The teak forests of Southeast Asia, of okoume in Gabon, and, above all, the magnificent dipterocarp forests of Borneo, the Philippines, and other parts of Southeast Asia have a high proportion of trees that are marketable and present a wonderful opportunity for the logger (Westoby 1989, p. 151). It is precisely these forests that are crumbling under the onslaught of the phenomenal post-World War II logging boom.

There are echoes of Canada's past in today's tropical wood industry. In the late 1700s and early 1800s, the British, deprived of their traditional source of ship's timbers by the Napoleonic Wars and declining forests in the Baltic region, sought the straightest pine trunks from eastern North America. With time, and as Canadian forests were progressively depleted, the major species harvested and products exported have changed: from pine to spruce, fir, cedar, and now even the once despised aspen; from logs to squared timber, to sawn wood, and finally to composition boards and pulp and paper. With time, too, the centre of the industry has shifted to increasingly remote regions.

This progression of species, product, and source is being repeated today in developing nations. In country after country, loggers arrive, deplete the forests, and depart. Some exporters (for example, Nigeria and Thailand) have already become net importers. Technological change, in the tropics as in Canada, has greatly expanded the range of trees that can profitably be harvested and the habitats that can be exploited. Tropical wood is used increasingly not just for fine furniture and trim, but for

plywood, veneer, and even as pulpwood. Precious ecosystems such as mangrove forests are coming under the axe. The need to be less selective has not necessarily brought about the sort of large-scale clear-cutting that we see in British Columbia, although that has happened, in New Guinea, for example (Lamb 1990); nevertheless, the effects on Third World forests have often been more dramatic. Logging exposes fragile tropical soils to compaction and erosion and is usually carried out in a totally unsustainable fashion. For each tree that is extracted from the forest, many more are destroyed in the process. Even more damaging, however, are the logging roads that provide access to previously impenetrable lands, opening them to the depredations of shifting cultivation and commercial agriculture.

Demand for tropical hardwood, the main product of these forests, has expanded along with rising affluence in Europe, Japan, and North America. But it has been the great cheapness of the resource that has probably been its major attraction. How has this happened? How has timber from these remote forests been able to compete with that of other major exporters? The beauty of the wood is only a small part of the equation; far more important is the fact that the price of the wood extracted has never reflected the true value of the forest, let alone the replacement cost of the trees. Governments have connived at this practice, have actively encouraged outside interests to exploit their forests in the name of profit, and, in so doing, have added greatly to the wastage of their natural resources.

Figure 1 is a model of the complex interactions often present as a "typical" wood-exporting country in the tropics develops its forest resource. In this model, it is assumed that the country wishes to exploit its primary forest base both for domestic use and, most importantly, to export materials to earn foreign exchange. Land may also be cleared for agriculture. The model describes the situation in Asian countries such as Indonesia, the Philippines, Thailand, and parts of Malaysia, as well as a few African and Latin American countries.

The model suggests a progression from a locally dominated,

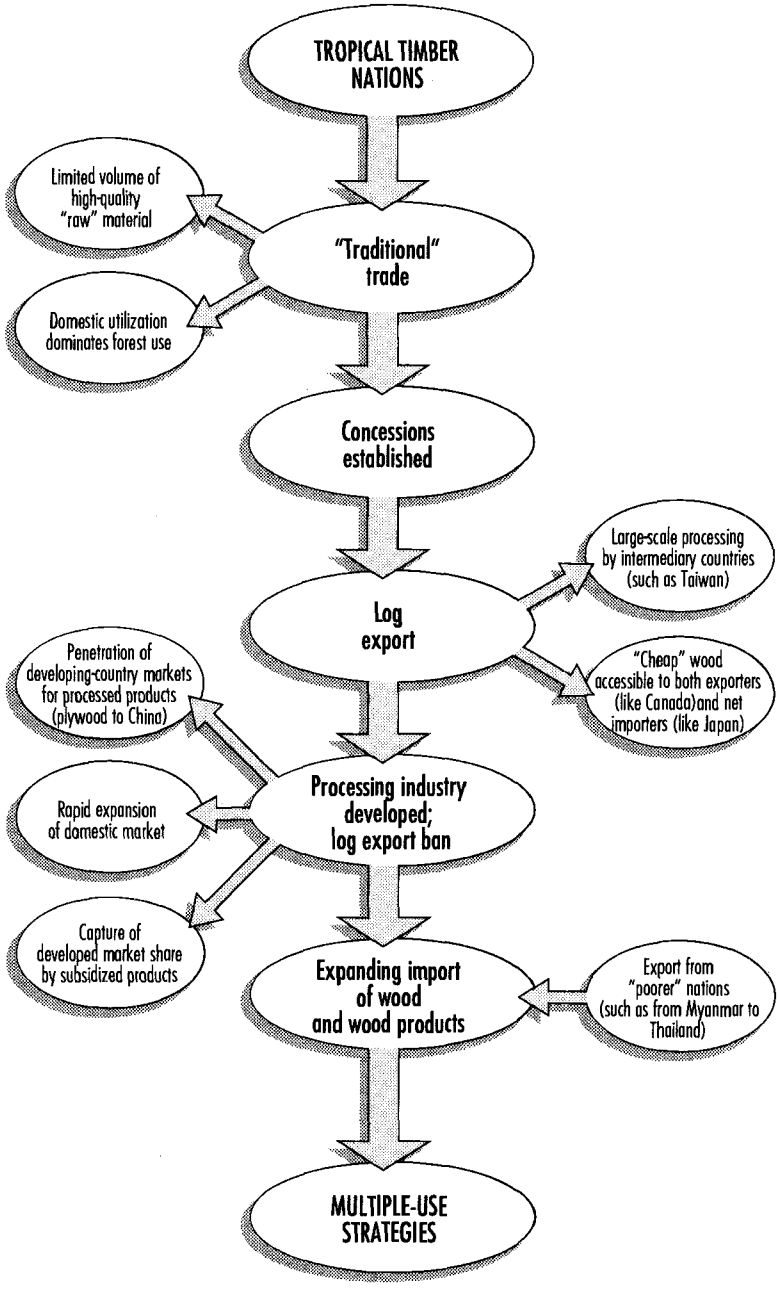

Fig. 1. Forest development in a wood-exporting tropical nation.

small-scale cutting regime where traditional rights hold sway, to a situation where higher levels of government grant concessions to wealthy private contractors, essentially ignoring local people and their intricate knowledge of the ecosystem's structure and functioning. The early stage of a concession is probably the most profitable in tropical forestry, since logs can be high-graded (taking only the most valuable), controls are likely to be minimal, and investment in processing can be avoided. In the past, countries such as Japan and those of the European Community have been able to draw upon a number of different sources for raw tropical logs, holding down their costs, but still providing an outstanding short-term profit to concessionaires, which are often joint ventures between Third World multinational corporations and powerful local elites, many of whom have made huge fortunes.

There are many pitfalls awaiting nations that seek to reap large profits from their forests. This has been graphically illustrated by Repetto and Gillis (1988) in their study of the way in which public policies have led to the destruction of forest resources in both the developing and the developed world. Their extensive case studies of tropical forestry reveal the stark failure of most governments to capture a reasonable "rent" from their forest resources. In a host of ways, both direct and indirect, policies have encouraged logging companies to scramble for short-term profits, while countries have been shortchanged. Furthermore, overcapitalization, corruption, outright greed, lack of control in the international marketplace, and other factors combine to prevent any chance of long-term profit and sustainability. In Côte d'Ivoire, Ghana, the Philippines, and many other nations, timber exploitation has been rapid and devastating (Repetto and Gillis 1988, p. 386).

Many countries have recognized that profits are slipping through their fingers and have encouraged the establishment of wood-processing industries in an attempt to capture a greater share of the profits. Banning the export of logs is a drastic measure that hastens the process. Indonesia, a country that urgently needs

foreign exchange to service its debt and fund development, provides the most dramatic example of both the costs and benefits of such a shift. In 1980, when the government announced a total ban on log exports, to be phased in over 5 years, Indonesia was an insignificant producer of plywood. By 1985, it had captured 45 percent by volume of world trade in the commodity (FAO 1990) and its share has continued to grow.

This amazing achievement has not been without cost. Heavy subsidies were necessary at the outset and the need for government assistance continues. In fact, studies have shown that Indonesia actually lost money as a result of the flawed economic policies associated with its plywood industry (Repetto and Gillis 1988, p. 97). In addition, enormous demands are being made on the resource base, in part because of the industry's great inefficiency. So who are the beneficiaries? Merchants have made fortunes. Many Indonesians are employed in the processing industry, although the number is small compared with other sectors. Other countries benefit from the low-cost plywood. Indonesia now aspires to become one of the largest pulp and paper producers in the world and in 1990 gave approval for 25 new plants (*Environesia* 1990a). Much of the raw material for this industry is to come from monoculture plantations. Indonesia has also banned the export of sawn wood to stimulate the furniture and other processing industries (*Environesia* 1990b, p. 14).

Indonesia is one of the clearest cases in the world of the relationship between debt and forest depletion. Much of the country's foreign debt is owed in yen. The appreciation of this currency in recent years has meant that Indonesia's debt payments have risen by at least 2 billion USD a year. The export value of Indonesian forest products just about covers the difference.

Whatever the situation today, neither Indonesia's nor the world's tropical forests can sustain the current level of exploitation. Several forecasts have been made of future trade in tropical timber; all predict rapid depletion of remaining forests and drastic reductions in exports in the early decades of the 21st century (for example, Repetto and Gillis 1988, p. 108).

Trade in Wood and Wood Products

Just how important is trade in tropical timber to the deforestation of tropical lands? Although just over half the wood harvested from the world's forests is cut in developing countries, only about 3 percent of wood cut in the South enters world markets. The rest is consumed domestically, mostly as fuelwood and charcoal, but also as timber (FAO 1990). This tiny percentage, however, masks huge regional differences. Almost all tropical timber traded internationally comes from a handful of countries, only one or two of which (like Indonesia) are also major producers. In those few countries that do export, logging is a major environmental problem, as it has been in those nations whose forests are now largely depleted, such as the Philippines and much of West Africa. In 1987, Asia accounted for 87.6 percent of world trade in tropical timber, Africa for 8 percent, and Latin America for 4.4 percent (Braga 1991).

The forests of Borneo, many of whose trees belong to the family Dipterocarpaceae, have dominated trade in tropical timber since the mid-1970s. In 1988, Malaysia, or more specifically the provinces of Sabah and Sarawak, accounted for 77 percent of tropical hardwood logs traded on world markets. In that year, Malaysia also exported 38 percent of sawn hardwood and 6.5 percent of the plywood originating in developing countries. Indonesia accounts for 28 percent of trade in tropical sawn hardwood and, by 1988, commanded 50 percent of all world trade in plywood (FAO 1990).

Many other countries are smaller players. In Africa, the equatorial forests of Cameroon and Gabon are under attack, as are the forests of Côte d'Ivoire. It has been estimated that more than 11 percent of the tattered remnants of that country's forests were being cleared each year in the late 1980s (Wood 1990, p. 26). In Asia, the net has spread to Myanmar, New Guinea, and even the Solomon Islands. Until now, the heterogeneous primary forests of the Amazon have been relatively unimportant sources of wood on world markets, since the few commercially valuable

species are so scattered. This situation must surely change. Brazil offered astonishingly liberal subsidies to wood-processing industries in the 1970s as part of its push to develop the region (Repetto and Gillis 1988, p. 28). As a result, annual production of logs from the Brazilian Amazon rose from 4.5 million to 19.8 million cubic metres between 1975 and 1985 (Collins 1990, p. 116). These forests now provide about half Brazil's wood harvest (Halifax *Mail Star* 1990). In the years to come, it is expected that exports from Amazonian countries will increase rapidly as forests in other regions are depleted.

Thus far, we have concentrated on the role of exporting nations. But the pull of demand in developed countries is just as important. Three regions account for most of the world trade in tropical timber: Japan, Europe, and the "little dragons" of East Asia. The story of Japan's involvement with tropical wood clearly illustrates the power of one nation to affect environments in the South. The country has been the major driving force behind the progression of logging in Southeast Asia over the last three decades.

The Role of Japan

The search for a secure supply of many basic commodities has long occupied the Japanese. The dependence on imports for a large percentage of its timber requirements, however, has developed only over the last 30 years. Today, Japan imports more tropical hardwood products than any other country: more than 42 percent of imports by developed countries and about 28 percent of world trade in 1986. Yet these products make up only 16 percent of Japan's timber requirements and around 25 percent of timber imports. One-third of the country's requirements still comes from domestic forests; Canada, the (former) Soviet Union, and the United States supply the huge Japanese softwood imports.

Japan's forests cover an impressive 68 percent of the country. In the past, however, there have been several periods of intense

overexploitation. World War II, the Korean War, and the postwar economic boom placed enormous demands on these forests. By the early 1960s there was a crisis. A policy of free trade and emergency measures to increase timber supply encouraged a "logging boom" in the countries of Southeast Asia, as the Japanese Sogo Shosha, or trading houses, spread a wide net in their search for wood. Between 1960 and 1963, log imports more than doubled. The peak year was 1973, by which time tropical log imports had increased almost sixfold to 27 million cubic metres (Nectoux and Kuroda 1989, p. 34). The oil shocks of the mid-1970s and early 1980s led to dramatic reductions in demand.

The Japanese have tried as much as possible to import raw timber, processing logs at home to their own exacting standards while supporting a large domestic industry. As forests decline and the exporting nations impose log bans, Japanese companies have moved to find new sources. The Philippines was the first case. Logging increased rapidly in the 1960s, reaching a peak in 1969, by which time the most accessible of the dipterocarp forests were exhausted by logging and agricultural development. By 1971, after Kalimantan had been opened to logging, Indonesia had replaced the Philippines as the main supplier of logs. Export restrictions, however, soon caused the Japanese to search for new sources, and, by 1978, Malaysia's log exports to Japan were larger than Indonesia's. By 1986, Malaysia was supplying 89 percent of Japan's tropical log imports. Japan continues to search for new suppliers in the region.

Japan has favoured Southeast Asian forests not only because they are close. The Japanese culture has long revered fine wood, and the dipterocarp forests of the region provide beautiful, uniform, high-quality timber that can be extracted at a remarkably low cost. Many of the uses to which this timber is put, however, do not reflect these features. Much of the tropical wood imported goes into the making of plywood and in "1986, 96% of all Japanese plywood was made from lauan wood" (Nectoux and Kuroda 1989, p. 46). Twenty-nine percent of this was "thick" plywood, which is growing in importance in Japan, and is used

mostly as *kon-pane* (concrete moulds) in the construction industry. *Kon-panes* have been used since the 1960s and most are discarded after one use. Nectoux and Kuroda (1989) estimate that perhaps 135 million square metres of plywood production was used for new *kon-panes* in 1987.

Over the last 50 years, there have been many changes in the Japanese timber industry and dramatic changes are taking place today. Japan is becoming more sensitive to charges that it is an "ecoterrorist" and directing more of its aid budget to the forestry sector.

Europe and the Far East

Japan and Europe import almost equal quantities of tropical wood, but the similarity ends there. Per capita consumption is much higher in Japan than it is in Europe. Japan tries to import most of its resources as raw material, although imports of sawn wood and plywood from Indonesia have risen sharply in recent years (FAO 1990). Europe, on the other hand, imports much more of a mix of products and from more diverse sources. Most of its logs come from the African countries of Cameroon, Côte d'Ivoire, and Gabon; Africa and Southeast Asia provide other products (Nectoux and Kuroda 1989, pp. 25–27).

The third major importing region, the Far East, imports tropical hardwood partly for processing and re-export. Hong Kong, Singapore, South Korea, and Taiwan are all important processors: on a per capita basis, indeed, South Korean imports of Malaysian hardwood logs and Malaysian and Indonesian sawn wood are roughly equivalent to those of Japan (FAO 1989a).

Canadian Trade in Forest Products

How does North America fit into this scene? Because of its own huge forest resources, it is a much smaller importer of tropical wood, accounting for less than a tenth of world trade (Nectoux and Kuroda 1989, p. 19). Canada's role in this trade is small

indeed and can only be discussed in the context of the mighty engine of our own forest industry.

Canada is the world's leading exporter of forest products and the world's third largest producer of industrial roundwood (a term that includes all wood other than fuelwood and charcoal). In 1988, Canada accounted for 59 percent of newsprint, 40 percent of softwood lumber, and 36 percent of wood pulp traded on world markets (Forestry Canada 1990, p. 12). In that year, our exports of wood and wood products totaled 22.6 billion CAD, more than 90 percent of which was bound for other industrial countries (Forestry Canada 1990, p. 22). Half of world trade in newsprint is from Canada to the United States, and we supply more than 99 percent of US imports of softwood lumber. We lead trade in newsprint to developing countries, although the amount is less than 10 percent of our trade. In 1989, the surplus of trade for forest products was 19.5 billion CAD, more than the combined surpluses from agriculture, fishing, mining, and energy (Forestry Canada 1990, p. 23). Canada's balance of trade in that year was only 3.3 billion CAD; without its exports of forest products, Canada would have incurred a large trade deficit in the years of the late 1980s.

The huge majority of Canada's exports are softwood products; almost all timber from tropical moist forest is hardwood, the weakest area of Canada's forest industry. Nevertheless, in 1988, our imports of wood and wood products from developing countries, excluding pulp and paper, totaled only about 140 million CAD, a fraction of our total trade.

Canadian Imports of Tropical Timber

Canadian imports are recorded in Statistics Canada Merchandise Trade publications. Some tropical wood is easily identifiable in the trade figures because the timber type is included in the description: mahogany, red maranti, white luan, or teak, for instance. With others, we must infer from the place of origin. We know, for instance, that the Indonesian plywood industry

depends on its indigenous hardwood forests. A major source of difficulty is the role of intermediate processing countries. The beautiful table imported from the United States may have been manufactured in Taiwan from Malaysian wood, but it will appear in our statistics as "furniture, of wood" from the US. But keeping this caveat in mind, it is possible to gain some idea of our dependence on tropical countries for these commodities.

Category 44 details Canada's imports of wood and wood products (plywood, veneer, lumber, etc.). In 1988, our imports from tropical and East Asian countries were worth almost 140 million CAD, 11 percent of imports in that category.

Where does Canada obtain its tropical timber? Our major tropical and East Asian sources of category 44 products are shown in Table 6. For each country, the value and description of the most important categories are also given. A more complete list would show that Southeast Asia, Brazil, and the rapidly industrializing smaller countries of East Asia account for almost all the value. African imports total only 1 million CAD, and Mexico is the only country in Latin America, other than Brazil, that exports forest products worth more than 1 million CAD, and

Table 6. Major tropical (and East Asian) sources of Canadian wood and wood product imports (category 44) in 1988.

Country	Value (million CAD)	Major components
Indonesia	49.8	Plywood or wood panels, 85%; continuously shaped hardwood, 10%
Taiwan	39.1	Plywood, 30%; the rest, a range of products
Brazil	15.2	Fibreboard, 34%
Malaysia	8.2	Hardwood lumber, 63%; coniferous lumber, 22%
Philippines	7.1	
Singapore	3.6	

Source: Statistics Canada (1989a).

most of that is paper. It must be added that East Asian countries also import large quantities of coniferous wood, so that their wood products do not necessarily come entirely from tropical forests.

In what form does Canada import these products? Most tropical wood enters Canada in a processed form, as plywood, hardboard, paper, and manufactured items. Almost all of the fine woods used in boat fittings, picture frames, furniture, and so on (rosewood, mahogany, teak, etc.) is now veneer. In 1988, our imports of tropical logs were worth only 600 thousand CAD, more than half of which came from Myanmar. The following figures are for products that are obviously tropical and they are almost certainly conservative estimates of our total trade.

Hardwood plywood is Canada's most notable import of obviously tropical wood. This is one category where imports exceed exports. In recent years, Indonesia has captured an increasing share of our growing imports (Fig. 2), displacing Taiwan and the Philippines in some categories and echoing its drive for world domination.

Tropical lumber imports have been increasing in recent years, although they were still worth only 17.8 million CAD in 1988. The US and Brazil together account for about 60 percent of the total, and Malaysia and the Philippines were the only other countries exporting more than 1 million CAD to Canada. Many other countries make up the balance.

Tropical wood veneer imports were worth only 5 million CAD in 1988, a small fraction of Canada's veneer exports. The US is Canada's major supplier, but small amounts come from Brazil, Côte d'Ivoire, the Philippines, and Zaire.

In 1988, Canada imported wood furniture worth 324 million CAD, of which 73 million CAD came from the US. The percentage of tropical wood in these imports can only be guessed at, but included were items worth 50 million CAD from Taiwan, over 4 million from Thailand, and 11 million from Denmark, a specialist in teak furniture. At least one American company with

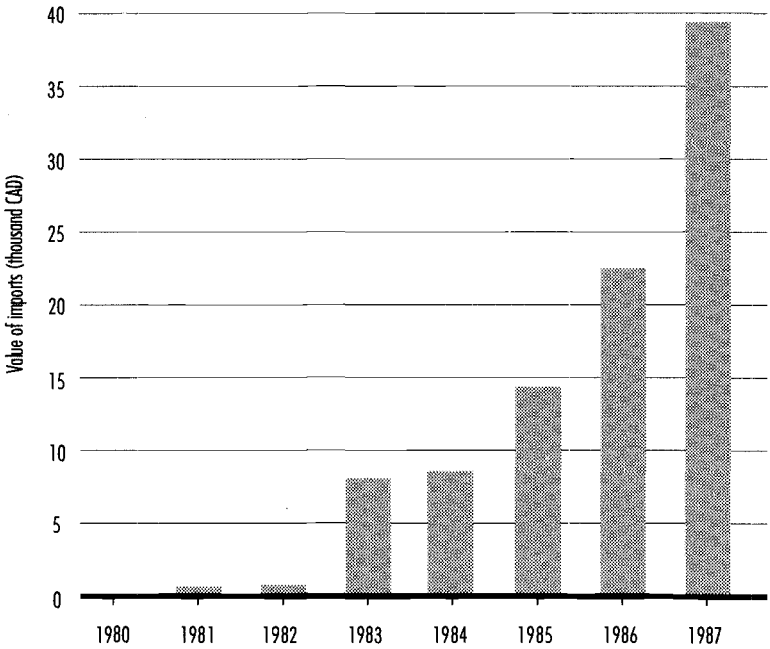

Fig. 2. Canadian imports of plywood from Indonesia, 1980 to 1987.

branch stores in Canada specializes in "mahogany" (actually a mix of species) imported from Southeast Asia.

Most of the specialty items that enter Canada, such as doors, windows, frames, kitchenware, and tools, come from the US. A small proportion is described as "mahogany" in the trade figures, but otherwise it is not possible to tell if Canadian imports come from tropical forests. Nevertheless, East Asian countries export quite an array of finished products to Canada. In 1988, for instance, Taiwan's exports to Canada included tableware, kitchenware, statuettes, and unspecified wood articles totaling about 17 million CAD. Much of this wood undoubtedly originates in the dipterocarp forests of Southeast Asia.

In summary, it is difficult to tell exactly how much tropical hardwood enters Canada each year. The only developing countries of any real significance as direct suppliers with exports to Canada of more than 10 million CAD appear to be Brazil,

Indonesia, and Taiwan. With the exception of Indonesia, Canada imports little directly from the major Asian producers.

Canada's imports of tropical wood products are minuscule in comparison to its own forest industry. Apart from the increasing amounts of hardwood plywood, much of what Canada imports comes under the heading of luxury; the mahogany lumber and trim for homes and fine furniture are things that could easily be dispensed with or come from alternate sources. Canada's role is minor, but all the more significant since it is unnecessary. Yet, for the South, there is a burning desire to access Northern markets, to earn foreign exchange, and to provide employment for its people. This they most certainly do with a wide range of agricultural commodities.

Other Tropical Commodities

Throughout most of the South, agriculture creates by far the most critical stress on TMF. Shifting cultivation accounts for a great deal of the destruction; but, over vast areas, the expansion of cash crops and livestock ranching is the major cause of forest clearance. Most of these commodities have their roots in colonial exploitation, but modern governments have had little choice but to encourage these activities. Indonesia, for instance, is dramatically increasing rubber production and will probably become the world's top producer by 1995 (*Indonesia News and Views* 1991). Thailand is another country that has aggressively promoted crops such as pineapple and cassava, which is exported as cattle feed, especially to the European Community.

Plant product commodities are enormously important to the economies of developing nations. The top money spinners are listed in Table 7. These products alone earned about 52 billion USD in 1988. It should be noted that tropical timber, responsible for so much deforestation, is but one of these commodities, albeit a very important one.

Canadian lives are enriched by the produce of tropical lands

Table 7. Plant product commodities entering world trade from developing countries in 1988.

Commodity	Value (million USD)	Commodity	Value (million USD)
Coffee	9 333	Oil seeds	2 844
Tropical timber	8 704	Bananas	2 050
Sugar	7 904	Rice	2 334
Rubber	4 849	Tobacco	1 805
Cotton	3 538	Tea	1 904
Cocoa and cocoa products	3 439	Coarse grains	1 520
		Citrus fruit	911

Source: FAO (1989b, p. 2; 1990).

in a thousand ways. Tropical products clothe us, feed us, transport us, provide us with warm, comforting beverages, and add a little spice to our dreary winter days. Indeed, the value of these imports far surpasses the value of wood and wood products we import from developing countries; we spend more on Indonesian rubber, for instance, than we do on Indonesian wood.

Canada obtains agricultural commodities from the South from many sources and in many guises. In the modern global economy, products are shipped from country to country, being repackaged here, undergoing a little processing there, and perhaps being mixed with other products in a manufacturing process at yet another way station. As with timber, it is difficult to determine our exact dependence on a particular country or commodity, but for some crops, at least, there is no doubt that they are tropical in origin: tea, rubber, palm oil, and cocoa, for instance, are grown almost exclusively in the tropics. In many cases, these products are grown on land that has been recently cleared of forest, although we will broaden our discussion to include most of the major agricultural commodities imported from the South.

The chain from Third World forest to Canadian store (or back alley) is shown in Figure 3. Table 8 shows the main sources and

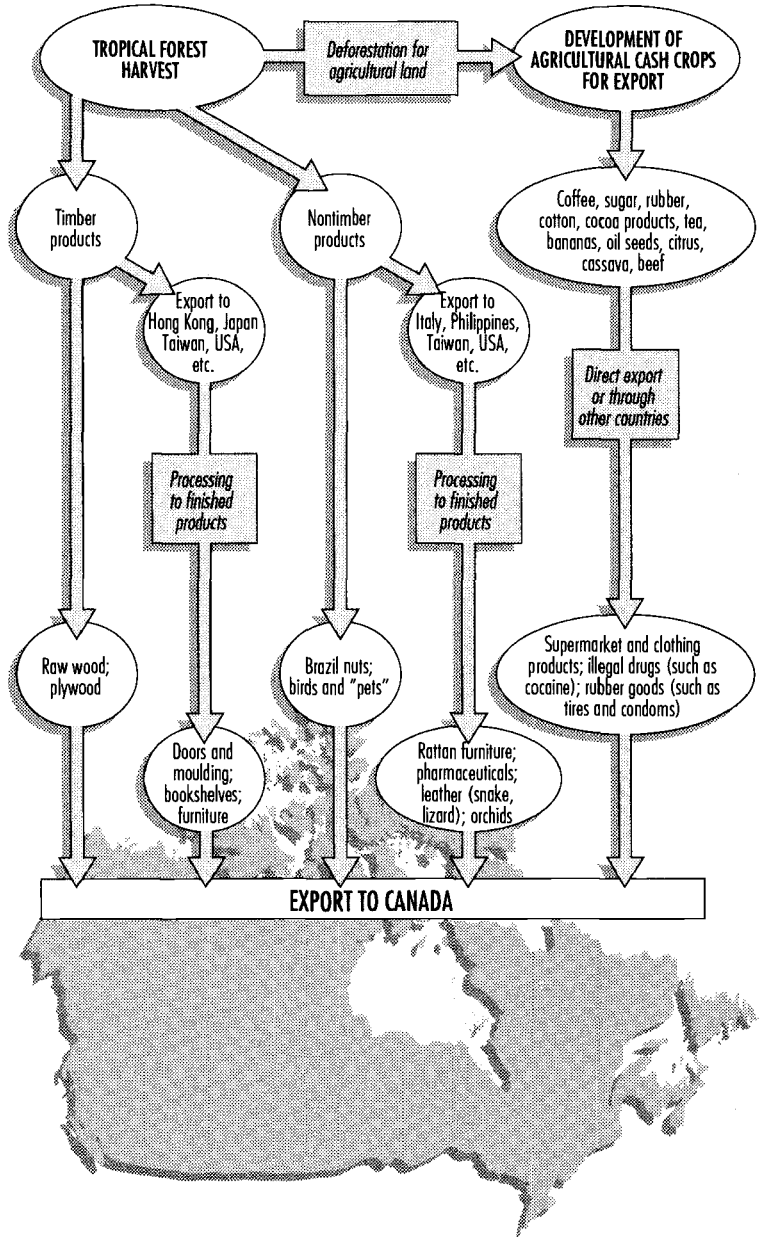

Fig. 3. Trade of tropical products to Canada from forested and deforested lands.

Table 8. Imports of major tropical agricultural commodities into Canada in 1988.

Commodity	Value (million CAD)	Major sources
Rubber		
Natural	134.2	Malaysia, 40%; Indonesia, 43%; US, 8%
Fabricated materials	333.3	US, 83%; Japan, 4%
Coffee	432.2	Brazil, 43%; Colombia, 18%; US, 11%; Africa, 6%; Asia, 4%
Citrus		
Fresh	197.7	US, 59%; Morocco, 18%; Japan, 9%
Orange juice	193.5	US, 50%; Brazil, 42%
Sugar		
Raw	207.3	Australia, 50%; Swaziland, 14%; Cuba, 13%
Processed	103.0	US, 81%; Europe
Cocoa and cocoa products	153.8	US, Europe, Brazil, Côte d'Ivoire
Bananas	147.8	Ecuador, 40%; other Latin American countries
Tea	74.0	UK, 54%; Sri Lanka, Kenya, US, each about 10%
Cotton	59.9	US, 29%; Brazil, 20%; Pakistan, Peru
Pineapples		
Canned (1987)	25.6	Thailand, 47%; Philippines, 25%; US, 14%
Fresh	8.3	US, 68%; Ecuador, 12%
Juice	2.8	US, 77%; Philippines, 17%

Source: Statistics Canada (1989a).

the value of Canada's imports of some of these commodities. Cotton and rubber provide the most trouble. For both, the figures given are just the tip of the iceberg as many hundreds of millions

of dollars' worth of products containing these commodities also enter Canada each year. Rubber, of enormous economic and strategic importance to countries of the North, enters in many manufactured goods, often mixed with the synthetic product, which is not identified in trade statistics. In 1988, for example, Canada's imports of tires alone were worth 760 million CAD.

Canada is importing increasing amounts of fresh fruits and vegetables from developing countries. Only the most important appear as separate categories in our trade statistics; an outstanding example is the 54 million CAD we spent on grapes from Chile. Again, it is often difficult to gain an exact picture of this trade. Mexican farm exports to Canada, for instance, are not well documented. Exports worth about 1.46 billion USD cross into the US each year. "Roughly 10 percent" of this is "brokered" into Canada, but it appears in Statistics Canada records as "US-origin" (Cook 1991).

Many other plant commodities come from the South. None of them is essential, but they add variety to our diets and the cumulative total is quite large. Examples for 1988 include palm oil imports of 18.5 million CAD, although we must also import large amounts in the form of cooking oil and soap and indirectly in baked goods; coconuts (9 million CAD); nuts, including walnuts from China worth 13 million CAD and cashews from Brazil worth 10.6 million CAD; and a host of spices, including pepper worth about 17 million CAD, half of it from India.

There are many ways in which cash crops grown for export can harm the social and ecological fabric of a country. Inevitably, there is competition over land of better quality, often at the expense of the small farmer and subsistence agriculture. Marginal land is frequently brought under the plough. Where cleared land is limited, deforestation is often a companion to production, either directly, or indirectly as subsistence farmers are forced into the forests and mountains. Pesticides are used in massive quantities. In Chapter 8, these points are graphically illustrated in the case of El Salvador.

The social effects are just as serious. Many commodities are grown on large plantations, usually run by multinational corporations or local elites. The impacts on communities are seldom benign. Where commodities are grown by farmers, corporations still control much of the production. Government policies often compound the problem. Furthermore, worldwide gluts of some commodities have led to volatile markets and low prices. For Third World economies, often dependent on a few, or even a single crop, there have been devastating impacts. Examples include rubber, cotton, and tobacco.

Rubber

In Indonesia, rubber estates are carved from the lowland rain forests of Sumatra, where they constitute a fairly stable land use. In Thailand, however, subsidies induce farmers to plant rubber trees even on steep mountain slopes. These trees have root systems that are far shallower than the forest trees they replace and do little to bind the soil. A massive landslide and flood disaster in southern Thailand in 1988 has been linked to this problem (USAID 1989).

Cotton

The most important nonfood crop in the world, the popularity of cotton has risen spectacularly in recent years. Cotton brings a high return and justifies many inputs, such as irrigation and pesticide use. Profound social and environmental costs have been the result of large-scale projects, such as those in the Sudan. Cotton exhausts soil nutrients quickly and massive applications of fertilizer and biocides are usual, with all the attendant problems. More biocides are used on cotton than on any other crop: in Central America, hundreds of people die and thousands are poisoned every year by these chemicals. Livestock is also contaminated, resulting in the loss of millions of dollars of export revenue from beef every year (Goodland et al. 1984, pp. 65–70).

Tobacco

Tobacco poses a major dilemma as it can be profitable for smallholders, plantations, and governments alike, although multinational corporations capture most of the benefits. In the early 1980s, 55 percent of global exports originated in the Third World and consumption is rising rapidly in those countries. Tobacco rapidly depletes soil fertility and regular applications of fertilizer are needed. Pesticides are also necessary in huge quantities. Tobacco's major environmental problem, however, is the quantity of wood needed to cure the product. Around 1980, WHO estimated that 12 percent of trees felled worldwide each year were used for the curing of tobacco. Tanzania is an example of a country where forest reserves have been exploited for this commodity (Goodland et al. 1984, pp. 51–64).

The Hamburger Connection

Encouraged by perverse government subsidies, cattle ranching in Latin America is a notorious cause of deforestation. In the US, well-orchestrated campaigns have targeted fast-food companies that import beef from the region. Canada, however, appears to play only a tiny direct role through its beef imports. Almost all of its large trade is with the US, although, in 1988, Canada did import frozen beef worth 23 million CAD from Nicaragua, a considerable increase over earlier years. Brazil is the only other source of any importance.

Illegal Drugs

Illegal drugs are the most profitable agricultural commodity. Demand for cocaine by countries in the North has been the cause of massive deforestation and pollution in the western Amazon in recent years. The world's major producers are Bolivia and Peru, although 90 percent of processing occurs in Colombia. Coca growers have directly or indirectly caused the deforestation of perhaps 1.7 million hectares of the Amazon, not only for the crop

itself but also for airstrips and shifting agriculture to feed the workers (Brooke 1989). Herbicides pollute the area and huge quantities of chemicals such as kerosene, sulphuric acid, and lime are used in processing; the residues discarded in local waters. Here is an obvious and horrible interdependence between tropical forests and Canadian society, and a trade that surely surpasses any single other commodity if its street value is used as a measure.

Other Forest Products

This section would not be complete without a mention of products gathered from tropical forests. Some depend on intact forests and many can be harvested in a sustainable fashion. Studies have shown that their value exceeds the value of timber and does not foreclose future options, although as with any resource, careful management is needed to husband supply. Such products sustain tens of millions of people in developing countries. The products — nuts, fruits, medicinal plants, etc. — do not in general appear as categories in Canadian statistics. Nevertheless, many pharmaceutical drugs owe their origin to plants growing in tropical forests.

Brazil nuts are a minor import into Canada, but they are important since they reflect the health of the Amazon rain forests. Clearing of the forests reduces the number of trees, and burning of underbrush destroys the insects essential for pollination. In 1987, Canada's imports were worth 2.9 million CAD, although this figure does not include nut mixtures.

Rattan, a prickly vine that grows in the forests of Southeast Asia, is the second most important product from tropical forests, after timber. Rattan furniture is popular in Canada, but it is not reported separately in trade figures. World trade is currently worth about 2 billion USD per year (Collins 1990, p. 30). In Sarawak, many Penan families are involved in processing and using rattan as a cottage processing industry, but unscrupulous outside companies are stripping the forests (Apoi 1989). Here

too, Indonesia hopes to corner the world market, first by bans on the export of raw and semiprocessed material, and, second, by large-scale investment in manufacturing facilities. There is also a shift to plantation cultivation. Canada's imports of the unprocessed product are small.

A Threat from the South?

Do the countries of the South pose a serious threat to Canada's wood product trade? Our discussion to this point has concentrated on the environmental impacts on developing nations of trade in plant commodities and on Canada's role in this trade. Such impacts are not, of course, restricted to developing nations. Canada's resource use is deeply affected by changes in other places. This has many implications for the environmental and economic well-being of the country. A particular worry in the early 1990s is Canada's ability to compete on world markets.

Trade in tropical timber has had relatively little bearing on Canada's competitive position on world markets. The forestry sector, however, is experiencing a period of rapid change. Many new competitors are entering the field, consumption patterns are changing, and technology is having a profound impact at every level from harvesting to the type of product being traded. At the same time, we are witnessing the first stages of a transition to a far more varied mix of sources (Sedjo and Lyon 1990, p. 15). Vast areas of essentially virgin forests remain in Canada, Alaska, Siberia, and the tropics, but most are remote and few can be harvested sustainably on their often impoverished soils. Increasingly, the world must look to second-growth and plantation forests for its wood. Increasingly, trees will be intensively managed, using techniques we associate with modern agriculture: monoculture, biotechnology, fertilizers, and so on. Of particular concern to Canada is the rapid expansion of highly productive plantations, many of them in developing nations such as Brazil, that could challenge our preeminent position in world trade in

pulp and paper. Another concern is the shifts in markets as governments and companies change their policies in the constant search for export earnings and resources. Inevitably, our share of global trade must be affected by events elsewhere.

Canada has traditionally relied on its "apparently limitless" forests to provide huge volumes of low-cost fibre to the world's markets. But we have depleted most of our easily accessible old-growth forest and cannot hope to compete, on purely biological grounds, with the favourable growing conditions of many of the new sources. In ideal circumstances, for instance, a hectare of an aggressively managed Brazilian plantation could conceivably produce wood at a rate 50 times higher than a hectare of Canadian forest (Sedjo 1990, p. 34).

The state of Canada's forests is also worrisome. Acid rain and pollution are taking their toll. Fire and insects destroy a greater forest area than is logged. Waste and mismanagement have characterized much of our logging; silviculture has been insufficient and often ineffective. The large amount of land that does not regenerate after logging increases each year. In short, Canada may be facing timber shortages of various sorts in the coming decades.

Do we in Canada then need to fear for this sector of our economy? After all, warnings of imminent timber "famines" have been made before, yet Canada's forest industry has continued to expand (Runyon 1991, pp. 7–8). Biology is certainly not the only determinant of success. Economic factors such as relative exchange and inflation rates can dramatically affect world trade. Comparative production costs are also important: cheap labour in developing nations, for example, gives those countries a clear advantage; in the past, Canada has benefited from its low-cost power. Access to markets is another imponderable. Despite the increased liberalization of world trade, the development of regional blocs could affect trading patterns.

The current state of Canada's pulp and paper industry may well provide a clue. In the early 1990s, it is reeling under the combined impacts of a worldwide glut, which led to devastat-

ingly low prices, the high value of the Canadian dollar, and recession, especially in the US, Canada's major market. In 1990, Canada was "the only country whose forest industry reported net aggregate losses" (Lush 1991). In 1991, the total loss was a disastrous 2.5 billion CAD.

Other factors have influenced this state of affairs. Many Canadian plants are old and inefficient and closings have become commonplace, especially in Quebec and Ontario, with the loss of many thousands of jobs in recent years. The dramatic escalation in demand for recycled paper is another problem for Canada. The industry will spend 1.2 billion CAD by 1993 to gear up for this change; but, since Canada exports about 86 percent of the newsprint produced, it is forced to import huge amounts of waste paper (Forestry Canada 1990). This puts Canada at a cost disadvantage and will leave it with mountains of toxic sludge from the deinking process. New mills are thus more likely to be built near the major US markets, threatening the Canadian industry. In recent years, Canada's share of the US market has declined from 80 percent to less than 50 percent by June 1991, in part because of recycling laws (Noble 1991, p. B11) and in part because of new low-cost US supplies.

Canada's pulp and paper industry is thus already in a precarious state. In the 1990s and beyond, the question of global supply and demand promises to become an even more crucial element in the question of Canada's competitiveness on world markets.

Supply and Demand for Forest Products

Several studies have tackled the question of global supply and demand over the last decade (for example, FAO 1982a). There are problems with all these studies. Data reported by developing countries are often suspect or incomplete, and assumptions about the future political and economic climate, of overwhelming importance in the behaviour of commodities, are frequently wrong. Some generalizations are possible, however. From a specifically Canadian viewpoint, a six-volume report prepared for

the Government of Canada in 1988 by Woodridge, Reed and Associates (WRA 1988) provides a comprehensive overview of prospects for the next 20 years.

From a trade perspective, the global forest industry is said to be "healthy and expanding" (WRA 1988, Vol. I, p. 1). Both consumption and trade are now concentrated in the developed countries and most of the increased demand will also be in the North. Rates of growth, however, will be far higher in the smaller markets of the South, such as Latin America, where consumption of paper and paperboard, for instance, is predicted to increase by as much as 4 to 6 percent per year (WRA 1988, Vol. I, p. 52).

The supply of timber to feed this demand will come from a variety of sources, old and new. About 70 percent of the extra softwood timber and 80 percent of the extra hardwood needed will come from plantations (WRA 1988, Vol. II, p. 90). Little of the hardwood produced in this way replaces the high-quality wood harvested from tropical rain forest, which is truly a disappearing resource (WRI 1988, pp. 77–78). Far more important are subtropical environments and exotic species, especially *Pinus* and members of the hardwood genus *Eucalyptus* (Sedjo and Lyon 1990, p. 30).

Plantation wood is seen as one of the easiest ways to earn foreign exchange. Many countries are attempting to establish themselves in the industry, although problems of political instability, lack of venture capital, pressure from burgeoning populations, and poorly developed infrastructure will inevitably reduce the yield in some areas (WRA 1988, Vol. II, p. 90). For softwoods, the major producers of plantation wood will be the southern United States, where about 1 million hectares were planted in 1987 alone, Brazil, Chile, China, Japan, New Zealand, and the Nordic countries. For hardwoods, the major new source is Brazil, with lesser amounts from Africa, China, the Iberian Peninsula, and Southeast Asia. By 2000, it is expected that half of Latin America's greatly expanded industrial wood production will come from plantations, which, by that time, will cover about 11 million hectares, mostly in Argentina, Brazil, and Chile (WRA

1988, Vol. II, pp. 29, 46). Only some of this new wood will enter world markets; China, for instance, desperately needs all it can produce.

In 1950, only about 10 percent of wood pulp produced worldwide came from hardwood, but changes in the technology of papermaking have allowed the use of these shorter fibres. By 2000, bleached hardwood pulp consumption is expected to surpass softwood kraft (WRA 1988, Vol. II, p. 55). For this purpose, *Eucalyptus* is the tree of choice and there has been a spectacular growth in its production. From less than 500 thousand tonnes in 1970, it is predicted to reach perhaps 9 million tonnes or more by 1995 (Molleda 1988).

This trend will continue. The Iberian Peninsula is the major producer today, but many new players are entering the field. Brazil's experience with the tree stretches back to the early years of this century. The government has been promoting it since 1965 and, in 1970, launched its National Pulp and Paper Plan to promote large-scale pulp production (Paoliello 1988, p. 69). Since then, hundreds of thousands of hectares have been planted each year. Low labour costs and high productivity give Brazil an overwhelming advantage on world markets, despite transportation costs. Exports faltered in the 1980s, but the country "promises to be a major contender in the world market over the next 15 years" as new wood comes on stream (WRA 1988, Vol. II, p. 130). Canada has already lost some of its market share in the US as a result of aggressive Brazilian salesmanship, and some Canadian plants import the fibre (Wiewel 1988, p. 41).

Implications for Canada

Canada is no longer a low-cost producer. Our forest industries are being forced to undergo a period of rapid and painful restructuring, at considerable expense. This involves a shift toward more specialized and value-added products and changes in the importance of different sectors. Pulp and paper, for instance, which now

accounts for 70 percent of our output of forest products, is forecast to rise to 76 percent by 2010 (WRA 1988, Vol. I, p. 29), in part because the shift toward hardwoods in the industry has given a commercial value to Canada's remote boreal forest, one of the world's major carbon stores. Provincial governments have offered generous subsidies to companies, many of them foreign multinationals, and now nearly "100 percent of Canada's most productive Boreal forest, including several provincial parks and wildlife reserves, is locked up in 20-year leases and available for logging" (McLaren 1990).

There is no doubt that Canada's competitive position in this, its most important industry, has been eroded in recent years. Plantation forestry is still in its early days, but the new competitors entering the field, particularly those in developing countries, may ultimately prove to be a serious threat to Canada's forest-product industries. Developing countries have considerable cost advantages over Canada and if they, too, can move to more value-added products to feed changing appetites, Canada may well lose even more of its market share.

Momentous change has been a feature of the industry in the past. Such change will continue and its direction and impacts on Canada cannot necessarily be predicted. Nevertheless, despite the problems that plague Canada's forests, the WRA report offers the hope that we could eventually overcome future shortages by practicing good management (WRA 1988, Vol. I, pp. 46–47). Canada's strength lies in its vast forest lands, which should allow us the luxury of the long growing cycle that our climate dictates (Sedjo 1990). Since the early 1980s, the industry has responded to concerns about future shortages with more attention to silviculture. Yet, although more than a billion seedlings were planted in 1990, it is far too early to judge the effectiveness of this strategy, especially on steep and marginal land. In addition, global warming may prove disastrous for Canada's forests, as we have seen.

With this brief discussion of threats to Canada's competitive position in world timber markets, we have come full circle. For

a few pages, we adopted the language of the forest industry, accepted the liquidation of our old-growth forests in the cause of Canada's short-term economic health, in an effort to demonstrate that change in the developing world and in the industry at large could affect this country. The last gasps of Canada's old-growth forests, however, are not being accepted with grace around the world. Nor do some observers welcome the transition to an industrial model of forestry. Canada is being chastised by a growing coalition of voices around the world. Large-scale clear-cutting in British Columbia and the sell-off of the boreal forest are inevitably compared with the horrors of tropical deforestation. These assertions are being denied vigorously by the industry, despite the fact that the amount logged in British Columbia each year far exceeds the allowable annual cut.

The debate over the state of Canada's forests has been protracted and emotional. Critics point to the increasing amount of land that is "not satisfactorily restocked" after harvesting and wonder whether soil-nutrient depletion will make it difficult to sustain harvests into the distant future. They note the damage inflicted by insect pests on our regrowth forests, where trees are even-aged and there is little diversity. They question the highly mechanized, capital-intensive approach that prevails today, an approach that treats forests merely as a source of fibre, to be farmed like any crop.

The world's forests *should* be a renewable resource, but much controversy surrounds the question of what constitutes good forest management. Perhaps the most striking aspect of this topic is its sheer complexity. Not only are the technical aspects of forestry complicated and the workings of each ecosystem difficult to unravel, but also political, economic, and social factors all play a part. Trees grow slowly, making research a long-term project, yet decisions are needed now, decisions that will have a lasting impact on the resource. Often missing from the discussion of the technicalities of modern forestry is a true understanding of the value of forests and a concern for the people who depend on them, whether in the North or the South. There is also an

assumption that nature should be exploited in the most efficient and rational manner possible, to provide the global market with as much product as it is willing to buy. Trade is driven by consumption patterns, which are influenced by the price of the resource, and we have not priced our resources to reflect their true value. Consumption is thus frequently wasteful: valuable tropical hardwoods are used as concrete moulds, old-growth temperate softwoods become advertising material, paper towels, diapers. Yet forestry is the reigning monarch of Canada's economy, its major employer. In a world where the "law of one price" prevails, we need to compete effectively. In addition, enormous demands are being placed on the Canadian industry, such as exacting new pollution standards. Plainly, solutions will be difficult and flexibility is essential.

As Canada moves into an uncertain future for its forests, so is the situation in developing countries changing. If tropical moist forest continues to disappear at the current rate, there will be little left outside of the Amazon, Zaire, and parts of New Guinea by the early years of the 21st century. Indeed, a World Bank study concluded that only 10 of the 33 countries that were net exporters of tropical timber in the mid-1980s would still be in the business in the year 2000 (World Bank 1985).

Countries in the South have benefited little from trade in tropical hardwood. Other parties reap much of the profit, environmental costs are considerable and there are few jobs for local people, whose lives are severely disrupted. There is no doubt that changes in government policies could dramatically reduce the wastage of this valuable resource and help "conservation efforts, regional development strategies, and other socioeconomic goals" (Repetto and Gillis 1988, p. 386); but the question must be asked whether it is possible at all to practice sustainable logging in TMF. There are few examples of successful, long-term rotations that have managed to preserve much of the ecological character of the forest. This is not to deny that on some soils, for some ecosystems, it may be possible to practice variations of selective logging over the long term (see, for example, Goodland et al. 1990;

Gómez-Pompa et al. 1991). In practice, however, the systems have been abused or the land appropriated for other uses long before the end of a rotation. Nowhere, moreover, is it possible to combine modern forestry and strict conservation of the enormously diverse flora and fauna (Wyatt-Smith 1987, p. 8). This is as true in Canadian forests as it is in the tropics.

As we have seen, logging is not the only destructive activity that government policies have encouraged, nor is it, in most areas, the major cause of deforestation in tropical forests. Far more land is cleared for agriculture each year than is logged and much of it is used to grow cash crops. There is no doubt that governments will continue to promote cash crops and plantation wood products for the export market, frequently incurring social and environmental problems.

There is, however, another side to this story. Export crops can bring great benefits to countries and communities in the South. In well-managed conditions, some perennial and tree crops are grown with little negative environmental impact, and some tropical soils are more fertile and resilient than others. Many Asian fields, for instance, have supported traditional agriculture for centuries. Social impacts can also be reduced if governments ensure that benefits are spread evenly.

There is merit, too, in plantation forestry. *Eucalyptus*, for instance, is despised by local people in many areas where it is grown. In Portugal and Spain, it has displaced ancient cork forests; in Thailand, tropical rain forest. It competes aggressively for water resources and provides few of the products local people depend on. Fire is a frequent companion. Nevertheless, it provides the uniform, reliable product that satisfies the demands of the industry and it may well be better to obtain our wood from such highly productive sources than to depend on natural forests, provided, of course, that the pest problems associated with monoculture can be overcome. In 1990, these simplified systems provided "about 50% of world industrial wood harvest — on about 3% of the closed forest area" (Roberts, R. 1991, p. 3).

Trade and the Environment

Trade is indeed a double-edged sword. It is an absolutely crucial factor in the increasing wealth of many nations. Yet, through consumption of tropical commodities, Canadians are linked to a wide range of social and environmental problems in the South, while our own need to compete in the global marketplace is leading us into unsustainable forestry practices. This collision between trade and environmental concerns promises to be a major issue for the 1990s, an issue entangled with the whole question of the prosperity and competitiveness of nations.

Since World War II, there has been a tenfold expansion in international trade. Much of this increase has been spurred by GATT, the General Agreement on Tariffs and Trade, which was first drafted in 1947 with the object of removing barriers to the free movement of goods. In 1992, 108 countries, accounting for more than 90 percent of world trade, were Contracting Parties to GATT, which is an institution, rather than a formal treaty between countries (WWF 1991a, pp. 9–10). GATT has made huge strides toward its goal of global trade liberalization. The latest round of negotiations, the Uruguay Round, which began in 1986, is attempting to dismantle barriers on virtually all goods and services. The path of these talks has been marked by snags and delays, largely caused by sharp differences between the European Community and the United States on agricultural subsidies.

For many years, developing countries have been demanding increased access to Northern markets as a way of earning valuable foreign exchange. In particular, they have fought against the sliding scale of tariffs imposed on processed and manufactured goods, which has forced countries in the South to export resources in the raw state. As national debt loads exploded in the early 1980s, the need became even more urgent. Industrial countries long resisted these calls but showed more willingness to respond during the Uruguay Round. Canada, for instance, offered to abolish almost all remaining import tariffs on tropical products so that "98 percent of these imports, with a value of

approximately $1.2 billion [CAD], will enter duty-free or at reduced rates under special tariff preferences" (Canada 1989). Many other countries from the North also announced broad tariff cuts (FAO 1990, p. 17).

GATT has had profound implications for resource use all over the world. Many critics worry that liberalized trade will lead to an increase in the massive deforestation already associated with export commodities such as timber, beef, and palm oil. Tariffs on raw logs, for instance, may well be abolished altogether. There are also concerns that increased access to lucrative Northern markets may be gained at the expense of what little ability remains in the hands of developing countries to control their own resources. Countries of the North, in particular the European Community, see bans on log exports, for instance, as clearly protectionist moves aimed at restricting the flow of raw materials. Under stricter GATT rules, such actions might not be countenanced (Brown 1990, p. 20).

GATT has not addressed environmental concerns in the past and the handful of rulings on specific disputes — such as the recent attempt by the US to ban imports of tuna from Mexico because many dolphins die in the fishing nets — has given little hope of future action. Although 34 industrialized countries, including Canada, pledged in the 1990 Bergen Declaration to accelerate the dialogue in GATT "on the interlinkages between environmental and trade policies" and on ways "to ensure that trade does not bring about harmful environmental consequences," environmental protection was not on the official agenda at the Uruguay Round (Brown 1990). Nevertheless, the link between trade and environment was a powerful issue for opponents of the free trade agreement with the US and the North American Free Trade Agreement (NAFTA). A federal task force has given NAFTA "the green stamp of approval," but environmentalists are not impressed and US President Bill Clinton wants the deal's environmental provisions strengthened (Fagan 1992).

This is not an issue that will go away. Indeed, it signals "a new North/South divide" (Sorsa 1991, p. 2). There are fears in

the South that environmental standards set by the North will become new trade barriers to exports from developing countries. The South is thus unlikely to support calls for uniform global standards. Trade issues are also likely to be a part of international agreements on sustainable development in the areas of climate change, biodiversity, and so on. Trade restrictions are already a part of the Montreal Protocol. Pressures on GATT to include these issues are thus coming from many quarters.

Other observers, however, support the position that liberalized trade acts both to promote efficient resource allocation and to boost economic growth. Without economic growth, they argue, a country may never reach the stage where it can afford the luxury of higher environmental standards. Furthermore, trade restrictions are seen as blunt and often ineffective instruments when it comes to environmental problems (Braga 1991): the real source of degradation lies in faulty government policies, in inappropriate subsidies, in questions of land and resource ownership, in corruption. It lies especially in the failure to include in the price of commodities the "externalities," the hidden costs of resource depletion, of pollution, of erosion, of damage to human health, and so on, and in the failure of governments to capture a reasonable share of the "rent."

Solutions will not be easy. It is essential that GATT and other international and regional organizations that deal with trade issues include social and environmental assessments of the articles of their agreements. The objectives of sustainable development should take precedence over those of free trade. The Earth Summit and its aftermath, in particular, are likely to have wide-ranging implications for the global trading system. For Canada, which depends heavily on its trade in natural resources, this is an opportunity to examine all our resource policies, and especially our forestry practices, in the light of sustainable development.

Chapter 6

Other Canadian Links to Tropical Forests

More than any other single project, Monteverde expanded Canadian horizons to embrace tropical rainforest conservation.
WWF (1991b)

Tropical forests have captured the imagination of people all over the world. Canadians have been entranced by David Suzuki's writings and documentaries, by Adrian Forsyth's books, by films such as "The Mission," and by photo essays in *National Geographic* and *Equinox*. But we have also been horrified by the evidence of destruction they present and a growing chorus is voicing its concern. In this chapter, we describe some of the actors in this new understanding and the enthusiastic support by Canadians of NGOs that focus on this issue. We track the changing face of Canada's aid policy toward forests in the developing world and discuss the development and effectiveness of two major international initiatives that some have seen as the last hope for tropical forests: the International Tropical Timber Organization (ITTO) and the Tropical Forestry Action Plan (TFAP). Canada is an active player in both these initiatives.

We begin the chapter with a brief discussion of Canadian business links to tropical forests, continuing the theme developed in the last chapter of Canada's place in the global marketplace. Many Canadian jobs depend on these environments.

Some, indeed, involve resource extraction and may be contributing to deforestation. For our case study, however, we have chosen a rapidly expanding sector of the tourist industry: ecotourism. Ecotourism is anything but prosaic, capitalizing as it does on the sense of wonder we feel for nature.

Business Interests in Forests

As we described in Chapter 5, forestry is experiencing a period of rapid change. In particular, globalization is having a profound impact on the sector. Huge corporations roam the globe in search of new markets and cheap, reliable sources of fibre, moving from country to country as forests decline and government policies change.

Foreign involvement in tropical forests varies considerably from region to region (Contreras 1987). In Africa, mahogany first attracted the British as early as 1880, but in most areas of West Africa, heavy exploitation did not begin in earnest until after World War II. Companies from several European countries, India, Japan, and the United States have been involved and, today, French and German interests are the most important.

During the 1970s, governments in the major producing nations of Asia and the Pacific (Indonesia, Malaysia, and the Philippines) began to impose more stringent conditions on the foreign multinationals that then dominated the sector. Today, companies from a diverse group of countries participate in joint ventures. Most of the companies involved over the last decade and a half are based in the North, especially in Europe, Japan, and the US, and include the giants of the industry. Multinationals from developing countries such as Korea, Malaysia, and the Philippines are, however, becoming increasingly important.

In Latin America, foreign investment in forestry has been concentrated almost exclusively in the pulp and paper industry and oriented toward local, rather than export, markets. The large-scale logging operations of the other regions have been less

common and foreign companies tend to import their raw material (Contreras 1987, pp. 44, 46). The economic crisis of the 1980s, moreover, made it hard to attract capital, but this is changing. Nicaragua, for instance, has sold off a huge chunk of its forests to Taiwanese interests (Jagger 1991). Throughout the region, Japanese and American interests are the most powerful. In the Amazon, multinationals have been heavily involved in a wide range of activities that have added to deforestation: cattle ranching, mining, dam building, and so on. These have been subsidized by national governments and multilateral development banks.

Yet Canada's major forestry companies, despite their size, have had relatively little involvement in tropical forests. The only significant business conducted in the South today is the marketing of Canadian products. One recent venture failed to come to fruition. During the late 1980s, Abitibi Price engaged in negotiations with the Government of Venezuela and Bowater Inc. to build a pulp and paper plant in Venezuela. This joint venture would have been the company's first major offshore project. In January 1991, Abitibi Price withdrew from the deal, citing prohibitively expensive financing, although the depressed state of the market and the large loss the company suffered during 1990 must also have been factors (Stackhouse 1991).

It is not hard to explain why there is so little investment on the part of Canadian forestry companies. The biggest and most prosperous markets remain in the North and the North has huge supplies of fibre to feed this demand. Conditions in the tropics may call for different and unproven technology. There has been a cloud of uncertainty over national policies toward foreign investment. Political instability and the possibility of sabotage by disaffected local interests are factors in many areas, and a company's reputation may be harmed if it is seen to be associated with environmental destruction, cultural genocide, or the ruthless actions of local investors and partners. Above all, the profoundly negative economic situation of so many developing countries has made it hard to obtain financial backing.

For Canadian forestry companies, opportunities in Europe and the US appear to be far more attractive. About half of the top 15 corporations have plants in the US. The southern states, such as Georgia and Alabama, with huge areas of fast-growing loblolly pine plantation and regrowth forest, are particularly inviting. Several companies are moving into the tempting European market. Noranda Forest signed an agreement in principle in early 1990 to build a pulp mill in the Gorky region of the former Soviet Union. The company had been frustrated in its attempts to profit from eucalyptus. A proposed joint-venture pulp mill in Tasmania, Australia, was the object of huge protests in that country and was eventually rejected by the government on environmental grounds.

Canada may invest in only a handful of countries, but an increasingly diverse group of countries moves in and out of the Canadian forest sector in response to changing economic conditions. In the late 1970s and early 1980s, many European and US corporations withdrew from Canada, selling their investments to domestic companies. With the waning of the recession in the mid-1980s, however, foreign capital returned, but in a different guise. US investment is still the most important, and there are Canadian subsidiaries of such companies as Scott Paper. Even one purchase can change the face of the industry: when Stone Container Corp. of Chicago bought Consolidated Bathurst early in 1989, Canadian ownership of pulp and paper capacity declined from 67 to 60 percent. Just 3 years earlier, 72 percent of the sector had been in Canadian hands (Noble 1989). Recession in the early 1990s is again affecting foreign investment.

Some European investment remains, but, in general, it was replaced by new players from the Pacific Rim. Fletcher Challenge, a New Zealand company, has exploded out of its narrow domestic confines with investment around the Pacific and designs on Europe. In Canada, it acquired several companies, making Fletcher Challenge Canada one of the largest integrated forest products organizations in the country, with investments in British Columbia where local investment is now only a small

proportion of the whole. South Korean money has also been attracted and, in 1986, the Government of China bought 33 percent of a pulp mill at Castlegar, British Columbia (Noble 1989).

The most significant of the new players, however, is undoubtedly Japan, whose role in the tropical timber trade has already been described. Although by 1988 it was the world's third largest producer of pulp (FAO 1990), demand is growing so rapidly that more and more imports will be needed. Japanese companies are combing the world to feed this demand. Their investments in Chile, for instance, are leading to a massive increase in plantation forestry at the expense of native forest (*New Scientist* 1991). They see a wonderful opportunity in Canadian forests, particularly in British Columbia and the boreal forests of northern Alberta. The Japanese are making huge investments in pulp mills. Oji Corporation has spent 1 billion CAD to modernize and expand the Howe Sound Mill in British Columbia. Alberta–Pacific Forest Industries Inc., controlled by Mitsubishi Corp. and Honshu Paper Co. Ltd of Japan, have planned a mill worth 1.6 billion CAD near Athabasca — "the largest single-line pulp and paper mill in the world."

In 1990, Daishowa opened a mill that is the largest single user of aspen in Canada in the Peace River area of northwestern Alberta. Most of the pulp produced by this mill will go to Japan. Daishowa also has several operations in British Columbia (Canada–Japan Trade Council 1989). Most of these plans have attracted widespread and acrimonious criticism on environmental grounds and from native groups. Furthermore, most of the new pulp mills planned for northern Alberta are coming on stream in the early 1990s, when the market is glutted, and are providing stiff competition for older, less efficient Canadian mills.

Although few Canadian forestry corporations have direct links to tropical forests, there are, nevertheless, many businesses that do. Several banks have helped finance projects that involve deforestation: the National Bank of Canada and the Canadian

Imperial Bank of Commerce, for example, lent 300 million USD to finance the Tucuri Dam, a megaproject in the Brazilian Amazon that flooded 2 400 square kilometres of tropical rain forest (Hallward 1989, p. 6).

Mining, however, is the most important activity. In Latin America, the investment climate has improved recently and more than 100 Canadian mining companies have a presence in the region (Fung 1991). Some have operations in rain forests. Cambior Inc., for instance, has begun work on the infrastructure for a 161 million USD gold mine project in the jungles of Guyana. Production is expected to begin in 1993 (Halifax *Mail Star* 1991). Brascan operates a tin mine in Rondonia, Brazil. Inco has a 50 percent interest in a gold mine in Goias, Brazil, and operates in Indonesia. The Government of Ecuador has encouraged oil exploration and is granting concessions to land in the Amazon. PetroCanada has been involved in the region. In many such projects, the greatest threat is road construction, which opens up land to rapid and destructive colonization and infringes the rights of local indigenous peoples.

Canada also has a large cadre of forest professionals, mostly based in British Columbia and Quebec, who work as consultants on a contract basis on projects around the globe. Much of this work is done in the tropics and is often associated with Canada's aid program. CIDA awards several hundred million dollars worth of contracts each year, hiring a large number of consulting firms, many in forestry and related areas, although not necessarily in rain forest. Reid Collins and Associates of Vancouver, for instance, were working in Peru and Zaire, and with SADCC (the Southern African Development Coordination Committee) in 1989 and 1990; Blais McNeil and Associates in Senegal and Guyana; and T.M. Thompson and Associates, of Victoria, in China and the countries of ASEAN (the Association of South East Asian Nations) (CIDA 1990a, pp. 46–50). Canadian firms also supply clients with the equipment necessary for forest development.

Lastly, there are many transnational corporations that have

operations both in Canada and in developing countries. These include Scott, Bowater, and Stora Kopperberg, but more diversified companies are also involved.

There are, then, many Canadians whose jobs depend in one way or another on tropical forests, despite the lack of investment by our major forestry companies. These jobs pale into insignificance, however, beside the investment in Canada by foreign corporations, to whom Canada is just another source of cheap fibre. Perhaps Canadians should be asking if we, like so many developing countries, are undervaluing our resources in a helter-skelter attempt to auction off our forests; if we, too, are offering too many incentives to foreign companies; if we are sure that these activities will be sustainable.

Ecotourism

One very tangible link between Canada and the South is tourism. Since the 1960s, tourism has become "one of the world's most important industries and economic forces" (English 1986, p. v). It is an important source of foreign exchange and employment for many developing countries and it plays a major part in North–South relations. By the mid-1980s, there were about 50 million tourist arrivals in developing countries each year, an increase from about 2 million in 1950 (English 1986). In 1988, Canadians made about 805 thousand trips to Asia, Africa, and Latin America, with about 1.86 million visits to individual countries on those continents, excluding Japan and Hong Kong (Statistics Canada 1989a). In that year, Canadians spent about 1 billion CAD in developing countries.

One small, but increasingly popular segment of this industry is nature tourism, or ecotourism. It is an economic activity in which many Canadians are engaged, either as participants or as entrepreneurs, and can be defined as "travelling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring and enjoying the scenery and its

wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas" (Ceballos-Lascurain 1987, quoted in Boo 1990, Vol. I, p. *xiv*).

A wide range of activities could be included in this definition, from sophisticated cruises up the Amazon, through academic research on a coral reef, to hiking in the Himalayas. The degree of interest in nature may be casual or professional; the effort expended, minimal or extremely rigorous. Much of the tourism involving natural settings could more accurately be described as adventure travel, but this too depends on relatively intact environments. Forests are the major attraction of many regions, but our remarks are relevant to any setting.

Ecotourism has been described as "a subtle blend of ecology and economy, an effort to capitalize on a growing interest in a diminishing resource: unspoiled nature." It is one approach that could help to make conservation "as financially attractive as forestry, smuggling exotic birds, overfishing, or any of the dozens of ways of exhausting nature in the pursuit of profit" (Hossie 1989a). It would be dangerous to consider it as a panacea, but, nevertheless, in its ideal form, it "could represent an important step forward in terms of coherent land management and ecological sanity, as well as contributing towards a sound economic base for rural areas" (Jones 1987, pp. 355–356). This vision of a sustainable future has captured the imagination of scientists, politicians, human-rights activists, and a host of ordinary people.

In the South, ecotourism is in its infancy. Even so, it has become a mainstay of the economy in a few countries such as Costa Rica, Ecuador, Kenya, and Rwanda. Tourism accounts for 30 percent of Kenya's foreign exchange earnings and brings 45 million USD each year to Nepal. By 1996, nature tourism worldwide is projected to bring in revenues of 230 billion USD (IUCN 1992).

What are some of the characteristics that make a country a good candidate for ecotourism operators from the North? Clearly, ecological diversity and unique species are important and the presence of commanding landscapes helps. What is also clear

is the need for a receptive government, a fairly high degree of civil order and therefore safety for the participants, and a reasonable guarantee that the areas of interest are being protected. Costa Rica is a country that fits the ideal profile, but the progressive deterioration of environmental conditions in that country, projected to worsen in the years ahead, eventually could destroy the important revenue source of a growth industry and affect not only the citizens of Costa Rica but also those many Canadians who have come to appreciate its natural beauty and richness.

The Case of Costa Rica

Costa Rica is a small country blessed with extraordinary biological diversity and spectacular scenery that is well known as an island of peace and democracy in a sea of strife. Thanks to a vigorous campaign by conservationists and biologists, about 20 percent of Costa Rica has been protected in a system of parks and reserves, both national and private (Boo 1990, Vol. II, p. 27). Included are examples of most of the country's habitats and species. From the mid-1980s, tourism was made a national priority and four specialized areas, including ecotourism, were targeted. The country uses the slogan "its only natural" (Laarman and Perdue 1989, p. 206).

Demand for nature tourism in Costa Rica has risen dramatically in the last few years. There are many opportunities for "soft" ecotourism, such as one-day trips from San Jose, but Costa Rica also attracts many scientists and naturalists. At Monteverde Cloud Forest Reserve, for instance, the number of visitors increased from around 3 hundred in 1973 to almost 13 thousand in 1987 (Boo 1990, Vol. II, p. 38), with a huge economic impact on the local community. In the country, many travel agencies specialize in ecotourism; in Canada, several companies are promoting it. Quest Nature Tours, for example, ran seven trips in 1991, up from just two in 1990. Blyth and Co.'s advertisements were a regular feature of the travel pages of the Toronto *Globe and Mail* in 1991.

Costa Rica still has a long way to go to benefit fully from ecotourism. The country is only now building the infrastructure necessary for the trade; there are too few park service personnel, few trained local guides, and park management budgets are far too low. Much of the small budget allocated has been spent on land acquisition. A direct result has been a lack of protection of the resource; in some areas, streams are ruined by dynamite fishing, squatters encroach on the land, game is overhunted, there is illegal logging, and land is lost to mineral exploitation and commercial agriculture (Laarman and Durst 1987, p. 9).

Canadian Ecotourism Operators

Most vacations to the South from Canada are undoubtedly of the "sun and fun" type and take place during our frigid winter months. The brochures of the major tour operators, such as Fiesta and Sunquest, tempt us with luxury resort hotels clustered along tropical beaches. Indeed, travel to Bermuda, the Caribbean, and Mexico accounted for 65 percent of all Canadian travel to developing countries in 1988 (Statistics Canada 1989a). In general, these are not destinations favoured by ecotourists and only seldom is nature mentioned. Nevertheless, nature and adventure tourism is said to be the fastest growing segment of the industry, increasing by 17 percent a year in the United States. One estimate of adventure travel suggests that 3 percent of Canadian spending on leisure travel worldwide, or 261 million CAD, was directed to this segment (Green 1989, p. 6). Recognizing this trend, Fiesta and Sunquest are now offering a small number of tours to Costa Rican National Parks, moving ecotourism into the mainstream.

There is a wide range of Canadian companies offering nature tours to the South. Most of the larger companies act as wholesalers, putting together packages from a variety of sources, many of them foreign. Some offer a huge diversity of options, particularly to Kenya and other East African countries, the region that depends most heavily on revenue from nature tourism. Examples include Trek Holidays, which claims to be "Canada's largest

Adventure Travel company," Worldwide Adventures (Toronto), which is the Canadian arm of a large Australian enterprise, and South Wind Tours, a specialist in Latin America.

Other companies offer a much smaller but still significant range of tours, which offer real nature study, often with a concern for the environment and native cultures. Ecosummer Expeditions, Nature Travel Service, and Quest Nature Tours are examples in this category. Blyth and Co., a major Canadian tour operator, has been expanding into the field and provides first-rate guides to many destinations in developing countries.

Several companies operate hiking and climbing tours, particularly to Nepal and the Andes. These include Canadian Himalayan Expeditions and Action Adventures, both specializing in the Himalayas. There are also several small, nonprofit adventure clubs, mostly run by one person, which operate hiking, rafting, and climbing adventures, usually in North America, but also in the developing world.

It is difficult to gain an accurate picture of the amount of nature-oriented tourism that originates in Canada. There are several destinations that stand out because of the large number of packages involved. The two most visited countries are undoubtedly Nepal and Kenya. Other important destinations are the Galapagos Islands, Rwanda, and Thailand. Tour operators are constantly on the lookout for new destinations; Irian Jaya and Belize are becoming popular. The full range of natural environments is covered from Antarctica to tropical rain forests. It is interesting that despite the great amount of publicity accorded the Amazon, only a few nature tours to that destination originate in Canada.

Many of the brochures speak of "responsible" tourism, of "a deep concern to avoid exploitation of the people and the lands in which we travel" (Passages Exotic Expeditions), and say they are "committed to helping indigenous peoples protect their environment" (Island Expeditions Co.). Several companies donate a portion of their profits to conservation organizations or even support projects directly. Ironically, there are also the begin-

nings of a kind of development education tourism to areas that have been ecologically or socially devastated. For example, tours to Haiti are arranged by Canadian universities and NGOs.

The World Wildlife Fund (WWF) of Canada has allied itself with two experienced Canadian adventure–nature companies. In 1990 and 1991, it launched a program of expeditions to areas of outstanding natural beauty and diversity. Many of the chosen areas are "endangered habitats for species which are themselves endangered" (*WWF Explorations* brochure). The trips offered under this program by Ecosummer Expeditions are both in Canada: the Queen Charlotte Islands and the High Arctic. All but one of Blyth and Co.'s destinations are in the developing world, with the exception of an Antarctic cruise. They include an East African safari in Kenya and Tanzania; 2 weeks in Ecuador, divided between the Galapagos Islands and the Amazon; a sea voyage to discover the natural wonders of Madagascar and the Seychelles; a 3-week tour of northern India, which includes both nature and cultural elements; and 1 or 2 weeks in Costa Rica. With expert guides and comfortable accommodations, this is the cream of nature tourism in the South, and it is not cheap. The cost of each trip included a set donation of between 100 and 500 CAD to WWF Canada, depending on the destination. WWF hopes to gain valuable publicity and raise funds through this innovative arrangement.

Some Pros and Cons of the Business

Is ecotourism really the benign activity painted in most descriptions? In recent years, doubts have arisen about the real benefits of tourism for developing countries. Much of the money earned appears to be siphoned off by foreign interests, including multinational corporations; employment opportunities are limited and usually dead-end; governments are forced to spend money on infrastructure and tax exemptions to foster the industry; and there can be terrible cultural and environmental costs. It is also a risky business, susceptible to a host of changes in the outside

world. The Gulf War, for example, dealt tourism a devastating blow all over the world.

Ecotourism, however, does have advantages other than the obvious preservation of natural environments. It is small-scale and diverts economic activity to many remote communities. It may be seen as attracting a more "desirable" type of tourist. Ecotourists tend to stay for longer periods and, for many, the scenery is more important than comfort or price (Laarman 1986, pp. 7–8).

A number of factors will make it difficult for developing countries to expand nature tourism and thus for Canadians to benefit from it (Healy 1988; Boo 1990; Brockelman and Dearden 1990). It is expensive to provide facilities and upgrade infrastructure, expensive to market the industry, and difficult to train and keep personnel, particularly tour guides. Just as important is the low carrying capacity; crowding is seen as a problem by many ecotourists and even small groups can compromise the integrity of the resource. Trekking in Nepal, for instance, has brought with it erosion and increased deforestation and pollution; the overcrowding and pollution in American parks such as Yellowstone should provide a salutary lesson. Furthermore, the cultural impacts on local people of even the most sensitively conducted tourism can be severe. Two 1990 issues of *Cultural Survival Quarterly* (volume 14, numbers 1 and 2) are devoted to this topic.

Nevertheless, nature tourism is an industry that can bring benefits to local communities and help preserve natural environments. Canadians have a vested interest in encouraging ecotourism in the South. From the financial point of view, many Canadian companies are involved in the industry at all levels. Canadians who visit natural areas in the South become sensitized to the problems, thus strengthening international opinion and prodding aid agencies to fund conservation and national parks. This is a power that can also influence governments in developing countries to work toward conservation. In turn, governments, seeing the economic benefits that can accrue from ecotourism, are more likely to make undisturbed areas available

to foreign tourists and strengthen the infrastructure needed for maintenance. But if local indigenous people do not have a controlling say in the direction of the industry, "a socially responsible and environmentally viable tourism cannot be fostered" (Johnston 1990, p. 5).

NGOs: Voices for the Forest

Only a few of us can afford the luxury of travel to distant shores, but we respond in droves to appeals to save the rain forest. The issue is, of course, just one factor in the explosive growth of the environmental movement in Canada and elsewhere over the last few years, but it is one that particularly touches our hearts.

There are about 1 800 environmental NGOs in Canada, with over a million members (Canada 1990a, p. 135). Most are local groups, with local concerns, but a number are actively involved in rain forest issues. The most professional of these have moved beyond the emotive appeals of their early days to develop a body of expertise on the subject able to influence public policy at home and abroad. The methods they use range from behind-the-scenes pressure directed at business, governments, and multilateral development banks, through public education programs, to direct support for indigenous inhabitants of threatened forest areas. Most are also involved in the battle to improve Canadian forestry practices; to them, the parallels between North and South are obvious. To increase their impact, some maintain a lively network of contacts with other pressure groups around the world, which has been formalized to some extent in recent years. This sharing of experience is a boon to poorly endowed groups in the South.

The World Rainforest Movement

The World Rainforest Movement (WRM) is an international network of citizens' groups and individuals involved in efforts to defend the world's rain forests. It also supports forest peoples in

their struggles against a host of forces. WRM includes groups in the major forest countries of the South such as Brazil, India, Indonesia, Malaysia, the Philippines, and Thailand, as well as organizations in Australia, Canada, Europe, Japan, and the United Sates. Among its members are Probe International, Friends of the Earth (both UK and Brazil), Survival International, the Rainforest Action Network (USA), and Sahabat Alam Malaysia. The WRM was initiated in 1986 and has its headquarters in Penang, Malaysia.

WRM carries out research on deforestation, monitors commercial and development projects, campaigns to support particular communities and encourage collaboration between people of different countries, takes part in international and regional fora, and produces educational materials. Its activities have included presenting the Secretary-General of the UN a petition signed by 3 million people requesting a special meeting of the UN to discuss tropical deforestation; worldwide campaigns on Southeast Asian forests and the role of Japan; a critique of the Tropical Forestry Action Plan (TFAP); and the development of "an alternative Peoples' Forest Charter" (Colchester and Lohmann 1990, pp. 105–106). In 1989, it issued a manifesto entitled *An Emergency Call to Action for the Forests, their Peoples and Life on Earth* (WRM 1989). Among other things, it called for a ban on most aid programs and on trade in timber from virgin forests.

World Wildlife Fund Canada

WWF Canada is the most active supporter of projects on the ground. It was founded in 1967, one of 27 affiliates of the affluent World Wide Fund for Nature. WWF's goal is to conserve the natural environment both for its own sake and for the long-term benefit of people. Its main international priority is to save the world's remaining tropical forests. WWF Canada has a host of conservation projects in Canada and is lobbying hard for the completion of the National Parks system. In 1991/92, its

international program accounted for almost half of its project spending of 2.3 billion CAD.

In the late 1980s, Canadians enthusiastically embraced a fund-raising drive to save Costa Rican rain forest at 25 CAD an acre. With the funds, WWF Canada was able to buy 20 thousand acres at Monteverde. As money continued to pour in, the program was extended to other countries. By late 1992, the *Guardians of the Rainforest* campaign had protected 125 thousand acres (50 thousand hectares), still a bargain at 25 CAD an acre. This represents the contributions of many thousands of Canadians. WWF is also able to attract large donors: between 1985 and 1988, Robert Bateman and Mill Pond Press donated 600 thousand CAD for international projects, which was part of their total donation; between 1986 and 1988, Jaguar cars gave 100 thousand CAD. WWF planned to spend 600 thousand CAD on Brazilian projects in 1990.

WWF Canada acts as a source of funds for projects, working with local partners in each region. Since 1988, it has been involved in large-scale conservation and sustainable land-use projects in Costa Rica in partnership with CIDA (WWF 1991b). The first, a 3-year, 450 thousand CAD project to reforest slopes in the buffer zone around the Monteverde Reserve, was run in association with the Monteverde Conservation League. In August 1991, a 3-year, 3 million CAD extension was announced, which will include experimental projects such as ecotourism, the harvesting of nonwood products from forests, and small-scale, traditional intensive farming. In Latin America as a whole, there are now more than 300 WWF conservation projects.

Greenpeace

Greenpeace has spread from Canada to become the largest international environmental organization in the world, with a very broad mandate. It has 450 thousand supporters in this country and about 5 million worldwide. A latecomer to tropical rain forests, Greenpeace launched a major program of action in late

1991. It plans to expose the abuses of the tropical timber trade, pinpoint the American, Canadian, European, and Japanese corporations involved in rain forest destruction, lobby Canadian and other governments, promote products from sustainably managed forest, and, predictably, "use the Greenpeace fleet anywhere in the world to protect this priceless treasure" (Greenpeace promotional literature).

Cultural Survival (Canada)

Cultural Survival (Canada) acts as an advocate for forest dwellers and an opponent of deforestation, both in Canada and in the developing world. It has funded causes in the Brazilian Amazon, Guatemala, Japan, and Malaysia. A small and recent organization, with about 400 supporters, it shares a dynamic director (Elizabeth May) and an office with the Canadian branch of the Sierra Club. It coordinates the Canadian contribution to World Rainforest Week.

Probe International

Probe International, a sister organization of Pollution Probe, has about 20 thousand supporters. Probe takes an active part in international networks of NGOs concerned with tropical deforestation. In 1990, it organized a fact-finding mission to Brazil to observe a wide range of destructive practices in the Amazon. It lobbies extensively on such issues as PetroCanada's oil exploration in Ecuador. Peggy Hallward, the Director of Forestry Research, is the recognized Canadian NGO authority on tropical forest issues.

Western Canada Wilderness Committee

The Western Canada Wilderness Committee (WCWC) has 30 thousand supporters and is growing rapidly. Paul George founded WCWC in Vancouver in 1980 and is now regarded as "the leading voice in the province [British Columbia] demanding the preservation of old-growth forest" (Rose 1991). Their fund-

raising material also asks donors to "help save the world's tropical rainforests." The organization's activities include support for the Penan in Southeast Asia and for indigenous people in Amazonia. In late 1990, WCWC supported a tour across Canada by three Borneo natives to publicize the plight of people in that region.

NGOs around the world have become involved in a wide range of activities involving tropical forests. The antitropical timber campaign, for instance, was started in Europe by Friends of the Earth, Survival International, Greenpeace, and IUCN. It called for consumer boycotts of goods made of tropical timber from forests that were not managed sustainably. The response was immediate and dramatic. In West Germany, 200 city councils stopped using tropical timber; in the Netherlands, almost half of local governments did likewise. In the UK, 200 retailers and timber users, including the major chains Laura Ashley and Habitat, announced that they would only use wood from properly managed forests. Bans were considered in the European Parliament and several countries, and many other actions were taken around the world (Oldfield 1989, p. 5; Goodland et al. 1990, p. 304). Trade circles have reacted strongly, arguing that countries need the revenue from timber and that if logging stops, even more devastating damage will ensue from shifting cultivators and plantation agriculture.

Yet, despite the success of such ventures, NGOs will only have a lasting influence if they can play an integral role in the policy-making process and are included from the outset in the design of development projects. In recent years, NGOs around the world have been working to do just that. They are beginning to build a tenuous but nevertheless valuable understanding with industry. They have become valuable players in the development assistance programs of many countries. At the international level, they have tried to play as large a part as possible in such fora as ITTO and TFAP, presenting position papers that not only critique the inaction of these initiatives but also offer alternatives. NGOs, too,

played a vital role in the Earth Summit process and the negotiations on climate change and biodiversity.

Canadian Foreign Aid to Forestry

Canada has a huge pool of experience and expertise in forestry. It is hardly surprising, then, that Canada is a leader in development assistance in the sector. Indeed, the World Bank, USAID, the Swedish International Development Authority (SIDA), and CIDA together account for 60 percent of the total assistance given to forestry worldwide. Annually, we commit about 115 million CAD and our total commitment to date is over 1.5 billion CAD. Many different actors from Canadian society are involved: development and research agencies (CIDA and IDRC), private industry, consultants, universities, NGOs, and federal and provincial government departments (especially External Affairs and Forestry Canada) being the most important.

Forestry assistance has been part of Canada's official development assistance (ODA) since the days of the Colombo Plan in the 1950s. In the early years, our aid policies were heavily influenced by our own industry and thus emphasized the commercial exploitation of forest resources. This narrow view of forestry was shared by other agencies of the time, such as the World Bank. During the late 1960s and early 1970s, however, aid agencies began to turn to a "basic needs" approach, which targeted the poorest of the poor, particularly those who lived in rural areas. Slowly, aid policies in the forestry sector evolved to reflect this change and there was a rapid growth in aid to the forestry sector.

Canadian International Development Agency

In 1968, CIDA was created to coordinate Canada's ODA activities. From the beginning, forestry has been an important part of the program. By the mid-1970s, CIDA had expanded its projects to include a wide range of forest-related activities, including

environmental protection and integrated rural development. Nevertheless, forests were still commonly viewed in terms of employment and revenue (CIDA 1976).

Between 1978 and 1984, CIDA contributed 438 million CAD to 104 projects in 32 countries. This accounted for about 15 percent of aid to the agricultural sector (CIDA 1985). During these years, CIDA's philosophy was evolving. Its changing attitudes are clearly spelled out in the 1985 booklet, *Sustaining the Forest: an Ecological Challenge*, which recognizes the many complex factors involved in tropical deforestation, the roles that trees play in satisfying basic human needs, and the importance of conservation (CIDA 1985). In particular, there is now a greater sensitivity to the role of women.

The sort of project that results from this type of philosophy is usually described as "social forestry," a loosely defined concept generally understood to mean tree-growing for the purpose of rural development. In practice, this has turned out to be a difficult undertaking, fraught with complex social variables. CIDA's first bilateral social forestry project was launched in 1984 in Andhra Pradesh, India, a country where there have been massive investments in social forestry. It was "one of the largest social forestry projects...for any agency" (Braatz 1985, p. 90). Many thousands of trees have been planted by farmers, communities, and the forest department, largely on unused land. In addition, CIDA was already involved in a large number of smaller projects through its NGO partner program.

CIDA was the first development agency in the North to provide financial support for the work of NGOs in international development and, today, only Switzerland, a relatively small donor, channels a larger amount of its aid through NGOs. NGOs have thus become "a major component in Canada's relations with the Third World" (Herbert-Copley 1987, p. 25). In general, this has proved to be an effective method of delivering aid, since NGOs work closely with local communities. In Andhra Pradesh, for example, Food for the Hungry carried out activities that complemented the larger project; CARE Canada works in forestry in

Kenya and agroforestry in the Sudan. In the fiscal year 1989/90, NGOs and international NGOs (INGOs) received 640 thousand CAD for forestry projects (CIDA 1991, p. 114). CIDA is also moving into some large conservation projects with NGOs, as we noted in our description of WWF Canada.

The Forestry Sector has eight full-time forestry specialists, each responsible for a specific region. Behind these specialists is a large body of forestry consultants with experience in international projects. In 1990, there were 42 active projects in 14 countries in Africa; 27 projects in 15 countries in the Americas; and 7 projects in 11 countries in Asia, where 2 projects involve the 6 countries of ASEAN (CIDA Forestry and Conservation Sector 1990, p. 225). One of these, the ASEAN–Canada Forest Tree Seed Centre Project, is a long-term cooperative venture between Canada and Southeast Asia to help reforestation in the region (Case and Wang 1990). During 1989, 253 Canadian experts were involved abroad in the forestry sector, either supported in some way by CIDA or through private firms, institutions, associations, or NGOs. Eighty-four people were on assignments of more than 6 months duration; the remainder were in the field for shorter periods (CIDA 1991, p. 114).

Canada supports many international institutions active in development assistance to forestry. These include FAO, the United Nations Development Programme (UNDP), and the World Bank. In 1989/90, Canada gave 900 thousand CAD to the Nairobi-based International Center for Research in Agroforestry (ICRAF). CIDA is also helping regional agroforestry research networks in Africa.

Canada's aid policies continue to evolve. In particular, CIDA is working to develop a coherent approach to sustainable development.

> Today, the focus of the forestry sector is still dominated by CIDA's concern for the poorest countries of the world and the need to address pressing global issues such as climate change, diminishing biodiversity and wildland conservation. (CIDA Forestry and Conservation Sector 1990, p. 225)

Given our background, there will probably always be projects

involving commercial forestry: inventory, small-scale wood-processing industries, and training in forest management and forest protection. If these help to improve local practices and the products are designed for national consumption rather than export, there can be benefits for local populations. The World Bank, however, has announced that it will no longer fund any development projects involving the destruction of primary tropical forests.

International Development Research Centre

IDRC was established by the Government of Canada in 1970 as an independent organization. Its mission is to contribute to development through innovative research and research-supporting activities. Its emphasis has been mostly rural, its research applied rather than basic. IDRC works in five main areas: environment and natural resources, social sciences, health sciences, information sciences and systems, and corporate affairs and initiatives. Forestry is covered by the Environment and Natural Resources Division.

Forestry research, in general, has been given a low priority by most countries in the developing world; what little there is mostly concerns industrial forestry. In addition, only about 5 percent of development assistance to forestry is devoted to research (Webb 1990, p. 237). In the mid-1980s, IDRC was the seventh largest sponsor of forestry research projects in the world. In its first 19 years, IDRC's forestry program supported almost 200 national projects, ranging in size from 15 thousand to 1.5 million CAD, all in the form of grants. More than 38 million CAD was spent in 50 countries, about 40 percent in Africa and 30 percent each in Asia and Latin America (Webb 1990, p. 238).

IDRC has a worldwide reputation for its innovative approach to forestry research. In keeping with its mandate to help ensure access to food and other basic necessities for the individual through the sustainable use of renewable resources, it has emphasized social forestry. It seeks to develop appropriate, low-input technologies; to train local scientists and support national

institutions; to encourage networking between scientists; and to make sure that local people benefit from their studies. Because of limited funding, IDRC now concentrates its work in four fields, closely related to its mission (Webb 1990, pp. 238–239). The major area is agroforestry, with long-term projects in Africa, Asia, and Latin America. The fuelwood and energy program is concentrated in 10 African countries where fuelwood provides 90 percent of energy requirements, and in the Andean republics of Latin America. In the field of forest management and production, IDRC supports research into bamboo and rattan. The last area, forest product utilization, accounts for 15 percent of spending and has targeted "lesser known species" that are usually ignored by commercial interests but are potentially useful. In Latin America, the program is investigating their use in low-cost housing.

Canada's aid to the forestry sector of developing countries has clearly grown to involve a broad view of trees. Tropical moist forests, the subject of most of these chapters, remain the target of some large programs. These include a photography–cartography forestry project in Cameroon, which had mapped 61 percent of the country's forests by 1990; inventory and training programs in Zaire; and a broadly based management project in the hardwood forests of Honduras, which promotes, among other things, small pit sawyer cooperatives and conservation. But Canada's aid program goes far beyond that. It includes the use of trees in a wide range of habitats and for many purposes: the integration of trees and agriculture in agroforestry projects; tree planting to provide fuelwood; the development of efficient cooking stoves; research into rattan and multipurpose trees; and projects that target women. Projects in the agricultural sector that help to intensify production also help to take pressure off remaining forests.

Canada is not alone in its concern over sustainable land use in the developing world. United Nations bodies, national governments, and hundreds of NGOs are engaged in a host of similar activities. Plainly, however, all this attention has done little to

slow the rate of deforestation and land degradation. For some time, it had been obvious that the ad hoc methods of the past do not work. Development projects, indeed, often add to the problem. Plainly, a far greater effort is needed, a coordinated effort that involves all concerned: governments at every level, business, local groups, and the international community. In the mid-1980s, work began in earnest on two international government initiatives that seek to stem the tide of deforestation. Canada is an active player in both.

The International Tropical Timber Organization

Commodity agreements have long been used as a way of managing international markets in commodities such as cocoa and coffee. Tropical timber, however, is like no other commodity, coming as it does from a tremendous diversity of species and ecosystems scattered across a vast belt of the planet, and "inextricably interwoven with tropical forest development as a whole" (Hpay 1986, p. 2). In recent years, it has become evident that virtually all logging in these forests is unsustainable. One survey estimates that fewer than 1 million hectares, out of over 800 million hectares of productive tropical forest worldwide, are "demonstrably under sustained yield management" (Poore 1988, Vol. I, p. 18). Many observers feel that even this low figure is overly optimistic and question whether sustainable logging of TMF is possible at all. This has obvious implications for the future of the industry.

International attempts to deal with the problems of trade in tropical timber have been fraught with difficulty. The interests of a wide range of producer and consumer nations must be reconciled, technical forestry questions accommodated, and the concerns of environmental organizations addressed. The path to the International Tropical Timber Agreement (ITTA) (1983) and the institution that oversees it, the International Tropical Timber Organization (ITTO) (1986) was long and tortuous but,

nevertheless,

> ITTA...emerged as a unique trade agreement. Its most significant articles not only set the ITTO the task of promoting the trade in tropical timber, but also gave the ITTO the apparently contradictory duty of encouraging the *sustainable* use and *conservation* of tropical forests and their genetic resources, and of maintaining ecological balance. (Colchester 1990, p. 166)

Dr B.C.Y. Freezailah, the Executive Director of ITTO, has compared this task to "a canoeist swirling down a foaming river with a 2-handled paddle, one end of which represented conservation, and the other utilization" (Colchester 1990, p. 167).

There are 46 members of ITTO, including Canada. Seventy-five percent of the world's tropical forest resources lie within the borders of the producer countries; consumer nations account for more than 95 percent of world imports (WWF 1989; Collins 1990, p. 191). This is truly a global response to a global problem and its potential to influence the future of the resource is obvious. Many NGOs, such as Friends of the Earth, IUCN, and WWF have actively supported ITTO and see it as the most important forum to promote the conservation of tropical rain forests (Pearce 1990, p. 46).

ITTO is still in its infancy, but its structure does not bode well for its future effectiveness. The voting power of a country in the presiding council depends on the degree of its participation in the trade, although the area of a nation's forests is also given some weight. Thus, Japan has by far the largest voice of any nation. Major producers also exert considerable influence. Furthermore, Japan's offer of generous seed money and facilities earned it the right to establish ITTO's headquarters at Yokohama. The potential certainly exists for ITTO to become little more than a lobbying group for the timber business.

Yet the concept of sustainable use is central to ITTA and ITTO. The participants believe that only if forests can be seen to provide a stream of financial benefits, will countries have an incentive to protect their forests, to provide alternative avenues for their people. To ITTO, this value comes from sustainable logging.

Dr Freezailah has said: "Our long-term objective is of course the expansion and diversification of trade and exports of more value-added tropical timber products" (WWF 1989).

Research and development are also an integral part of the work of ITTO. The largest of the first round of projects is seeking sustainable uses for the Amazon rain forests of Acre State, Brazil, from logging to extractive reserves. There are plans for many other projects to study sustainable forest management, including three in Indonesia, one being a 7-year, 11 million USD study. But funding difficulties have plagued the organization from the beginning and research is lagging.

ITTO remains convinced that sustainable logging of TMF is possible. At the May 1990 meetings held in Bali, members agreed to achieve sustainable logging by the year 2000 and provided members with guidelines. This is a laudable goal, but it ignores the urgency of the situation and is wildly unrealistic, particularly since the timber trade seems uninterested in the proposal. A report presented at the meetings showed that Sarawak, by far the largest source of tropical logs today, will be stripped in 11 years if logging continues at the current hectic pace (Pearce 1990). Malaysia promised in November 1990 that logging will be reduced in the state and, in 1992, Sarawak pledged to cut its annual yield by 25 percent by the end of 1993.

ITTO has made little progress toward its aims. NGOs have become increasingly vocal in their protests. Underfunded, understaffed, and plagued by political considerations, ITTO is not, however, the only international attempt to grapple with the problems of tropical deforestation. A more ambitious initiative, also fraught with problems, is the Tropical Forestry Action Plan (TFAP).

The Tropical Forestry Action Plan

In 1985, the World Resources Institute, assisted by private foundations and several development assistance agencies, including CIDA, UNDP, USAID, and the World Bank, issued *Tropical Forests: a*

Call for Action (WRI 1985). At the same time, FAO was working on its Tropical Forestry Action Plan, which it released in October of that year. In 1987, these two initiatives came together in a revised plan (Winterbottom 1990, p. 3). By August 1991, 86 developing nations were involved in the process and three others, including a dilatory Brazil, had made enquiries (TFAP 1991). This was without doubt a remarkable response.

TFAP provides a broad framework to help tropical countries and the international community coordinate their actions against tropical forest destruction. It also seeks to overcome political and institutional barriers to effective action. The original documents show that TFAP hoped to "contribute decisively to improving life in developing countries" by providing better food security, more jobs, sustainably managed forests, increased flows of fuelwood and forest products, more community involvement in forest management, and protection for watersheds, wildlife, and genetic diversity (Winterbottom 1990, p. 5).

TFAP is administered by a small secretariat in the FAO Forestry Department. Each country must make a formal request to be included. A National Forestry Action Plan (NFAP) is then drawn up in a complex series of steps that ideally should take about 18 months. The first step is a major review of the forestry sector by a team of national and international experts. One agency takes the lead, but funding and help can come from many sources. To date, more than 40 agencies, which together provide almost all development assistance to the sector, have collaborated in more than 50 reviews. A long-term strategy and a short-term program of action for the forest sector are then planned. Specific projects are identified and funding is sought from international donors. By late 1991, only a small number of countries had actually embarked on projects. None had obtained full funding. Many governments, UN agencies (especially FAO and UNDP), and a few NGOs have been involved.

The process is, however, far from straightforward. Few countries are following the guidelines exactly. In many, the process has stalled along the way. Nevertheless, the amount of money

allocated annually to the sector has roughly doubled since 1985 and, by 1990, had reached about 1.3 billion USD. It has not been easy to disburse such large funds in countries that often lack the expertise to manage projects in the field. Furthermore, the small secretariat has become overwhelmed by a tidal wave of plans.

Canada, through the medium of CIDA, is an active participant in TFAP. It was part of the original task force on tropical forests that published *A Call for Action* and is a founding member of the TFAP Forestry Advisers Group, an informal organization that has become the main forum for monitoring the process and seeking solutions to problems. Ralph Roberts, Director of the Forests and Environment Sector of CIDA, chairs this group; so, Canada has "important direct involvement in the evolution of the Program" (CIDA Forestry and Conservation Sector 1990, p. 228). CIDA has been involved in sector reviews in 12 countries in Latin America and Africa (both Anglophone and Francophone), acting as the lead agency in Guyana, Peru, and Zaire, and is listed as an interested agency for many other countries (Winterbottom 1990, pp. 12–13). By 1990, it had contributed a total of 1.3 million CAD and had pledged 0.5 million CAD to help Francophone Africa.

TFAP, at its inception, was hailed as the solution to the problem of deforestation. But progress has been halting and harsh criticism its just reward. Perhaps too much was expected from the process, but it seems to have strayed far indeed from its basic principles. First and foremost, it uses a top-down approach, with almost no involvement from the local communities and NGOs most affected. Governments, development assistance agencies, and experts oversee the development of national plans, usually in secret. The politically sensitive topics of land reform, national and international policies, and development projects are almost never addressed. In most countries, there has been a narrow focus on the forestry sector and many plans will lead to an increase in logging and commercial wood-processing industries. There is, however, considerable variation from country to country.

In 1990, there were three reviews of TFAP: by the World Resources Institute (Winterbottom 1990), by the World Rain-

forest Movement (Colchester and Lohmann 1990), and by FAO itself. The first two of these recommend dramatic changes to the process. Predictably, the review of the World Rainforest Movement is the most scathing, and its critiques of nine individual national plans have a direct bearing on Canada's contribution as CIDA was the lead agency in two of the plans. For the NFAPs of both Guyana and Peru (Colchester and Lohmann 1990, pp. 16–30), they feel that the plans will lead to increased logging, with no benefit to indigenous peoples, who were apparently not consulted. They cite an air of unreality in the Peruvian plan; it fails to ask how a government in such dire straits could cope with the level of drug trafficking and insurgency present in large regions of the country, or to offer more than band-aid solutions to problems in the poverty-stricken highlands that force people to colonize lowland forests. Furthermore, it follows closely the government's 5-year plan, even though existing policies have led to forest destruction. In neither country is it clear that the poor will benefit from fuelwood plantations.

With time, TFAP has responded to some of the criticisms by changing its procedures and guidelines. By 1989, it had acknowledged the need for sustainable development and the active involvement of local groups and communities (Colchester and Lohmann 1990, p. 11). TFAP's structure is still evolving. It is too early, however, to tell if the proposed institutional changes will result in any real improvement.

Conclusions

Over the last two chapters, we have shown some of the many links between Canadians and tropical forests. We are involved as tourists, scientists, professionals, and consumers; through development assistance agencies, advocacy groups, and business interests. We are active participants in two international initiatives directed at the sector.

It is only logical that Canada should be a leader in this field.

Our preeminent position as exporters, our great pool of expertise, our relatively enlightened aid agencies and NGOs, all fit us for the role. Our guiding principle has already been enunciated in many government pronouncements: sustainable development. The only task is to translate it into meaningful action, hopefully as part of a broad foreign policy on environment and development that would embrace "aid, trade, and other measures to reduce the debt and increase the net flow of resources to developing countries" (MacNeill et al. 1989, p. *xii*). As we have seen, tropical forests cannot be treated in isolation.

What then should we do? An interesting set of guidelines has been proposed by a group of Canadian NGOs in *What Canada and Canadians can do to Save Tropical Forests* (unpublished, 1989). Cultural Survival, Probe International, Pollution Probe, and WWF Canada oppose the clearance of primary tropical forests, whether it be for logging, plantations, dams, roads, mines, cash crops, livestock projects, colonization schemes, or any of a wide range of industrial or infrastructure projects. They are particularly concerned about the loss of biological diversity and the need to protect the rights of indigenous peoples. They want CIDA and Canadian business interests to follow these guidelines in all of their projects and to carry out full and open environmental impact assessments before funding is approved. CIDA should also work to influence the multilateral development banks, such as the World Bank, to adopt similar policies.

The NGOs favour a ban on the import of tropical wood and ask Canadians not to buy it unless strict guidelines for its harvest are followed. Sustainable rain forest products from extractive reserves, on the other hand, are enthusiastically endorsed. They suggest that Canada, through the Department of External Affairs, should "strengthen its support for the conservation mandate" of ITTO, and in particular

> should take a leadership role in promoting the principle of sustainable forestry management within the ITTO. Avenues for this include the provision of financial support for ITTO demonstration projects on sustainable forest management and

the secondment of a forest ecologist to work at the ITTO Secretariat.

They have no time for TFAP, however, and suggest that forestry funds be channeled directly to NGOs in the South. Canadian banks holding Third World debt are encouraged to develop debt-for-nature swaps, which could protect forests from unsustainable uses.

The recommendations address wider concerns as well. Far more funding should be given to projects "which protect or restore the ecological basis for development in developing countries." CIDA should actively promote staff-training programs both in Canada and in developing countries to ensure that officers involved in development have some understanding of ecological principles. Technical support to developing countries to help with resource inventories, environmental profiles, and data bases should become an even more important part of our programs.

Strict adherence to these proposals would certainly change the face of Canadian involvement in tropical forests. CIDA funds some projects involving logging; some of the national forestry plans we have helped devise through TFAP include increased levels of cutting; Canada uses tropical woods in wasteful ways; and there are Canadian business interests in the area. It is indeed important that Canada does its utmost to make sure that it does not contribute to tropical deforestation through its activities. There is a need, for instance, for Canadian companies to carry out careful social and environmental impact assessments before proceeding with new enterprises. Just as critical, however, is the need for Canada to exert its influence not only in ITTO and TFAP but also in other dealings with developing countries, to encourage them to examine policies that lead directly or indirectly to forest clearance.

Diplomacy is a delicate business and it may be difficult to make progress in such vital but politically sensitive areas as inequitable land distribution without incurring charges of colonialism. We can, however, provide concrete assistance to countries to help them reform the wide range of subsidies, tax credits,

and other incentives that lead to unsustainable development in agriculture, energy use, and forestry. Such structural reforms, along with changes in crop-pricing policies and the development of renewable energy sources, are just some of the many possible areas where change could lead to decreased pressure on forests. Such action is needed as much in Canada as it is in the South.

Chapter 7

Compliance Required: Endangered and Migratory Species

We must indeed all hang together, or most assuredly we shall all hang separately.

Benjamin Franklin

Tropical rain forests are wondrous treasure troves of biological diversity, home to at least half of all species on Earth. Yet their extraordinary richness is no defence against human activity. Hundreds of thousands, perhaps even millions of species are at risk today. This danger is not limited to forests of course; ecosystems all over the world are threatened and, even in Canada, with its much lower level of diversity, 230 species are now in jeopardy (WWF 1992).

No one knows how fast species are disappearing, no one even knows how many species exist on Earth, and much of this uncertainty is precisely because our knowledge of tropical forests is so limited. Scientific estimates of the total number of species range from 5 to 30 million or more (Wilson 1988, p. 5); but, to some extent, the exact number is irrelevant. What is important is the loss of diversity, not only through extinction but also in the loss of genetic variability within species. This promises to have dire consequences for future generations, to foreclose our options in agriculture, medicine, and other areas, and to open the door to the pests that thrive on simplicity.

The importance of diversity, especially that of the rain forests, has been well documented, its economic, ecological, and ethical worth convincingly argued, and its sad decline described (for example, Durrell 1986; Norton 1986; Wilson 1988; McNeely et al. 1990). In this, our last chapter on forests, we describe two tangible links between Canada and threats to biodiversity in the South. Both are stories of wildlife that moves in one way or another between North and South, both of species at risk because of actions at home and abroad. The main focus of the chapter, however, is a discussion of major international conservation treaties and, especially, Canada's participation in these agreements.

The first case study concerns the huge, often illicit, trade in wildlife, most of which originates in developing countries. This trade is a significant factor in the depletion of many plant and animal species and much of it is fueled by demand in the North. Many Canadians, including leather workers, pet shop owners, and scientists, depend on this trade and thus have a vested interest in the sustainable use of wildlife in the South. Much of this section has been abstracted, with permission, from a 1988 Dalhousie University Master of Environmental Studies thesis by Douglas J. Hykle, the most detailed examination available of Canada's performance as a member of the Convention on International Trade in Endangered Species (CITES), the major international treaty governing wildlife trade (Hykle 1988).

The other case study is a discussion of migratory birds, many of which depend on intact tropical forest in their wintering grounds. Sooner or later, many of these birds will be affected by habitat destruction in the South, although it is difficult as yet to prove that migrant bird populations are declining because of tropical deforestation. Such declines in the future could harm the Canadian economy in many ways.

The need for international cooperation in protecting wildlife is obvious. We have seen the problems associated with two international initiatives that target tropical deforestation — ITTO and TFAP. The treaties discussed in this chapter are only indirectly

concerned with forests, but they raise many important questions. Canada's own wildlife was subjected to catastrophic levels of hunting in the early years of settlement. Eventually, this was brought under legislative control in the country, and Canada was a pioneer in regional agreements covering migratory waterfowl. Yet Canada has not joined the one global convention that specifically addresses migratory species and, as Hykle's thesis shows, we have subverted the aims of CITES. If Canada, for all its wealth and stability, cannot set a shining example in the way it carries out its obligations in these relatively limited treaties, or does not join them, what hope is there for the ambitious conventions planned under the Earth Summit process?

International Wildlife Law

The earliest forays into international agreements to protect wildlife had a strictly utilitarian focus on species of direct value to humanity, such as insectivorous birds. With time and understanding, however, treaties have shifted to emphasize the role of species in ecosystems and the need to protect even the most apparently insignificant organisms from extinction. The type of threat faced by animals has also changed over the last century; habitat destruction, rather than direct slaughter, has become the major danger in the last few decades. Treaties now include ways to address this problem. Just as important is the growing realization that conservation strategies must be integrated with the legitimate rights of local people to use wildlife in a sustainable manner.

In 1902, 12 European nations concluded the first major international treaty, the Convention for the Protection of Birds Useful to Agriculture, which remains in force, but has been of little value. Canada's first agreement was with the United States. The Convention for the Protection of Migratory Birds, signed on Canada's behalf by the United Kingdom in 1916, regulated hunting, but made no provision for habitat protection.

In the intervening years, there have been many international agreements, both bilateral and multilateral. In general, these aim to preserve individual species (such as the 1973 Oslo Convention for the Conservation of Polar Bears, which was signed by five circumpolar nations, including Canada), groups of closely related species (like the 1946 Washington International Convention for the Regulation of Whaling), or are broad regional nature conservation treaties (such as the 1973 Berne Convention on the Conservation of European Wildlife and Natural Habitats).

Canada has been a signatory to several of these treaties and, since 1989, has signed bilateral agreements including biodiversity issues with France, Mexico, and the former Soviet Union. At the level of the Canadian Wildlife Service (CWS), Canada is involved, either actively or at the negotiation stage, with Cuba, Northern Ireland, Peru, and Suriname. At the regional level, the eight circumpolar nations are moving toward cooperation on a wide range of Arctic issues, including flora and fauna (CWS 1990).

Until recently, Canada was not able to join the major regional agreement in the Americas, the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (1940), which was restricted to members of the Organization of American States (OAS). This Convention was "a visionary instrument, well ahead of its time" in the concepts it espoused (Lyster 1985, pp. 97–98). Species were to be protected from extinction, reserves set up, migratory birds protected, and international trade in wildlife regulated. Because of this wide range of provisions, the treaty remains of great potential importance. Plainly, however, it has been unable to halt the destruction of wildlife and habitats. Reserves have been set up in some countries and there have been many cooperative conservation projects, particularly on the part of the US; but, in general, the Convention has been of little value (Lyster 1985, p. 111). In many countries, indeed, it has lain dormant. Canada's new status as a member of OAS, however, gives us an opportunity to exert influence in Latin America.

Complementing a host of regional conservation agreements

are four major global instruments, all concluded in the 1970s and open to all who wish to join. These target migratory animals (the Bonn Convention), wetland conservation (the Ramsar Convention), trade in endangered species (CITES), and habitats of outstanding value (the World Heritage Convention). Canada is a contracting party to the last three of these "big four" conservation treaties. All will be touched on in this chapter, but the focus will be on CITES, the Convention on International Trade in Endangered Species.

International Trade in Endangered Species

International trade in live wildlife and wildlife products is big business. WWF estimates the minimum declared value at about 5 billion USD per year (Fitzgerald 1989, p. 3), although some reports quote much higher figures. Much of the wildlife traded originates in the developing countries of Africa, Asia, and Latin America, which are abundant sources of skins, furs, meat, and manufactured products, as well as live animals and plants. In a list of 24 major exporters of wildlife drawn up by WWF, all but two (South Africa and the United States) are developing nations (Fitzgerald 1989, p. 6).

As with any other resource, trade is driven by consumer demand, which is rising steadily with increasing affluence in the North. Canada is a major importer of wildlife, as are the European Community, Japan, the former Soviet Union, and the United States. Echoing the trade in tropical timber, countries in East Asia have also become major consuming, processing, and re-export points. Traditional medicine in many Asian countries uses an astonishing variety of wildlife, both plant and animal.

The 1989 WWF report, *International Wildlife Trade: Whose Business Is It?*, gives examples of the amount of international trade that occurred in a typical year in the late 1980s: 40 thousand primates, 1 million orchids, 10 million reptile skins, 15 million pelts from wild furbearers, more than 350 million tropical fish, and the ivory from 90 thousand elephants. The US alone imports

snake, crocodile, and other reptile skins worth between 200 and 250 million USD (Fitzgerald 1989, pp. 3–5).

Much of this trade is illegal and, "in many ways, illegal wildlife trade is strikingly similar to drug running, currency laundering, and other well-organized international crimes" (Fitzgerald 1989, p. *xiii*). Indeed, smuggling wildlife is said to be generally more profitable and less hazardous, in terms of penalties and fines, than smuggling narcotics. As with the drug trade, the poor people in developing countries profit little.

The standard laws of supply and demand apply. Unusual or rare species are particularly vulnerable, since they have a much greater commercial value than more abundant or commonplace varieties. As a species is forced to the brink of extinction, its value rises, driving local wildlife collectors and dealers to even greater efforts to satisfy consumer demand. When it becomes prohibitively expensive to harvest one species, the trade shifts to previously unexploited and less-preferred alternatives. Since it is illegal to harvest and sell many of these species, all sorts of dangerous methods are used to escape detection and many, if not most, live specimens die along the way, increasing pressure on the species.

The effect of trade on some species is devastating. For the rhinoceros, for example, illegal trade poses a terrible threat: between 1970 and 1987, there was an 85 percent decline in its numbers worldwide (Fitzgerald 1989, p. 105). Horn from the Asian rhinoceros, the most valued species, can fetch as much as 60 thousand USD per kilogram (WWF 1991c); in Taiwan, it is a much prized ingredient of many traditional medicines. Another outstanding example is the African elephant, whose numbers were halved from 1.2 million to just over 600 thousand in 8 years as a result of poaching (Barbier et al. 1990, p. 2). Japan is far and away the major consumer of ivory and Hong Kong is the main centre for carving. Trade in all elephant products was banned in 1989.

Far less publicized is the fate of many plant species in the wild. The passion of greenhouse owners and gardeners for rare

plants such as species of cacti, cyclamens, African violets, and jungle orchids is rapidly depleting the flora of such countries as Mexico and Turkey.

North American wildlife is not immune to these pressures. A recent article in *National Geographic* (Poten and Azel 1991) paints a graphic picture of the situation in the US, where illegal profits from animals are estimated at 200 million USD and growing. Trophy hunters enter national parks to shoot elk, deer, and bighorn sheep. Poachers kill walruses for their ivory, eagles for their feathers, and sturgeon for their caviar. Bears are especially treasured both as trophies and for their parts; the gallbladder of a polar bear may be worth 3 thousand USD in South Korea. Organized crime has become heavily involved. In Canada, too, parks are a major focus of poaching activity and a considerable amount of illegal hunting takes place all over the country.

If used in a sustainable manner, wildlife can provide long-term benefits to local people and to the economies of producer and consumer nations alike. In Canada, for instance, fish- and wildlife-related recreational activities contributed 11.5 billion CAD to the country's gross domestic product (GDP) in 1987 (Federal–Provincial Task Force for the 1987 National Survey on the Importance of Wildlife to Canadians 1990, p. 34). In the past, Canada was a significant exporter of legal wildlife products, most of them furs. Between 1982 and 1985, for example, Canada exported 75 thousand lynx skins and 8 thousand wolf skins (Hykle 1988, p. 11). Much of this trade has collapsed in recent years as a result of international pressure by animal-rights groups.

The Convention on Trade in Endangered Species

After a long gestation, CITES was signed by 21 nations on 3 March 1973 and came into effect on 1 July 1975. By the end of 1991, it had a membership of 112 Parties. Nearly all the major importing

and exporting nations belong and "the convention receives more administrative support and enforcement attention than any other international conservation measure" (Fitzgerald 1989, p. 11).

CITES regulates the trade in live wildlife and wildlife products through a permit system. A species is listed in one of three appendices, which determine the degree of trade regulation and, thus, the international protection that it is afforded.

Appendix I lists species of fauna and flora "threatened with extinction which are or may be affected by trade." It includes, for example, many whales, primates, spotted cats, birds of prey, marine turtles, and wild cacti; more than 600 species of plants and animals in all. Under CITES, their trade is generally prohibited and is only allowed in exceptional circumstances. Permits must be issued by both the exporting and the importing countries before a specimen can be exported.

Appendix II includes species that, although not necessarily threatened with extinction, may become so unless trade is regulated. Polar bears, some pythons, cockatoos, and American ginseng are examples. Whole families of plants and animals are included, so the total is huge, with more than 2 300 animal species and more than 24 thousand species of plants. Only an export permit is needed for these species and, since many countries do not check exports, it is essential that importing countries keep close watch over CITES permits.

Species listed in Appendix III are not considered globally endangered. However, if a country is concerned about the status of a particular species within its borders, it can protect that population by listing it this appendix. The population is then regulated in the same way as a species from Appendix II.

There are exemptions for several types of wildlife specimens. Captive-bred animals and artificially propagated plants are accorded special treatment, for instance. There is another form of exemption: parties can register "reservations" to the listing of any species and continue to trade, albeit with permits. Japan has been a flagrant upholder of this right and has imported

astonishing quantities of endangered wildlife products in the past (Fitzgerald 1989, pp. 16–18).

CITES is managed at the international level by a secretariat that coordinates the activities of the member states, arranges meetings, undertakes scientific studies, and prepares reports. Every 2 years, there is a conference of the Parties attended not only by the members but also by other states and a wide range of NGOs and international bodies. CITES depends on adequate data: most monitoring is done by the Wildlife Trade Monitoring Unit (WTMU), which is supported by IUCN, UNEP, and WWF. WTMU receives information from national governments and from TRAFFIC (Trade Records Analysis of Flora and Fauna in Commerce), an NGO associated with the World Wildlife Fund, which acts as a watchdog.

At the national level, each CITES Party is responsible for implementing the convention's provisions. Each country must designate at least one Management Authority, entrusted with issuing permits, and at least one Scientific Authority, which advises on matters of a scientific nature. These authorities, together with inspection and enforcement agencies, are responsible for ensuring compliance with CITES permit requirements.

For the most part, Canada's performance in CITES has been judged on the basis of its orientation toward wildlife management and not on its record of implementation and enforcement. How well did Canada comply with the articles of the convention during its first 13 years?

Canada and the Implementation of CITES

Canada's large size and small population alone make enforcement difficult, but the government of the day chose to slot CITES into existing legislation that was not suitable for the task. A complex organizational structure resulted. Federal, provincial, and territorial governments all implement some of the provisions of

Canada's domestic CITES legislation. In the federal government alone, five departments share responsibility for the administration and enforcement of various aspects of the Convention. The Canadian Wildlife Service acts as the Management Authority and the scientific authority for Canada; enforcement is the responsibility of Customs and Excise and the Royal Canadian Mounted Police (RCMP). Hykle (1988) describes a host of ways in which a lack of cooperation and coordination between these bodies has hindered the implementation of CITES in Canada.

Customs and Excise is responsible for controlling all traffic and goods, both private and commercial, entering or leaving Canada. All inspectors at all customs offices where goods are normally processed are expected to be conversant with CITES regulations. They must collect, verify, and validate CITES documents accompanying goods presented for export or import; examine travelers and their baggage to intercept wildlife specimens potentially regulated by CITES; and detain goods that lack appropriate CITES permits or that need further identification to establish the species involved. Finally, canceled permits must be sent to CWS.

Yet Canadian customs officers have had little training for this job. Only a short, elementary seminar was given in basic training and field courses were drastically curtailed during the 1980s. There were no demonstrations of listed species or their products provided in the training, and officers on the job do not have easy access to manuals that could help them to decide if the specimen might be listed. In fact, identification was left to a small number of outside experts, fewer than 20 in 1987. For customs officers in the commercial stream, there was almost no training at all.

Commercial shipments account for the bulk of global trade in live wildlife and wildlife products, yet Canada placed the administration of CITES in the Passenger Programs Directorate. Given the enormous demands on officers and the abysmal level of their training in CITES procedures, the outcome is easy to predict. Between 1980 and 1986, there was only one detention or seizure of wildlife or wildlife products for every 130 thousand

traveler entries into Canada, an average of 620 detentions and seizures each year. The vast majority of these cases involved individual travelers and small quantities of goods, many of them tourist souvenirs. The processing of each case is complex and time consuming.

Many Canadian businesses import and export wildlife and wildlife products in bulk, either for immediate distribution and sale or for further processing in Canada, perhaps for re-export. Hykle (1988) analyzed data for two major categories: imports of live psittacines (parrots and parrot-like birds) and imports of reptiles and reptile products. These represent a significant portion of the living and nonliving CITES specimens imported into the country.

Imports of Psittacines into Canada

The appeal of parrots, with their brilliant plumage, their ability to mimic the human voice, and their quirky personalities, lies behind a global trade worth up to 1 billion USD each year. Air travel has revolutionized this trade and, faced with the double threat of tropical deforestation and exploitation, 71 of the world's 333 species today face extinction (Soper 1991). Perhaps 95 percent of all parrots on the world market are caught in the wild. Major sources include Argentina, Guyana, Indonesia, and Tanzania; the United States is far and away the world's leading importer. TRAFFIC (USA) has estimated that as many as one-third of the psittacines entering the US are imported illegally (Thomsen and Hemley 1987). Some of these birds are probably destined for Canada as re-exports. Records show that 81 species were imported into Canada in 1984.

Since 1981, all Psittaciformes, with three exceptions, have been listed in either Appendix I or Appendix II of CITES. Hykle uses three sources to estimate Canadian imports of these birds:

- Imports listed in the annual reports of the Canadian Management Authority;

Table 9. Estimate of Canadian psittacine imports from 1982 to 1985.

Year	Canadian Management Authority	CITES trading partners	Agriculture Canada
1982	862	5 738	30 879
1983	1 625	6 451	20 726
1984	610	4 977	25 025
1985	2 870	5 185	15 167

Source: Hykle (1988, pp. 157, 161).

- Exports and re-exports to Canada recorded by other CITES parties in their annual reports; and
- Data compiled by Agriculture Canada, which inspects live plants and animals entering and leaving the country (this has nothing to do with Customs controls, but serves as a check).

Theoretically, these estimates should be equivalent. In fact, as shown in Table 9, there were monumental discrepancies in the years 1982 to 1985. In two of the years, over 95 percent of the birds processed by Agriculture Canada were not accounted for in CITES figures. Individual cases are even more dramatic: for 1982, the Management Authority reported that only two psittacines had been imported from the US; Agriculture Canada had records of 19 861! For these years then, the CITES administration, which is responsible for monitoring imports of CITES-regulated wildlife, was aware of only a small fraction of the psittacines that were imported into Canada. These figures, of course, do not include birds that are brought into the country surreptitiously.

What does this mean? The most likely explanation is that customs was not examining commercial shipments properly and checking the accompanying documentation. If this was being done, then the documents were not being forwarded to the CITES administration. Without copies of foreign export permits, the federal authority has no knowledge of trade in CITES specimens.

Reptile Imports: Manufactured Products and Live Specimens

Consumer demand for products made of reptile leather fuels a lucrative processing industry. The global trade is extensive and has persisted for many years despite the fact that the supply of some species is nearly exhausted. A relatively small number of Appendix II species accounts for the bulk of Canadian imports of live animals and manufactured leather products. They include a few crocodilians (notably the spectacled caiman, *Caiman crocodilus*), members of the genus *Tupinambis* (tegu lizards), monitor lizards (Varanidae), large boas and pythons (Boidae), and some species of iguanids. Again, Hykle compares the figures submitted to CITES by Canada's Management Authority and other countries (Table 10).

Here, too, there were huge differences between reported exports and imports. Fully 95 percent of the snake and lizard-skin shoes that entered Canada with CITES documentation were unaccounted for. Many of these shoes were manufactured in Italy from skins obtained from Indonesia and Thailand. The records for live reptiles, mostly iguanas, caimans, and pythons, are not much better.

Table 10. Estimate of Canadian reptile imports from 1982 to 1985.

Item	Canadian Management Authority	CITES trading partners	Unaccounted for (percent)
Whole skins	113 917	289 892	60.7
Watchstraps	86 125	155 717	44.7
Shoes	2 181	44 440	95.1
Belts	1 152	4 598	74.9
Handbags	998	4 926	79.7
Other items	6 016	45 555	86.8
Live specimens	808	8 119	90.0

Source: Hykle (1988, pp. 167).

Imports and Exports of CITES-Regulated Plants

These shortcomings were not confined to shipments of animals and their by-products. WTMU records from 1982 to 1985 show that close to 1 million live cacti and 100 thousand orchids were exported to Canada, mostly from the United States. Yet almost none appeared in Canadian import statistics. There were also large inconsistencies on the export side. In 1984, for instance, we supposedly exported 42 thousand plants. In the very next year, exports jumped to 445 thousand. This seems unlikely.

Enforcement

Since Canada has not controlled legal shipments effectively, what then of its ability to intercept illegal goods?

Traffickers in illegal wildlife have two chief ways of evading detection: physical concealment (for example, in the most inaccessible parts of container shipments) and fraudulent documentation. Permits may be altered or forged, or the shipment may be smuggled into a country that is lax in its enforcement of CITES regulations, then re-exported. Bolivia, El Salvador, Indonesia, and Paraguay are just some of the countries that have "laundered" parrots in the past (Fitzgerald 1989, p. 162). Sophisticated methods are used by some illegal traffickers to avoid detection and specialized skills are needed to counteract illegal trade. Canadian Customs has not had the resources to tackle this problem.

Since customs is so ineffective, a second line of defence is clearly needed. The RCMP conducts most investigations into CITES-related violations and the Ontario Ministry of Natural Resources has also played a prominent role in some investigations into wildlife smuggling. The Canadian Wildlife Service provides technical advice to enforcement agencies when asked, but there is little liaison between the agencies. Sometimes, CITES is not even told about investigations. Moreover, the enforcement arm of the Canadian Management Authority has had almost no resources; in the fiscal year 1987/88, only 5 thousand CAD was

appropriated by the Canadian Wildlife Service to coordinate enforcement across the country.

Between 1975 and 1986, only about 140 shipments of wildlife were seized by the RCMP and Customs. Most cases consisted of fewer than five articles. The only significant seizures occurred in 1980 or earlier: 142 python skin purses (1980); 17 thousand watch straps (1980); 9 leopard skins and 67 ivory carvings (1978); and 7 ivory carvings (1977). There were just 20 seizures of live animals between 1975 and 1986 and, in most cases, only one or two animals were involved. It is important to remember that these figures are the product of over a decade of CITES enforcement.

No single agency holds records of CITES-related prosecutions that are complete and readily accessible. In most of the small number of cases where sentences or fines were imposed during the years covered by the study, the level of punishment was clearly not related to the seriousness of the crime, which was usually not considered from a conservation perspective. Some judges did not appear to be well briefed on the significance of CITES. In some cases, defendants were allowed to keep the specimens or the proceeds of their sale, in exchange for small fines. Canada thus did little to deter prospective criminals.

In the field of education, too, Canada has fallen short. Traditionally, CWS has relied on brochures, public service announcements on television and radio, and permanent exhibits. By the late 1980s, these materials had become obsolete and distribution unreliable. The preparation of literature for the commercial sector had been neglected altogether.

Conclusions

This discussion has barely touched on the many technical problems outlined in Hykle's thesis, which concludes with four pages of detailed recommendations. It has, however, given some idea of the extent to which Canada, a major importer of wildlife, has failed in its implementation of CITES. In the mid-1970s, Canada was regarded as an innovator in many areas of CITES implementa-

tion. Since then, however, the country's commitment has declined. Nevertheless, it is interesting to note that in 1986, only about 30 percent of CITES Parties complied "in full" with CITES' reporting requirements (WRI 1990a, pp. 304–305). Canada is listed as one of these countries. How well, then, do the other 70-odd nations obey the articles of the Convention?

Global cooperation is obviously essential to CITES' success. Since developing countries have such limited resources to devote to wildlife control, it is especially important that wealthy consumer nations make a special effort to comply with the articles of the treaty. Yet it has been said of CITES that inadequate funding and a lack of political will render it "a convention which is not enforced by many of its parties and is probably not enforceable" (De Klem 1982). Nevertheless, there have been some notable successes. It has, for instance, helped to reduce the threat that international trade once posed to large cats. The recent ban on the ivory trade has met stiff opposition from Hong Kong and several of the producer countries in southern Africa, but both poaching and the price of ivory appear to have plummeted since 1989 (Pagel and Mace 1991).

In Canada, too, there is hope. The Green Plan vows to improve our compliance with CITES. In late 1991, the Wild Animal and Plant Protection Act was tabled in the House of Commons. It seeks to improve our performance under CITES. Ottawa will provide 12.3 million CAD under the Green Plan to hire and train 29 officers to enforce the new rules. Prison terms of up to 5 years and large fines now await offenders. The bill is especially aimed at fighting poachers and smugglers of animal parts taken from Canadian wildlife (Bueckert 1991).

Migratory Birds to the Neotropics

Less than two centuries ago, most of North America was clothed in virgin forest. In the span of only 60 years, from 1860 to 1920, over 150 million hectares of American trees east of the Rockies were felled (Terborgh 1989, p. *xiv*). Today, only remnants of

original forest remain in the US and the situation is little better in most areas of Canada. The secondary growth and agricultural fields that have replaced it provide very different habitats for plant and animal alike. A changing landscape, however, has not been the only threat; many species were subjected to spectacular levels of hunting. The composition of our wildlife was permanently altered in the early years of settlement, as Farley Mowat has shown so graphically in *Sea of Slaughter* (1984).

In North America, forests are growing once again on abandoned farmland, but as smaller patches rather than as contiguous forest. To our south, however, massive deforestation is underway, at a pace reminiscent of 19th century America. In Central America and the West Indies, enormous areas have been cleared for cattle ranching, smallholder agriculture, and cash crops.

In the late 1970s, bird-watchers in North America began to notice that some groups of birds appeared to be declining — thrushes, warblers, and vireos, for example. These are all species that spend their winters in tropical forests. To many, there seems a clear-cut connection, but John Terborgh's book, *Where Have All the Birds Gone?* (1989), carefully analyzes the available evidence to show how difficult it is to draw such a conclusion — yet!

About 250 species of North American birds regularly migrate to the Neotropics. In their summering grounds, these birds make up more than 50 percent, and often 85 percent, of local populations, particularly in northern regions of Canada. For long it was thought that these birds were intruders in a tropical landscape already teeming with local species, competing "at the margins of a crowded environment" (Fitzpatrick 1982, p. 40). It is now realized, however, that migrants are fully integrated members of local communities in the South; indeed, most of them spend a longer time in the South than they do in the North. Birds are adapted to both temperate and tropical habitats, sometimes with completely different diets and behaviours in each home (Morton and Greenberg 1989, p. 179).

Distribution of Migrant Birds in the Neotropics

Just where do our land birds go each winter? Many species travel a short distance, spending the winter in warmer parts of North America and even in southern Canada. Of the species that do migrate into Latin America, however, there are distinct patterns. Near areas are favoured over far. The further south one goes, the smaller the numbers of migratory birds from the North (Table 11).

Most birds that breed in western North America do not go further than Mexico and Guatemala. The birds in these regions mostly come from habitats that are arid and similar to those of western Mexico. Eastern songbirds, on the other hand, come mostly from deciduous forests and they seek out forest environments in the South. These birds either fly over the Atlantic Ocean or the Gulf of Mexico, or along its coastline, reaching destinations from central Mexico on south, but concentrating in Panama and Colombia. The two groups meet in the south of Mexico, which is why that area has such a high diversity of migrant birds. Thus, deforestation in different parts of Latin America could be expected to affect the breeding populations in different parts of Canada.

Perhaps as many as half of all land birds that travel south of the US each year end up in Mexico and the northern Caribbean. Populations are thus forced into a much smaller area than in their

Table 11. Proportion of migrant birds in Latin America and the Caribbean, from North to South.

Latin America		Caribbean	
Region	Migrant birds	Region	Migrant birds
Mexico	>50%	Bahamas	50%
Costa Rica, Panama	20–40%	Hispaniola	20–40%
Colombia	5–15%	Puerto Rico	10–20%
Venezuelan forests	<1%	Trinidad and Tobago	<1%

Source: Terborgh (1980, p. 22).

breeding grounds. Terborgh (1980, p. 22) estimates that "clearing 1 hectare of forest in Mexico is equivalent to expanding urban sprawl by perhaps 5 to 8 hectares in the Northeast." Since it is the northeastern deciduous forests and the boreal forests that hold by far the largest numbers of migrants, deforestation in Central America assumes a very real significance for Canadian birds.

In the tropics, migrant birds are concentrated in distinct habitats. In western Mexico and the Antilles, migrants use a wide range of habitats that may be arid and have highly seasonal climates. Further south, the birds of eastern North America seek out moister, shadier types of vegetation. Here, altitude becomes more important; migrants favour midelevation regions. On the Pacific slopes of Central America, it has been the belt between 500 and 1 500 or 2 000 metres that has been most under attack from human exploitation. The Caribbean slopes and mid-elevations in Colombia and Ecuador are also being rapidly deforested. Just as these regions most suit people, they are the favoured habitats of our migrant songbirds. Those birds that cannot adapt are probably already in danger (Terborgh 1989, pp. 145–149).

Effects on Canadian Birds

Are declines in our migrant songbirds really the result of tropical deforestation? It is difficult indeed to establish cause and effect in an ecological problem such as this. Birds are suffering insults not only in the South but also in their breeding homes and at staging points along their migration routes. In North America, birds have been affected by a host of agricultural chemicals, by government policies that encourage farmers to fill in prairie potholes, by the use of mechanical harvesters that leave grain in the fields, by water pollution and soil erosion, by forestry practices that lead to monocultures, and by the destruction of wetlands. The fragmentation of our forests as a result of urbanization, road building, and agriculture is especially damaging to populations of migrant, forest-interior birds, precisely the

species that may also be expected to suffer from tropical habitat destruction. It makes them more susceptible to predators and to the parasitic brown-headed cowbird, which lays its eggs in the nests of about 200 North American species (Terborgh 1989, p. 53). Even backyard feeders, which distribute bird seed worth 500 million USD each year in the United States, have favoured predator species (Terborgh 1989, p. 66).

A major problem is an ignorance of the past. There are almost no reliable long-term studies of bird populations, especially of those in large, undisturbed, North American forested areas (Terborgh 1989, pp. 11–18). In the Neotropics, ornithology is in its infancy. Guidebooks are still appearing and it is, quite simply, very difficult to study birds in tropical forests.

Richard Hutto (1988) has critically assessed a number of studies. He concludes that "reported declines can be better explained by local events" in North America. Nevertheless, Robbins et al. (1989), in an analysis of breeding bird survey data collected east of the Mississippi and in eastern Canada in the years 1966–1978 and 1978–1987, found highly significant declines over the last decade in birds wintering in Mexican forests, declines that did not seem to be tied to habitat destruction in the North. This was not true of those species wintering in scrub: their populations have tended to increase, as one would expect with the fragmentation of intact forests into patches of secondary brush and forest. The case of Costa Rica is an excellent example.

Costa Rica, an island of peace and democracy, and a model in the way it has established national parks and reserves, is nevertheless suffering from high rates of deforestation. Satellite photos from the late 1980s reveal that only 5 percent of land outside nationally protected areas is still densely wooded (Sun 1988).

We asked the following question: which bird species found in Canada spend a significant part of the year in Costa Rican forests and are showing signs that deforestation and other habitat changes are affecting their numbers? Without knowing precisely

which populations of a North American bird travel to which country, such a question is plainly unanswerable. We have, however, drawn up a list, based on three sources, that may give some pointers. This is a purely speculative exercise.

Candidates for such a list should spend their time preferentially in forest, either primary or secondary. Most of these birds live over a wide range of altitudes in Costa Rica, usually up to 1 500 to 2 000 metres or more, thus encompassing much of the country. Our major sources are *Birds of Canada* (Godfrey 1986) and *A Guide to the Birds of Costa Rica* (Stiles and Skutch 1989), which give detailed descriptions of the habitats preferred by each species. Robbins et al. (1989) provided a guide to those birds that are actually declining in North America and prefer forest in their homes in Mexico.

Highly significant declines are apparent for the wood thrush, chestnut-sided warbler, black-throated green warbler, and the Canada warbler (during migration). Significant declines are apparent for the Tennessee warbler and the ovenbird. And the yellow-throated vireo, Swainson's thrush (during migration), and the golden-winged warbler have shown nonsignificant declines.

Plainly, we need to know a great deal more about the behaviour and adaptability of our migrant birds, both in the tropics and in the North. We do not know what will happen to these birds, but with little hope for Central American forests beyond the end of this century, we should expect great changes. The extreme devastation being wrought in countries like El Salvador (which we discuss in the next chapter) and even in Costa Rica, with its conservation policies, may be far worse than anything that has occurred in North America. For Canada, decreases in songbirds are potentially serious. This is not merely an aesthetic problem, but an economic one. Most of our migrant songbirds are insectivorous and help to protect our fields and forests from pests. Canada thus has a considerable stake in ensuring their survival (Morton and Greenberg 1989, p. 182).

Global Agreements on the Protection of Migrant Species

Migration is a remarkable adaptation. It allows a species to exploit resources in places that are unsuitable for much of the year. The success of the system, however, depends on the well-being of a linked chain of areas, some of which may be very small indeed. Birds, in particular, are vulnerable at many points of their life cycle to habitat destruction, pollution, and hunting. This chapter has dealt with forest-dwellers, but the situation of shorebirds paints an even clearer picture of the problem.

Shorebirds often congregate in enormous masses at single feeding sites en route to their destinations. More than 80 percent of the breeding population of a species may be supported by one area (Myers et al. 1987, p. 20). The Copper River Delta in Alaska, the largest staging area in the Western Hemisphere, is visited by up to 20 million birds each spring. Several other North American wetland sites are host to over a million birds during a few short weeks each year. These sites are absolutely critical to the survival of some species; yet, from the Arctic to the tip of South America, wetlands are being severely eroded by development pressures. Mangroves are particularly endangered; in northern South America, aquaculture has almost eliminated all of them. Studies sponsored by the International Shorebird Survey and the United States Fish and Wildlife Service suggest that, over a 15-year period, several shorebird species suffered major declines exceeding 70 percent (Myers et al. 1987, p. 23).

This fragile dependence on a chain of sites shows why cooperation between countries is so essential. It also suggests why conservation of migratory species is such a difficult international problem.

The Bonn Convention — There are many treaties concerning migratory species, but only one of global dimensions: the Convention on Conservation of Migratory Species of Wild Animals, which was concluded in Bonn in 1979 and came into force in

1983. Countries have been slow to join the Bonn Convention. By 1990, 31 nations, mostly in Europe and Africa, had ratified the Convention and another 11 were awaiting ratification (CWS 1990). In the Americas, only Chile, Panama, Paraguay, and Suriname are contracting parties; Jamaica has signed. (Merely signing such a treaty does not impose any obligations on a country. To become a full member, or "contracting party," the signature must be ratified by the government of the country.)

The major reason that so many countries have refused to join is the exceptionally broad and therefore potentially powerful language of the Convention. There are strict provisions for the conservation of endangered species. The rules that cover hunting are much more stringent than the laws of most nations. In addition, there are wide-ranging implications for national land-use policies in the articles of the Convention that deal with habitat protection (Lyster 1985, p. 287). Species are offered protection from a wide range of harmful factors, "which potentially cover(s) every possible threat" (Lyster 1985, p. 284). Signatories to the Bonn Convention thus open themselves to the possibility of censure over their actions. This is unusual for such a body, and "illustrates, at least theoretically, an interesting willingness by the Parties to accept an unusual degree of outside interference in their domestic activities in order to promote the conservation of an endangered species" (Lyster 1985, p. 288).

The Bonn Convention has the potential to help many migratory species, but only if a large number of countries agree to its provisions. Besides the problems just mentioned, major sticking points include the costs of enforcement, the level of technical expertise needed, and the difficulties that states have encountered in other agreements such as the Ramsar Convention (Lyster 1985, p. 297). Canada is hardly alone in its reluctance to become a party to this treaty. Nevertheless, nonmembers such as Canada are able to join members in protecting certain groups or species. Such an agreement is being developed for western palaearctic waterfowl (CWS 1990).

The Ramsar Convention — The problem of wetland destruction has been recognized in another treaty that is partly concerned with migratory species. The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (1971), known as the Ramsar Convention, came into force at the end of 1975. By the end of 1990, there were 61 Parties, including Canada, Mexico, and the United States. Latin American countries apart from Mexico have been slow to join. By 1990, only seven nations from the region had become members, three of them in that year. Panama is the only Central American member to date (WRI 1990a, p. 300; IUCN 1991).

Ramsar is the only global nature conservation agreement that is concerned with a particular type of habitat. The definition of wetland is broad and includes ecosystems as diverse as tundra and coral reef. Members undertake to use their wetland resources wisely and to designate at least one reserve of international importance. By June 1991, 525 sites, comprising more than 31 million hectares, had been designated around the world. *More than 40 percent of this area is in Canada* (WRI 1990a, p. 300). In Europe, the Ramsar Convention has been reasonably effective. Its success in the Americas, however, has been limited by the small number of member countries. A global Wetland Conservation Fund was set up recently to assist developing countries protect and use their wetlands wisely (IUCN 1990).

Canada is involved in other conservation initiatives that attempt to overcome some of the shortcomings of formal international agreements by working at a more local level (Myers et al. 1987). One fledgling effort is the Western Hemisphere Shorebird Reserve Network (WHSRN), launched in 1985, which "unites wildlife agencies, private conservation groups and other organizations in an innovative, international effort to solve conservation challenges faced by migratory shorebirds and their habitats" (WHSRN pamphlet).

Members of WHSRN are establishing a network of sites of critical importance to shorebirds. The Canadian Wildlife Service, for instance, is cooperating with Suriname to protect coastal

lagoons in that country, where birds are endangered by pesticide runoff from extensive rice-growing projects. One link of these wetlands to Canada is the semipalmated sandpiper; about 80 percent of its population overwinters along the Suriname coast. The Minas Basin in Nova Scotia is a staging area for more than a million of this species and a reserve has been established along its shores (Myers et al. 1987; WHSRN 1988).

Canada and the US are also cooperating in the North American Waterfowl Management Plan, which aims to conserve ducks, geese, and swans. Several million hectares of wetland, most of it in Canada, will be protected under this 15-year plan. Efforts such as this can be beneficial and are most likely to work precisely for those species that travel through narrow bottlenecks, with clearly identifiable critical sites. For songbirds, which migrate across a much broader front and winter in dispersed areas, it will be much more difficult to establish and protect a sufficient number of reserves.

The World Heritage Convention — The Convention Concerning the Protection of the World Cultural and Natural Heritage (1972), which is administered by Unesco, is the last of the "big four" conservation agreements. It came into effect in December 1975 and, by early 1992, there were 122 signatories, more than any other conservation convention. Its aims are to protect natural and cultural sites of global significance. Among the sites designated so far are several of the world's most biologically diverse areas, including Panama's La Amistad International Park and Canada's Rocky Mountain Parks. The World Heritage Fund disperses about 2 million USD each year to assist nations in their obligations under the treaty. The combination of both natural and cultural sites under one umbrella, however, is often said to weaken its focus (McNeely et al. 1990, p. 138).

Conclusions

Even before the Earth Summit in Rio, then, the beginnings of a system of international instruments aimed at protecting biodiversity had been set in place. In addition, the world community — with the notable exception of the United States — has heartily endorsed the 1982 United Nations World Charter for Nature, a nonbinding statement of principles that is "an important symbolic expression of an intent among nations to achieve a more harmonious and sustainable relationship...between mankind and the earth" (Caldwell 1990, p. 92).

Canada has been an important player in most of these developments. Within our own borders, the government now acknowledges the need to improve our performance. In 1990, for instance, Canada adopted a National Wildlife Policy. A main aim is to strengthen the enforcement of the Migratory Birds Convention Act. In 1991, the government introduced the Wild Animal and Plant Protection Act, which seeks to improve Canada's performance as a member of CITES, in part by improving enforcement mechanisms and stiffening penalties (Canada 1990a, pp. 86–87).

But, as this chapter has shown, there are problems. Even in an ideal world, the international agreements discussed above could protect but a tiny fraction of the world's endangered species and habitats. This is not, however, an ideal world. Many nations have refused to join existing treaties, many have signed but have done little to honour their obligations, and most lack the resources and political will to do a really effective job of enforcement. There have been notable victories; but, if anything, the destruction of biodiversity has accelerated during the years since these treaties were first proposed. Where do the problems lie?

First are the weaknesses inherent in all international agreements and initiatives (McCormick 1989, p. 176). Although supposedly binding, international law cannot easily be enforced. Frequently, negotiation and moral suasion are the only tools that will induce states to change their behaviour. With growing

understanding of the interlinked nature of the world's problems, too, has come an increase in the complexity and imprecision of international treaties. Success in persuading many countries to sign an agreement usually means that its provisions have been diluted or are worded ambiguously. Such ambiguity often means that "every state can interpret [treaties] differently, producing different national legislation and different results" (McCormick 1989, p. 177). All these weaknesses, and more, are reflected in conservation agreements.

Experience has shown that treaties are more likely to be effective if they have a strong institutional structure at both national and international levels, regular meetings, an obligation to submit reports, and plenty of publicity. CITES does all of these things, at least in theory; but we have seen the problems that exist, even in Canada. Obviously, there is a need for aggressive enforcement, with teeth, if treaties are ever to work. This can only be done where the political will exists.

A second problem is the woefully inadequate level of knowledge about biodiversity, especially in tropical forests. Far too little has been invested in basic research and far too few people have the training necessary to carry out this research. A start has been made with the establishment of conservation data centres in several developing countries, especially in Latin America. The Nature Conservancy has long been a leader in this field. Other NGOs involved include IUCN, WWF, and Conservation International.

At the international level, the World Conservation Monitoring Centre "acts as the primary clearing house for data on species and ecosystems" (McNeely et al. 1990, p. 77). It holds, for instance, over 9 million records of trade transactions for CITES-listed species. The usefulness of such centres, however, depends on the reliability of the information received. This chapter has shown how very little relationship Canada's annual CITES reports have with reality. Without accurate data, it is impossible to judge the success or failure of conservation treaties, or to track the decline of diversity in a country.

A third problem is the lack of attention given to habitats in some of the global conservation treaties. Without large areas of protected wilderness, the future of wildlife is uncertain at best. Halting progress has been made in the protection of wetlands, especially in North America, but most countries are experiencing dramatic habitat destruction. Although almost every country has set up national parks and reserves that restrict human activity to some degree, these areas are frequently seen by local people as "repositories of richness...and potential income...set in a gulf of poverty" (WRI 1988, p. 100). Widespread plundering of resources has been the inevitable result.

Canada's spaces, too, are endangered. Our national parks system is far from complete. Existing parks are threatened by a host of pressures such as tourism and poaching, yet there is a dearth of money and personnel (McNamee 1989, p. 77). The signals are ominous. In all but the largest North American parks, mammal populations are declining or disappearing (McNamee 1989, p. 69). Acid rain and pollution are taking their toll, from Quebec's Forillon National Park to Canada's most northerly protected area on Ellesmere Island. Mineral extraction and logging despoil several provincial parks. Outside the parks system, valuable ecosystems are being eroded even more rapidly.

Canada's Green Plan recognizes these threats to Canada's biodiversity. It promises to complete the terrestrial national parks system by the year 2000 and states a long-term goal of setting aside 12 percent of the country as protected areas. Canada has a unique opportunity to protect its last surviving wilderness, but only if it acts quickly. Pressures on remaining wilderness areas are mounting. Hydroelectric development, forestry, mining, and native land claims are all competing for the land, much of which is in the north. Indeed, "behind every square kilometre sits a lawyer and a plan" (Eidsvik 1989, p. 44). In 1988, the federal government strengthened the National Parks Act, placing limits on development and raising the maximum fines for poaching to 150 thousand CAD (McNamee 1989, p. 80).

Protected areas by themselves, however, do little to conserve diversity. More effective management of all resources is essential if societies are to conserve species and habitats and, at the same time, derive a sustainable stream of benefits, which can be used locally or traded to other regions. This was stated forcefully by the 1980 World Conservation Strategy (IUCN 1980), which argued that there could be little long-term development without the conservation of resources. Since 1980, more than 45 countries have used the precepts of the strategy to prepare national conservation strategies, which are extremely broad environmental management plans.

A new World Conservation Strategy, titled *Caring for the Earth*, was released with much fanfare in October 1991 (IUCN et al. 1991). *Caring for the Earth* provides concrete targets and goals, and is intended to be a practical guide to the policies and actions needed for sustainable development. It moves far beyond the original document, since it restates "simply and succinctly the principles defined in the World Conservation Strategy, but [goes] on to relate them to factors such as ethics, economics, population, use of traditional knowledge and other topics that have become prominent over the past decade" (IUCN 1989).

The road ahead will not be easy. The conservation of biodiversity impinges on a wide variety of human activities and economic interests. At the national level, the obstacles to progress often appear overwhelming, and huge gaps remain in the international treaty system. It was probably a vain hope to wish that the missing pieces would be filled in when the Biodiversity Convention was signed in Rio. Inevitably, the same North–South confrontation was played out during negotiations. Worse, the United States, alone among over 150 nations, refused to sign the final document, in part because of what it saw as threats to its fledgling biotechnology industry. Yet, although no clear targets or dates were set, the treaty will hopefully encourage developing countries to preserve threatened ecosystems and species in return for funding from the North. Canada, the first to announce that it would sign the treaty, has set the ball rolling by offering to wipe

out all debt owed this country by 10 Latin American countries (145 million CAD) in an ambitious and innovative "debt-for-sustainable development swap."

Epilogue

Over the last three chapters, we have looked in turn at a number of institutions, organizations, and treaties that deal, either directly or indirectly, with various aspects of the world's forests. Yet, despite the enormous interest in forest-related issues at the international level during the last few years, these initiatives form a ragged and inefficient patchwork. This must surely change.

The idea of a convention on forests, proposed in June 1990 by the Independent Review Committee of TFAP, was supported in the Houston Declaration of the G-7 leaders and in other high-level political fora during 1990. At the first Preparatory Committee (PrepCom) Meeting of the Earth Summit in August of that year, Japan proposed an international charter. Forests became, somewhat belatedly, a major focus of the Earth Summit process, even as forest issues were being hotly debated by the international committees developing conventions on climate change and biodiversity. Ultimately, of course, these three initiatives must reach a common conclusion; the same trees, after all, can and do serve a wide range of functions (Maini 1991a, pp. 9–10).

The complexity of the issues and their intricate interweaving with the economic and social health of nations were, however, major stumbling blocks to the negotiations. From the first PrepCom Meeting to the final hours at Rio, discussions were

decidedly polemical. The G-77, led by a passionately vociferous Malaysia, was concerned over possible boycotts of tropical timber and adamant about its sovereign right to develop its resources. The original hope that a convention would be ready for signing in Rio was soon abandoned. In the end, only a watered-down, nonbinding statement of forest principles was possible. Agreement could not even be reached on the need to proceed toward a convention; indeed, few topics at the Earth Summit were more contentious.

Nevertheless, the unprecedented range of negotiations taking place in the early 1990s is helping to create for the global community a profoundly different approach to the Earth, which may eventually have major impacts on resource use in North and South alike. As steward of 10 percent of the world's forests and the largest trader in wood products, Canada has been an active leader and shaper of deliberations over the fate of the world's forests. Forestry Canada has worked hard to "situate Canada in an influential position" and advocates what it calls "a balanced consideration of economic and environmental dimensions" (Maini 1991b). A major reason for assuming such a high-profile role is the desire of this country's massive industry to have clearly defined international forestry standards to follow, so that it can shake its image as the "Amazon of the North."

For many years, the aim of forestry in Canada has been to achieve a "sustained yield" from our forests. This policy has many flaws, since it views trees almost exclusively as sources of fibre to be harvested. In 1992, however, there is a glimmer of hope. Industry has begun to wake up to the problems in its midst, and federal and provincial forestry ministers have issued a comprehensive strategy that they hope will pave the way to sustainable development in our forests (National Forest Steering Committee 1992). Few issues are as urgent if we wish to protect the economic and ecological well-being of this country.

PART IV

THE HUMAN FACE OF ENVIRONMENTAL DEGRADATION

Overview

Much of this book has dealt with global problems, trade flows, the effects of government policies, and international agreements. Yet the results of environmental degradation are experienced most keenly at the local level and especially by the world's poor. In this section, we turn to the human dimension of global change. We look at two classes of people afflicted by the crisis in the South: environmental refugees and indigenous peoples. Their sad plight is both a symptom and a symbol of the state of humanity's relationship with planet Earth.

For millions around the world, the cycle of poverty and degradation has reached the point of no return; flight is their only option. People are forced to leave their homelands when traditional strategies for coping with local environments no longer provide a living. In some cases, drought or some other natural disaster serves as the trigger. In others, conflict and war are part of the picture, blurring the underlying causes of destitution. Refugees pose grave problems for the global community.

In many regions, indigenous peoples are the most affected. Living in fragile ecosystems vital to the planet's health, they have evolved sophisticated and durable systems of resource management. Spirituality, sustainability, and an intricate understanding of the workings of nature are cornerstones of their diverse ways

of life. Today, however, most have been dispossessed by a host of development pressures and many are refugees in their own lands.

Stripped of their culture, marginalized for the most part in society, these people have endured great suffering. Yet indigenous peoples are mobilizing to fight for their right to self-determination, for control over their lands and resources, and for preservation of the environment. The growing network of indigenous organizations, often allied with environmental, church, and human-rights groups, is becoming a powerful voice on the world scene. It is a voice that is challenging destructive models of development, fighting for human rights, and leading the way to more sustainable paths of development.

Nowhere is it easier to draw parallels between Canada and the South than in the material conditions under which many of this country's aboriginal peoples live. Yet Canada today is a democratic nation, with an admirable human-rights record, unlike all too many countries in the South. It is not surprising then that Canada's native peoples are at the forefront of this struggle, both at the international level and in the rapidly accelerating race for land claims, self-government, and recognition in the Constitution. As they gain increasing control over large areas of Canada, there are sure to be changes in the way in which this country's resources are developed, perhaps even changes in the very governance of the country. In the meantime, uncertainty pervades most of Canada's resource industries.

This year, 1992, marks the 500th anniversary of the "discovery" of America. There have been extravagant festivities in Latin America and Spain. Indigenous peoples, however, equate the date with conquest, exploitation, and genocide. To them, 1992 is a symbol of oppression, a time to reconsider the history of Western civilization, the role of natives in society, and the critical lessons humanity can learn from the insights of aboriginal culture.

Chapter 8

Environmental Refugees

The growing number of refugees today is already a rough indicator of the severity of global environmental decline. This yardstick may be imprecise but its message could not be clearer.

Jacobson 1988 (pp. 38–39)

From the earliest days of human history, people have fled disaster and turmoil, abandoned degraded lands, or simply migrated in search of a better life. In recent years, however, there has been a dramatic escalation in the numbers involved. Mass population movements and refugee emergencies of unprecedented magnitude and complexity have become a hallmark of the late 20th century, reflecting not only regional conflict but also growing economic disparities and the declining state of the world's environment. From Chernobyl to Kuwait, from the African Sahel to Afghanistan, millions of people have been displaced by war and disaster, often with little hope that they will ever return home. Huge flows of people also crisscross the world in search of employment or a more secure existence. In the 1990s, most come from the troubled nations of the South. Increasingly, they are placing pressure on the North. We must expect this pressure to grow.

The definition of the word "refugee" is constantly evolving. The United Nations 1951 Convention Relating to the Status of Refugees, amended in the Protocol of 1967, defines refugees as people who are outside their country of origin because of a

well-founded fear of being persecuted "for reasons of race, religion, nationality, membership of a particular group or political opinion." The original narrow definition of "convention refugees," and the structures set up to deal with them, reflected conditions in Europe following World War II. The rise of conflict and civil-rights abuses in Africa and other less-developed regions, however, eventually led to the extension of the definition to include whole groups fleeing from dangerous circumstances such as war and civil disorder — that is, to people who can no longer depend on the protection that a state normally affords its citizens.

For the refugee seeking a haven, definition is all important and geopolitical considerations often determine the outcome of individual cases. Each country has its own interpretation of eligibility that reflects its interests. In 1988, for instance, American immigration authorities granted refugee status to only 3 percent of Salvadoran and 4 percent of Sri Lankan applicants, while 84 percent of Soviet and 53 percent of Nicaraguan cases were given asylum (Helton 1989, p. 26).

The causes of today's massive flows, however, lie as much in a host of intertwined political, social, economic, and environmental factors as they do in conflict and human-rights abuse. Many are forced to move because of acute poverty and deprivation. For these "economic refugees," there is often no welcoming asylum, no acceptance of the risks to their survival, unless they can prove persecution. In this chapter, we discuss a rapidly growing class of these displaced persons: "environmental" or "ecological" refugees. We look at the increasing incidence of disaster in the South, and give a brief historical overview of environmental decline in two ravaged nations — Ethiopia and El Salvador — to illustrate the complexity of the crises that spawn refugees. Finally, we discuss some implications for Canada of these disturbing trends.

A Global Crisis

The number of refugees as defined by the United Nations High Commissioner for Refugees (UNHCR) has climbed rapidly over the last two decades, from less than 2.5 million in 1970, to 8.2 million in 1980, to more than 15 million by the end of 1990 (*Refugees* 1990a; Perez de Cuèllar 1991). By late 1991, the number stood at 17 million (*Refugees* 1991a). In addition, more than 2 million Palestinians are being helped by the UN Relief and Works Agency for Palestine and Refugees in the Near East (UNRWA). Each year brings massive new flows and more human misery. In 1990, for example, roughly two-thirds of the population of Liberia fled their homes to escape massacre and starvation (*Refugees* 1990b). In the Horn of Africa, hundreds of thousands of refugees stream back and forth across borders in response to conflict, drought, and famine.

Official numbers do not, however, accurately reflect the huge populations that have been displaced around the world, mostly in developing countries. If we include those people who are living in refugee-like circumstances, both within the borders of their home countries and without, the total could rise to 35 million, although this can be little more than a guess (Brown 1991, p. 21). For countless others, flight is necessary simply because it is no longer possible to satisfy basic human needs. Often this occurs as a result of natural disaster or land degradation.

In Canada, we are familiar with the "dust bowl" of the 1930s, when many families were forced to leave their prairie farms. These Canadians were just as much environmental refugees as the people of the Sahel. Essam El-Hinnawi (1985, p. 4) provides a succinct definition:

> [Environmental refugees are] people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life.

Hidden in this straightforward statement is one phrase that will be the focus of our discussion: "triggered by people." It is a phrase that conceals great complexity, but is the key to the phenomenon.

The genesis of an environmental refugee is far from simple. The chain of events may start with any number of social, political, or economic factors (Fig. 4). These lead to physical changes in ecosystems so that their productivity and resilience are reduced. The changes may be widespread and obvious, as in the devastated hillsides of Haiti; may reveal themselves only slowly, as in the salinization of irrigated lands; or may be more or less hidden until a major force of nature, a disaster, acts as the "trigger" event that causes enormous dislocation. The severe rainstorm that in the past only created minor damage now causes catastrophic flooding and landslides; drought quickly leads to famine; quite mild earthquakes cause massive structural damage.

The Impact of Disaster

Our perception of disaster depends on its effects on people and property. An earthquake in a remote part of Alaska is far less significant to us than one in the middle of Mexico City. Anders Wijkman and Lloyd Timberlake, in their book, *Natural Disasters: Acts of God or Acts of Man?* (1984), develop the thesis that many "natural" disasters are far from natural. In recent decades, the severity and frequency of recorded disasters have increased, and the number of people killed has risen strikingly: fatalities were six times higher in the 1970s, for instance, than they were in the 1960s (Wijkman and Timberlake 1984, p. 23). Furthermore, disasters are increasingly transnational in scope, whether they be accidental (Chernobyl and various oil spills) or triggered by natural factors. The persistence of drought and famine across sub-Saharan Africa is the most dramatic example of such large-scale calamity. This trend has continued. The early months of 1991, for example, were witness to war and extreme human and

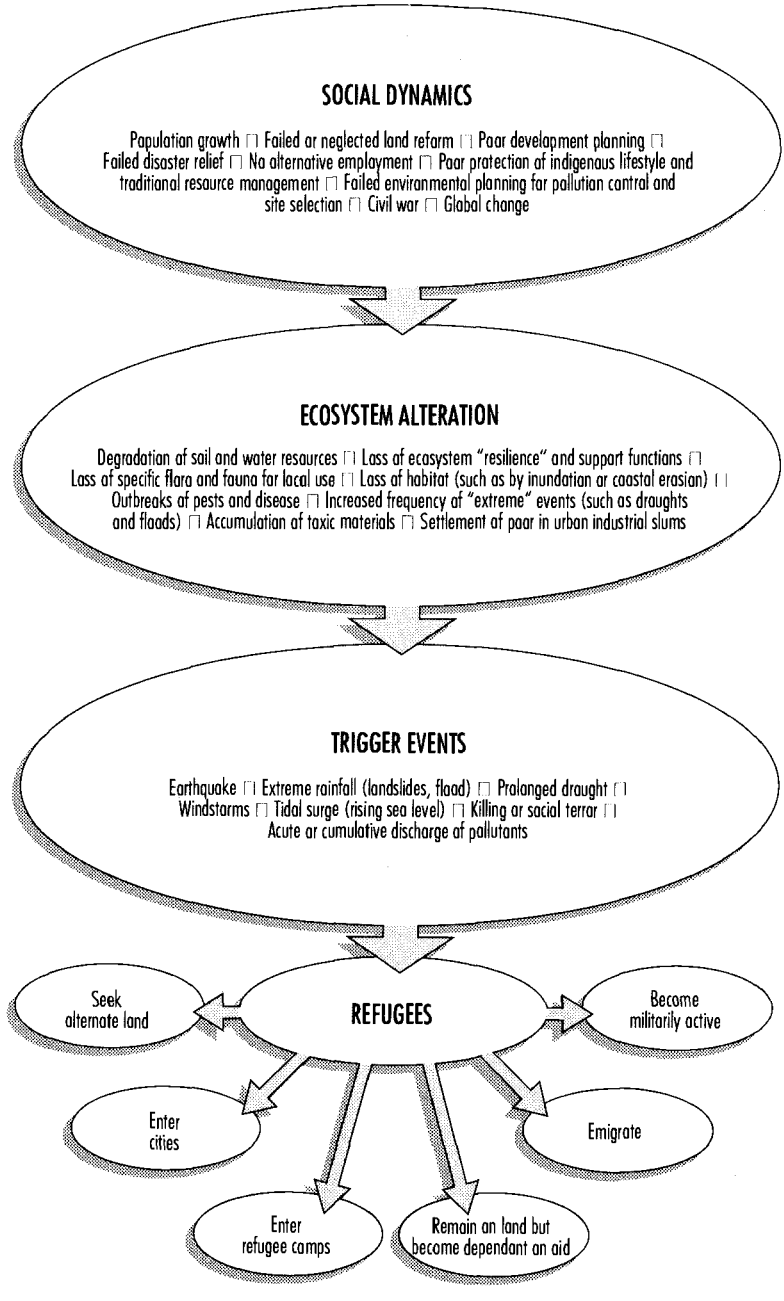

Fig. 4. Factors in the home country that create environmental refugees.

ecological devastation in the Gulf, the threat of famine for about 12 million people in the Horn of Africa, a cyclone in Bangladesh that claimed over 150 thousand lives, and volcanic eruptions in Japan and the Philippines.

The average loss of life in each disaster is dramatically higher in the South than it is in the North. This phenomenon is easy to explain. Poor countries cannot afford to protect their citizens in the way that the Netherlands can against storm surges or Tokyo has against earthquake. Indeed, as populations rise, marginalized people have no option but to live in areas prone to disaster: on islands in the Bay of Bengal, on steep hillsides around Latin American cities, in the shadow of volcanoes, on the floodplains of rivers. Their flimsy dwellings offer no protection and can be dangerous in themselves. Also, the number of victims is highest precisely in those countries where environmental degradation is proceeding at the fastest rates. Those who suffer are often the poorest and most vulnerable: women, children, the elderly, and minorities.

> Over the past 20 years, extreme natural events have been responsible for the death, injury, or loss of home for nearly one billion people, and they have caused unparalleled destruction in several developing countries. (Kreimer and Zador 1989, p. v)

The exact geographical distribution of disaster changes from year to year, but the pattern is clear. In a few areas, such as the Sahel, it is possible that feedback processes are indeed changing regional climate; but, in general, the forces of nature have not suddenly become more ferocious. As our case studies will show, poverty, population increase, and political factors are responsible for increasing vulnerability to hazard; land degradation and conflict are frequent companions, reinforcing each other over long periods of time.

Triggers to the Flow of Environmental Refugees

Drought

During the 1980s, there were severe droughts in Africa, China, North America and other areas, greatly reducing global grain stocks and raising prices after three decades of improvement (Brown and Young 1990, p. 9). There are several types of drought. For humanity, the most important is undoubtedly agricultural drought, when there is not enough moisture for crop growth. In many areas of the South, deforestation, erosion, and desertification are destroying the capacity of ecosystems to absorb and retain moisture, so that even small deviations from average rainfall can lead to catastrophic drought or flood. In areas such as Ethiopia, where degradation is far advanced, drought appears to have become endemic.

In the broad swathe of Africa known as the Sahel, long-term variations in climate were not understood. During the 1950s, rainfall was higher than average and agriculture was extended onto land used by pastoralists. They, in turn, increased their herds, often in response to well drilling by development agencies. The major drought of the early 1970s was followed by years of continued lower than average rainfall. "By early 1984, more than 150 million people in 24...African countries were on the brink of starvation" (Jacobson 1989, p. 62). In Ethiopia and the Sudan, the two largest countries involved, perhaps 12.5 million were affected, and many hundreds of thousands died (Timberlake 1985, pp. 18–19). The response to such disaster has been mass migration, often to cities. From the Sahel, many moved to West African coastal countries, particularly Côte d'Ivoire. The most seriously affected were the pastoral nomads, most of whose herds were slaughtered or died.

Other areas where drought has produced famine and flows of refugees are northeastern Brazil, northern China, and India. Famine, however, claims no victims in industrialized countries.

We in Canada are protected by soil and water conservation schemes, by welfare, and by the safety net of insurance and credit, although soil erosion may be costing this country as much as 1 billion CAD each year in reduced yields (Jacobson 1988, p. 9). As Timberlake (1985, p. 23) has pointed out:

> For famine to follow drought, two pre-conditions are required: a vulnerable agricultural system and misplaced political priorities.

Food production and distribution systems can easily be disrupted in conditions of political instability, conflict, and poorly integrated economies. Rising prices, and not a complete absence of food, are often the precursors (Sen 1981). Farmers are forced to sell livestock to buy grain, and the prices of their animals drop precipitously. Rural households must eat all their stocks of grain. Finally, such people move to other regions, having a ripple effect on prices as they move. Inadequate warning systems, food reserves, and response strategies complete the march to disaster.

Flood and Storm

The increased frequency and severity of floods in recent years are also directly linked to land degradation. Water runs off degraded land far more rapidly, carrying silt that, in turn, clogs river channels. Torrential rain associated with tropical storms causes havoc on hillsides denuded by deforestation. Wholesale destruction of coastal forests, mangroves, coral reefs, and dunes in recent years has increased the likelihood that storm surges will wreak appalling damage on coastal communities. In addition, fertile floodplains and deltas continue to attract people in many crowded countries. Even small rises in sea level associated with global warming will affect many millions of people in such areas.

Industrial Accidents

In developing countries, the victims of industrial accidents are often squatters who live in sight of the source, often refugees fleeing from other problems. This type of accident is likely to

increase. Nuclear power is produced in several developing countries, and sabotage is always a possibility. The rare catastrophic incident is not, however, the major problem. Many more people are forced to move by such processes as oil contamination of coastal fisheries or chronic pollution of agricultural lands.

Development Projects

Many tens of thousands have been permanently displaced as a result of projects such as state farms, cash-crop plantations, and dam construction. Examples include the Aswan Dam (120 thousand displaced in Egypt and the Sudan), the Volta (80 to 84 thousand in Ghana), and the Kariba (50 to 57 thousand in Zambia and Zimbabwe) (El-Hinnawi 1985, p. 33).

Conflict and War

Conflict and persecution have traditionally been the major catalysts causing people to flee. But war itself creates many environmental refugees. Large areas of Vietnam were rendered uninhabitable because of bomb craters and herbicide treatment, which "completely destroyed 1,500 square kilometres of mangrove forest and caused some damage to another 15,000 square kilometres" (El-Hinnawi 1985, pp. 38–39). About 17 million people were displaced during the war, most of them from rural areas. The remnants of war, such as unexploded bombs and land mines, can also discourage resettlement. Afghanistan and Kuwait are two dramatic examples.

However horrifying the numbers of victims, most of the people affected by short-term trigger events such as flood and earthquake are not permanently dislocated, although their position remains precarious. But many of the victims of longer term disasters such as drought can never return to their homes. Land degradation, in one guise or another, is now the largest cause of flight, and will remain so unless rising sea levels from global warming cause greater disruptions. Environmental refugees are

now "the single largest class of displaced persons in the world," and the permanently displaced form the largest number of these (Jacobson 1989, p. 75).

El Salvador and Ethiopia are two countries that have suffered from exceptionally high levels of both environmental degradation and civil strife in recent years. In addition, Ethiopia has endured terrible levels of drought and famine. Millions of refugees have fled their homes, finding refuge either in their own country or across borders. In both cases, a heavy load has been placed on the shoulders of host countries and international relief organizations. These case studies will not deal with the specifics of internal conflict or of international action, but rather will give background information on the social and historical dynamics that have fostered disaster in these countries.

Case Study: El Salvador

Central America is one of the most geologically active regions on Earth. Its rugged mountain landscapes are the scene of many volcanic eruptions and earthquakes. Mirroring this physical instability, political and social upheaval have marked the history of the isthmus, an area of great cultural, biological, climatic, and physical diversity.

El Salvador is a small country on the Pacific coast, with an area of about 21 thousand square kilometres and a population of over 5.5 million. About 95 percent of the land is hilly or mountainous, with many valleys blessed with fertile, volcanic soil (Leonard 1987, p. 4). There is a coastal plain, wider in the east; but, in places, the mountains plummet almost to the coast. Climate depends to a great extent on elevation, with two distinct seasons: April to October is hot and wet; the rest of the year is cooler and dry. During this latter period, there can be drought and severe dust storms.

El Salvador's hillside zones have a far higher percentage of good, deep soils than do those of any other country in the

region: 76 percent, compared with Costa Rica's 50 percent and Nicaragua's 20 percent (Leonard 1987, p. 16). This helps to explain the great differences in population density in the countries of Central America. El Salvador has an astonishing 246 persons per square kilometre, or 703 per square kilometre of cultivated land (1986 figures — Leonard 1987, p. 198). These figures are far higher than those of other countries in the region, although they are still well below population densities found in parts of Asia. "This competition for a limited land base...remains central to the historical development of the nation's society and economy" (Browning 1987, p. 353).

Even before the Spanish conquest of 1524, intensive agricultural systems had supported fairly high population densities. By the middle of the 19th century, visitors to the country could still be impressed by "the generosity of nature ...and the abundance of food" (Burns 1984, p. 294). Indians, living in traditional communities, still owned enough communal land for their subsistence activities, although they were increasingly drawn into the production of export commodities, particularly indigo. The large haciendas slowly encroached on Indian lands and the small elite exploited Indian labour; but political instability, frequent wars, and a lack of capital prevented the absolute domination of the haciendas (Burns 1984, p. 297).

Between roughly 1860 and 1890, however, El Salvador was rapidly transformed. The elite, newly obsessed with European doctrines of liberalism and modernization, discovered coffee as an export commodity when the indigo market collapsed. Government policies favoured the spread of large estates. In 1881 and 1882, all remaining communal forms of landholding were abolished in the name of progress. This had the effect of further concentrating wealth in the hands of a small group of coffee planters and processors — the vast majority of the population was driven from its lands to become an impoverished, powerless underclass, dependent on seasonal work on the plantations (Burns 1984, pp. 299–300). As coffee came to dominate the economy, international capital was attracted to the country; a

period of prosperity, relative political stability, and rapid modernization ensued. As the 20th century progressed, so did American involvement in the country, although it was largely national capital and expertise that fueled the changes (Browning 1987, p. 353).

The international depression of 1929 exposed the weaknesses of an economy dependent on one crop, which contributed 80 percent of the national income and 90 percent of its exports. In the financial crisis that followed, land was concentrated into an even smaller number of hands and production was increased, leading to a spiral of rural unemployment and declining food production (Burns 1984, p. 308). Political stability had been achieved until this time through an accommodation between a pampered military and the wealthy elite, and rural revolt had been contained. This no longer proved possible, and a military coup in 1931, followed by a peasant uprising that was most brutally suppressed, set the stage for the ongoing domination of the Salvadoran political scene by the military.

After 1945, export-led agricultural growth was resumed, again benefiting the minority (Browning 1987, p. 353). Coffee maintained its leading position, but the arrival of the insecticide DDT allowed a cotton boom in the late 1940s and 1950s, taking tens of thousands of hectares out of food production. Cotton, however, has many problems as a crop, and production declined, with about half the land reverting to maize (Anderson 1981, p. 31). Sugar and a range of minor products are also grown, and cattle are far more integrated into the subsistence sector in El Salvador than in most other Central American countries, where ranching is more common (Leonard 1987, p. 92). In general, however, agriculture stagnated in the 1960s.

Whereas El Salvador's tiny elite has enjoyed a comfortable lifestyle, an accelerating rate of population increase has exacerbated the plight of the poor. In 1821, there were perhaps 250 thousand people in the country. By 1920, the number had risen to 1.3 million (Burns 1984, p. 296). The eradication of malaria and yellow fever helped push the population to 2.5 million by

1961, and FAO has predicted that there could be as many as 8.7 million people in El Salvador by the year 2000 (Foy and Daly 1989, p. 13).

The absolute numbers are perhaps not as important as the extremely inequitable distribution of land and the emphasis on export crops. One-fifth of the land was owned by just 145 estates in the early 1960s, and the concentration was increasing. Just over half of all farms were of less than 1 hectare and, by 1979, 80 percent of rural households had little or no land (Anderson 1981, p. 133; Foy and Daly 1989, p. 15). The most fertile areas — river valleys, middle volcanic slopes, and parts of the coastal plain — were occupied by the large estates, which concentrate on export crops (Eckholm 1976, p. 168). The large class of landless peasants has been forced up the hillsides and mountains in a desperate attempt to produce food. By 1980, half of the country's farmers were farming steep slopes (IUCN 1986). In addition, wood and charcoal have long been the major source of fuel. The resulting deforestation and soil erosion is El Salvador's major environmental problem. As a result, agricultural productivity has steadily declined, while food imports have risen (Myers 1989, p. 33).

Forests once covered more than 90 percent of El Salvador, but now "forests are mostly a memory,...leaving only a single 20-square-kilometer plot of cloud forest relatively undisturbed" (Leonard 1990, p. 43). The nation must now import most of its wood. Four-fifths of the land suffers from erosion and, in the northern nonvolcanic region, bedrock is exposed in many areas. As early as 1972, a USAID report estimated that 45 percent of the land was "seriously eroded or degraded" (Leonard 1987, p. 128).

Silt washed from the slopes of Central America is seriously disturbing almost every watershed in the region. The generating capacity of several of El Salvador's hydroelectric plants has been reduced and maintenance costs have risen. Furthermore, El Salvador has little control over the watersheds of most of its rivers: they are in other countries where degradation is also a problem.

The region's coastal resources are also threatened. Fisheries are being overexploited, and valuable habitats such as mangroves, marshes, and estuaries are being degraded. In El Salvador, mangroves are harvested for fuelwood and for the charcoal and tanning industries. Agricultural runoff is also a problem.

The levels of pesticide use and abuse in El Salvador are higher than in any other Central American country (Foy and Daly 1989, p. 13). In one recent year, the nation used "at least 20 percent of the world's total parathion production" (Leonard 1990, p. 45). Large-scale poisonings and pollution have been the result. Many insect pests have developed resistance to the chemicals, threatening crops and health. Malaria has become a problem again. There is a "boomerang effect" on the industrial countries that produce these chemicals: residues in produce may reach the Northern consumer, unless the goods are refused entry.

Since there is little natural habitat left, most of the country's wildlife, including 88 terrestrial vertebrates, is endangered (IUCN 1986). Agricultural productivity is declining. Malnutrition is rampant, with 75 percent of children under 5 years of age affected (Foy and Daly 1989, p. 15). A 1975 study by FAO suggested that, with low inputs, the land could support only 3.1 million people by the year 2000 (FAO 1982b, p. 103). With intermediate inputs, the number rises to 5.6 million, so that even a more equitable distribution of land might not solve fully the problem of limited resources (Foy and Daly 1989, pp. 13–14). High inputs may be far too expensive for such a poor country. Government family planning efforts to date have been less than equal to the task.

Landless people have sought several avenues of escape: to the rapidly growing cities, particularly San Salvador, and through migration to Guatemala, Honduras, and the United States. Honduras, in particular, has long served as a safety valve. Workers flocked to the banana and cotton plantations, cities, and mines, or squatted on land. The oversupply of labour, caused by the presence of 300 to 350 thousand Salvadorans, led to considerable animosity in Honduras. The 1969 Soccer War has been called "perhaps the first war in the Western Hemisphere caused

by population pressures" (US Committee for Refugees 1989, p. 5).

In the years since 1969, El Salvador has exploded into civil war, suffered the depredations of government death squads, and, in 1986, experienced a devastating earthquake. The civil war has had catastrophic human, economic, and environmental costs. A program of sabotage by the rebels, compounded by the international recession of the early 1980s, seriously affected agricultural production, and real GDP fell by 22.3 percent between 1978 and 1982. The industrial sector was seriously harmed and the resulting unemployment created more pressure on El Salvador's soils and forests as people were thrown back into the subsistence sector (Leonard 1987, p. 56).

Declining terms of trade for agricultural commodities since the early 1960s have worsened the nation's position. Some progress has been made toward land reform in the last decade, as part of large changes introduced into the economy by the Duarte government, but it is unclear if these changes will affect the environmental crisis (Foy and Daly 1989, p. 15). Other policies have harmed the environment in many ways. Overvaluation of the currency, a lack of environmental laws or enforcement agencies, and a "grossly inadequate response to the deforestation and soil erosion" (Foy and Daly 1989, p. 14) are just some of the problems.

The ongoing violence in El Salvador cannot be blamed solely on the destruction of natural resources and lack of equitability in land rights, although the left-wing rebels are drawn mostly from the ranks of the dispossessed. Complex political, economic, and social factors are at work, including foreign interests. The US provided some 350 million USD annually in economic and military aid in its attempts to bolster short-term security in the country (Hossie 1989b). The 1984 Kissinger Report recognized that poverty and inequality were reasons for the region's instability, but gave almost no attention to environmental factors.

About 75 thousand people have died over the past decade and many hundreds of thousands have been displaced. In El

Salvador itself, perhaps half a million were forced to leave their homes and squat in the cities or countryside; many others fled to other countries in the region. For most, the situation must be regarded as permanent. In their host countries, the refugees in turn have exerted pressure on their new environments. In addition, it has been estimated that up to 600 thousand illegal immigrants from El Salvador live in the United States (Lamb 1987).

Whatever the state of El Salvador's environment, the condition of its land is not materially different from other Central American countries. The assault on closed forests in Costa Rica, Nicaragua, and Honduras, estimated at 7.6, 2.7, and 2.3 percent per year, respectively, means that little will remain by the early years of the next century (WRI 1990a, p. 292). In the Caribbean, Haiti remains the classic example of a land wracked by violence, environmental degradation, and poverty, a land from which perhaps a million people have fled in recent years.

It will be difficult for the countries of Central America to overcome the hurdles of rising population, depleted resources, poverty, inequity, and political instability and to devise policies that will foster sustainable development.

> If deterioration of these natural resource systems continues, political and social instability will be exacerbated as will economic stagnation and rural poverty. This phenomenon in turn will constrain future economic and social development in all seven countries of greater Central America. (Leonard 1990, p. 40)

Conflict in Central America has been considerably reduced in recent years, although violence and persecution continue. UN-sponsored negotiations between the Government of El Salvador and the FMLN (Farabundo Marti National Liberation Front), which began in mid-1990, led to a ceasefire in early 1992. A regional peace process is underway, and the International Conference on Central American Refugees, Returnees and Displaced People (CIREFCA), which met in Guatemala City in May 1989, confirmed a plan of action to help the hundreds of

thousands of uprooted people scattered throughout the region. By early 1991, some 30 thousand Salvadorans had returned to the country. Other Salvadoran refugees, both in El Salvador and in other Central American countries, are benefiting from projects designed to boost their self-sufficiency. The United Nations and the European Community are strong backers of this attempt to improve living conditions in the troubled nations of the isthmus.

Case Study: Ethiopia

If the causes of conflict and environmental decline in El Salvador are complex, how very much more difficult it is to tease out the strands of causation in Ethiopia, a vast country, rich in history and in the diversity of its land and peoples.

Ethiopia is one of the poorest countries of the world. Yet it has been called the potential breadbasket of Africa because of its extensive areas of rich, volcanic soil. More than 80 percent of the people depend on agriculture for their livelihood. Cash crops, particularly coffee, are the chief source of export earnings, even though production has been severely limited.

The land is mountainous, bisected by the great East African Rift Valley, which, like Central America, is an area of intense geological activity. The highlands are "jagged, intricate and fantastic," pierced by steep gorges (Eckholm 1976, p. 92), yet they are the site of most of Ethiopia's agriculture. Average annual rainfall figures are essentially meaningless, since the timing and distribution of rain are highly variable, and drought has been a recurrent feature of the nation's history. Agriculture depends on two principal rainy seasons. The major crops are wheat, barley, and the native teff in the regions between 2 300 and 3 600 metres, and these crops along with sorghum, millet, and corn between 1 800 and 2 300 metres. Nomadic pastoralists tend livestock in the more arid lowlands and other areas; Ethiopia, indeed, has the largest concentration of livestock in Africa.

Much of Ethiopia's land is marginal at best, and the region has a history of population movements and alterations in the pattern of subsistence activities that reflect a changing and capricious environment. To be successful in the face of adversity requires flexibility and the use of risk-avoidance strategies that take account of change, both short and long term. Groups living in the semi-arid areas of Africa have at times moved back and forth between agriculture, grazing, and hunting and gathering activities. Risk is spread by cultivating a variety of crops, with reliability rather than amount of yield being the most important factor. Vulnerability is reduced by complex networks of reciprocal obligations in and between communities, often spanning several ecological zones. Even the most apparently isolated communities usually have commercial links to market centres and towns. In any society, however, poverty restricts people's ability to participate in such connections, and thus to be protected in times of stress (Anderson and Johnson 1988).

Such adaptive mechanisms have been very important in Africa as hedges against recurrent disaster, but the events of the last two decades illustrate that there are limits to their usefulness. Where drought is widespread and severe, as it has been since the early 1970s, coping systems have plainly disintegrated. Indeed, famine has occurred many times in Ethiopia's past. Why is this so? Again, an historical approach reveals some of the roots of the nation's inability to manage its resources.

Despite the myths of its rulers, Ethiopia as a state dates only from the last decades of the 19th century. The final annexation of territory (Eritrea) occurred as recently as 1962. Ethiopia, too, experienced colonialism, but at the hands of other Africans as the Amhara from the northern and central highlands invaded. Menelik II (1889–1913), using instruments of modern warfare, brutally subjugated neighbouring peoples to the south and ruled over them with rapacious exploitation. A feudal style of government evolved, by which indigenous peoples, their land confiscated and given to Amharan soldiers, settlers, nobility and the Christian Church, became *gabbars* (serfs) on their own lands,

forced to provide taxes, labour, and a large percentage of their harvest. Slavery existed alongside this system well into the 20th century. Social and political institutions in the subjugated regions were destroyed and most Ethiopians lived in abject poverty, squeezed of all surplus production (Bulcha 1988). They were thus in no position to ward off any extra disaster. In the north, too, there were incessant demands, although the system of land tenure was different.

The depredations of Menelik and his successors were not the only source of conflict in the region. Foreign invasions occurred with some regularity, including conquest by Italy between 1935 and 1941. The peoples in the conquered areas have risen time and again against the Ethiopian government.

During Emperor Haile Selassie's long reign (as regent, 1916–1930; as emperor, 1930–1974), some modern institutions were introduced, but the feudal system remained. From the 1960s, capitalist agriculture was promoted and thousands of peasants displaced. In the Awash Valley, for instance, irrigation was developed so that foreign firms could grow sugar, cotton, and alfalfa, thus preventing the annual flood from enriching the land and forcing pastoralists into marginal areas. Technological improvements that could have raised the level of productivity were limited mostly to the modern sector. Peasants continued to farm using only the most rudimentary tools, such as oxen and plough. Pests and drought were frequent companions and all surplus production was expropriated. Unemployment, social unrest, and increases in rent were ignored by the government, whose chief strategy for development was the expansion of large-scale modern farming.

In the last years of Haile Selassie's rule, there were severe socioeconomic problems, spiraling inflation, war, and drought. Famine ensued, fueled as much by the inability of the poor to buy food as by the severe drought. Grain prices rose; livestock prices fell. Attempts to ignore the situation, and indeed to suppress information about the deaths of several hundred thousand people, provided the final trigger for a military takeover in 1974.

The Derg (the ruling Military Council) introduced a program of radical land reform. All land became the property of the state and rights to farm it were redistributed, theoretically in parcels of up to 10 hectares per peasant family. Peasant Associations, the first step toward collectivization, provided a framework for political education, conscription, and communal projects. Although this reduced inequities in some areas, particularly in the south, where about 55 percent of the peasantry was landless, huge regional differences remained; in some densely populated areas, land holdings are less than 1 hectare (Mengisteab 1989, p. 26). No attention was paid to the quality of the land or access to oxen. Furthermore, little incentive was given to peasants to produce, particularly with enforced sale of much of their produce, at artificially low prices, to the state-run Marketing Corporation. Constant demands on the peasants' time for communal labour further reduced production, although many of the projects did address soil conservation and afforestation. Most investments in agriculture were concentrated in the state farm sector, which occupies the best land and uses up scarce foreign exchange, but has failed to make a profit (Mengisteab 1989, p. 31).

Two policies of the Derg were strongly condemned both in the country and by international opinion. The first, "villagization," was an attempt to move peasants from scattered farms into new villages, supposedly to allow for the provision of improved services. This was seen as a method of controlling dissent and was carried out with considerable brutality. Second, the "resettlement program," intensified in late 1984 ostensibly as a way of aiding famine victims, promised wholesale removal of people from severely affected lands to "unpopulated" lowland regions in the south. Many of these settlements are situated in forest or arid areas and the result has been deforestation and soil erosion (Bulcha 1988, pp. 123–124). Since little planning or financial assistance was provided, the program caused much suffering and many died or fled the country in its initial phases (Clay and Holcomb 1985; US Committee for Refugees 1988).

Erosion in the Ethiopian highlands is older than history: ancient Egyptian society depended on silt washed down in the annual floods. During the feudal era, huge areas of the vast estates were underused or kept fallow, so that erosion was contained to some extent, although not where peasants were forced to till intensively. Land reform, however, opened up huge areas. Deforestation and erosion have accelerated enormously in recent years. Forest cover was halved to about 20 percent between 1900 and the early 1960s; but, by 1984, government experts were quoting figures, based on satellite photos, of 2 to 4 percent. USAID has calculated that the country loses annually 1 billion tonnes of topsoil, about as much as is lost in the USA (Timberlake 1985, p. 129). Such massive erosion has severe repercussions for countries downstream.

A major reason for Ethiopia's declining resource base is rapid population growth. A 1984 census suggested a population of about 42 million, but this is little more than a guess, since huge areas are inaccessible, and the real figure is almost certainly higher (Goyder and Goyder 1988, p. 75). The rate of increase has escalated since the middle of the century as a result of smallpox- and malaria-eradication programs (Robinson and Yamazaki 1986, p. 330). Crude birth and death rates remain high, and life expectancy is short. The United Nations has estimated that Ethiopia's population will reach 67.1 million by the year 2000 (EIU 1989, p. 8).

As animal and human populations have increased, people have been forced to farm ever smaller plots of land. Fallow periods have been abandoned and marginal land brought into production, often on steep slopes. In the Gamu Highlands, south of Addis Ababa, a sustainable system of agriculture has broken down over the last two decades. The steeper slopes were once reserved for grazing and the gentler hillsides terraced as a form of erosion control. Manure was carefully husbanded and fallow periods and crop rotations preserved the soil. But population pressure has forced the people to plough former grazing lands, causing overgrazing in remaining areas and starting a cycle of

degradation (Eckholm 1976, p. 95). The larger population needs more fuel and, as vegetation becomes scarcer, cow dung is used, thus depriving the soil of valuable nutrients. With unprotected soil, the heavy rains accelerate erosion and little moisture is retained. Water cascades from slopes, washing down topsoil and even boulders, and streams become roaring torrents after rain, but often remain dry for much of the year (Hancock 1985, p. 75). Soil fertility declines rapidly, and watersheds are severely affected.

The degree of erosion and deforestation in Ethiopia has a historical component, depending on the length of settlement and population density in each region. The centre of civilization has shifted southward over the centuries, and soil depletion has accompanied this process. In northern areas, many slopes no longer carry grass and much agricultural land has been turned into stone desert. In the central highlands, grass and scrub replace forest.

Pastoralists, who traditionally move their herds to take advantage of several ecological zones, have been squeezed all over Africa. Their movements have often been restricted by the boundaries of new nation states, and the extension of agriculture into grazing lands has thrust them into marginal areas where pastoralism is not sustainable. In Ethiopia, it was the Afar people from the Awash Valley who suffered most severely from the Wollo famine of 1973 and 1974 (Goyder and Goyder 1988, pp. 80–81).

Even in years of good rainfall, there is now a large grain deficit. Indeed, 34 percent of the population (14.7 million people) was "food insecure" in 1986, not one of the worst years (Brown et al. 1989, p. 13). For most peasants, it is impossible to generate a surplus to tide them over poor years.

The cost of maintaining the largest armed forces in black Africa and of waging war has sapped the whole economy of this, the poorest country in the world in terms of GNP per capita. Between 1975 and 1985, one-quarter of arms deliveries to sub-Saharan Africa was to Ethiopia, costing about 5.4 billion USD (1989 dollars). Most of this was owed to the Soviet Union, which

had made Ethiopia one of its client states in the late 1970s. For the years from 1978 to 1983, military expenditures absorbed more than 40 percent of government revenues; 3 percent or less was spent on agriculture (Mengisteab 1989, pp. 29–31).

The Derg, one of the most repressive governments in the world, proved itself unable to prevent recurrent famine. Although the form of government and the conditions of inequality changed, the bias against the peasantry and the extremely low level of agricultural productivity did not. Internal conflict, agricultural stagnation, and environmental decline remained as interacting problems.

Prolonged drought was undeniably the precipitating factor behind the famine of 1984, but the preceding discussion shows how important the role of the state has been in determining the outcome. As a reaction to outrage over the disaster of the early 1970s, the Relief and Rehabilitation Committee of Ethiopia was set up in the dying days of Haile Selassie's reign. The country's early warning system is now one of the best in Africa, although it suffers from a lack of resources. Its appeals for help, which began as early as 1981, were ignored by the international community for many reasons, some of them political (Goyder and Goyder 1988, pp. 89–90). A lack of access to the worst areas because of war, hid much of the problem. Government preoccupation with lavish 10th anniversary celebrations, which took place in September 1884 in Addis Ababa, did not help. Even when the enormity of the crisis was appreciated, the rescue effort was hampered by conflict, severe bottlenecks in the distribution pipeline, and the difficulty of dealing with millions of destitute people, many of them on the move (Adunga 1989, p. 118).

Conditions in Ethiopia are not unique in the Horn of Africa. Similar problems assail most nations and have spawned millions of refugees in recent years, spilling across borders all over the region in response to conflict, repression, drought, and famine. In 1992, the worst drought of the century has hit southern Africa, and 2 million of Somalia's 7 million people face death from starvation in a country wracked by violence.

Refugees, driven by environmental problems and often forced to settle in remote, inhospitable regions, are themselves the cause of ecological degradation in their host countries. A study by Lincoln Young (1985) details some of the impacts of Ethiopian refugees in Somalia. The dry climate, with its harsh winds and irregular rainfall, is mostly suitable for nomadic and seminomadic pastoralism. Degradation caused by overgrazing and deforestation for fuel was well under way before the refugees arrived in the wake of the Ogaden War of 1978 and the droughts of the 1980s. Huge areas around the camps were stripped of vegetation for building materials and fuel. Small domestic animals, particularly goats, finish off what is left. Farms, set up to help the refugees produce food, suffer from soil breakdown and severe wind erosion. Irrigation is leading to salinization of the soil. Dust is a constant in the bleak landscape.

In May 1991, the Ethiopian army, demoralized and stripped of its support by the crumbling Soviet Union, finally collapsed under the onslaught of the Democratic Front, a coalition of rebel groups. The government was forced to flee. Democratic elections have been promised for 1992, but the political future of the country, even if it remains intact, is uncertain. There are fears that secessionist groups will soon resume fighting, leading to massive new flows of refugees and increased destabilization for the entire region. Restoring peace and feeding the millions of people who face starvation must be the first priority of the new rulers. But the problems mount: there has been an enormous influx of refugees fleeing violence in Somalia. As early as mid-April 1991, there were 1.2 million refugees in Ethiopia, up from 800 thousand at the beginning of the year. Two hundred thousand of the new arrivals are Ethiopians who had been living in camps since the crises of the 1970s and 1980s (Hug 1991). Even if peace can be restored, the country and its expanding population remain vulnerable to recurrent drought and famine. Economic chaos and ecological bankruptcy have greeted the new leaders. Increased assistance from the international community is absolutely essential if further disaster is to be avoided.

Canada and the Refugee Crisis

The case studies of El Salvador and Ethiopia are extreme, but they provide stark evidence of what can happen when so much conspires against a land and its people. They also emphasize the great importance of looking at the whole context of a country's woes, at the intricate connections between flight and a multitude of underlying factors such as poverty, repression, and faulty economic policies. Our definition of the term "environmental refugee," and indeed of the word refugee itself, has been considerably muddied in the process. UNHCR itself now acknowledges that no meaningful distinction can be drawn between economic refugees and those fleeing insurgency in El Salvador and certain other countries, since the two groups are so interwoven.

Refugees open up a wide range of issues and dilemmas for the North. On the one hand are actions in the North that affect the number of environmental refugees in the South; on the other hand, the considerable pressures that refugees exert on industrial societies. Figure 5 shows several of the most important of these issues. In the discussion that follows, we touch on three areas of significance to Canada: human-rights concerns, aid and humanitarian assistance, and our immigration and refugee policies.

Canada has a long tradition of peacekeeping and humanitarian assistance. We have played an active role in the creation of multilateral humanitarian agencies and are one of the most generous donors of disaster relief in the world. Canada is also one of the three major countries that traditionally accept refugees for resettlement, along with Australia and the United States. Since the end of World War II, we have admitted over half a million people under the 1951 UN Convention or through ad hoc humanitarian programs. In 1986, Canada was awarded the Nansen medal for outstanding services to refugees, the first time that a country had received such an honour.

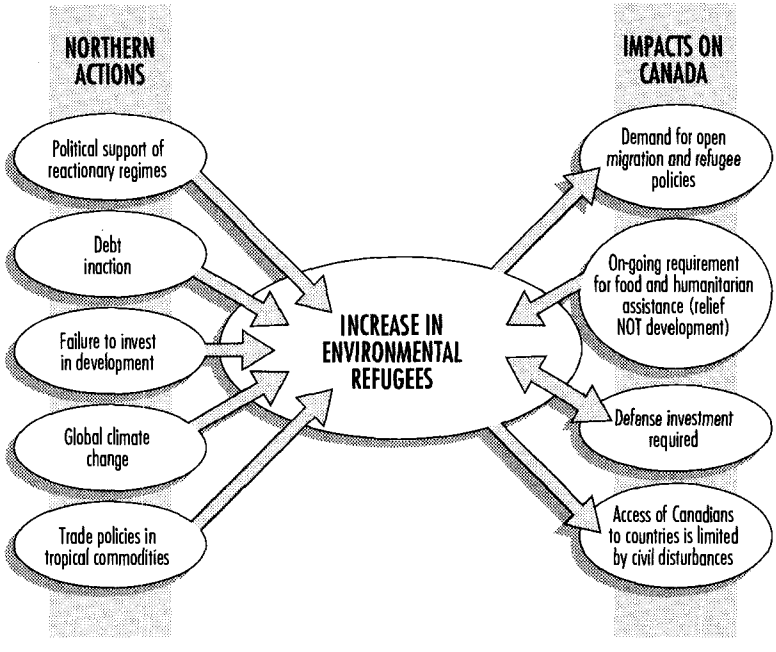

Fig. 5. Actions of the North that are likely to increase the number of environmental refugees and potential impacts on Canada.

Canada's Immigration and Refugee Policies

Today, there are few opportunities for legitimate immigration in the world. Fewer than a million places are available each year in the traditional receiving countries: Australia, Canada, New Zealand, and the United States. Other countries, particularly in Europe and the Middle East, do employ many millions of guest workers from the South, but their stay is theoretically temporary; their status, tenuous. Faced with these restrictions, "the mobile of the developing world are instead clambering over the immigration barricades erected against them" (*Refugees* 1991b). Many become illegal immigrants; but, over the last decade, the route of choice has been to claim asylum as a refugee. In Europe, there has been an enormous escalation in their numbers: from 13 thousand a year in the early 1970s, to 70 thousand in 1983, to 442

thousand in 1990 (Chua-Eoan 1991, p. 19). In 1992, over 400 thousand asylum seekers have flooded into Germany alone. Incidents of violence against the newcomers have become commonplace. Canada, too, is a desirable haven. By 1989, this country had built up a backlog of more than 100 thousand people claiming refugee status, a backlog that persists despite repeated attempts to streamline the process.

Canada accepts several types of refugees. Besides those who are granted refugee status under the 1951 UN Convention, Canada recognizes people from particular countries who are living in "refugee-like situations." These "designated classes" include Salvadorans and Guatemalans living in their home countries and Indochinese from Cambodia, Laos, and Vietnam who fled before 1989, but are still in limbo. Canada made a commitment to sponsor another 16 thousand Southeast Asian refugees between 1990 and 1992, adding to the more than 120 thousand Indochinese refugees already admitted since 1979, the largest program to date (Malarek 1990, p. A10). In "special cases," Canada accepts people for humanitarian reasons, especially those fleeing civil strife or natural disaster. Lebanon has been the major source in recent years. People who are regarded as economic refugees must apply as ordinary immigrants. Often there is no chance that they will be accepted, opening the door to fraudulent refugee claims.

In the late 1980s, the unannounced arrival at our doors of rapidly escalating numbers of people claiming refugee status unleashed a huge debate in Canada. There is a wide spectrum of public opinion on this topic, including those who press for a much more open and accessible immigration policy and those who express great resentment over "queue jumpers" who are not obviously victims of persecution.

The Toronto *Globe and Mail* (McLaren 1991) reported that about 160 thousand claimants, representing about 192 thousand people, would be seeking asylum in Canada in 1991. These included those still in the backlog (more than 60 thousand people as of February 1991) and those who had claimed refugee status

since new procedures were introduced in 1989, or roughly 36 thousand new applicants each year. The task facing Immigration Canada is plainly daunting. In June 1992, the government proposed sweeping changes to Canada's immigration law. One effect of these changes, if implemented, would be to cut numbers of refugee claimants entering the country by 40 percent.

Here, too, political considerations have been important. Canada responded with open arms to the crises of 1956 and 1968 in Eastern Europe and continued to accept large numbers of self-exiles from that region until August 1990, by which time the Cold War had been well and truly buried. Yet it was only as a result of considerable public pressure that the government eventually accepted several thousand refugees from Chile in the mid-1970s (Dirks 1985, p. 128).

Canada responded to the crisis in El Salvador by raising its admissions quota. The number of Salvadorans accepted as landed immigrants in Canada rose steeply between 1981 and 1983, stabilizing at between 2 500 and 3 500 annually (Immigration Statistics Division, Employment and Immigration Canada). A small number may have been helped by ties between Canadian churches and the US sanctuary movement (Billard 1987). In 1982, we instituted a special program for Salvadorans threatened with deportation from the United States.

Yet the number claiming refugee status each year in Canada represents quite a small fraction of our total immigration. Most of the people we accept have gained admittance as relatives of people already here, as potential investors, or as independent migrants who must pass a "points system," which emphasizes education, job training, job experience, and other factors. The face of immigration has profoundly changed in recent years; immigrants from developing countries now easily outnumber those from the North (over 3 to 1 in 1988). Half of these come from Asia, with Hong Kong the clear leader.

Can this change be linked to environmental degradation? During the 1980s, we had more applicants from Ethiopia than any other African country, and more applicants from El Salvador

than any other Latin American nation: about 10 and 20 thousand, respectively. Before the 1984 famine, few Ethiopians entered Canada as landed immigrants in any one year. In 1981, there were 152; by 1988, the numbers had risen to 1 546. The relationship is far from clear.

In general, our immigrants are not the poorest of the poor. They often have the means and qualifications to escape declining conditions in their native lands and are perhaps the very people those countries can least afford to lose. Indeed, there have been no large-scale efforts by the international community to resettle displaced people from Central American or African countries, despite chronic conflict, political instability, and human-rights violations. Repatriation has been the preferred solution; but, for many refugees, there is little hope that they can ever return to their native lands. In the future, however, we will surely face pressure from other countries, churches, and relatives for a more open immigration policy to absorb increasing numbers of refugees, including environmental refugees.

Aid and Humanitarian Assistance

Ethiopia is the classic example of a country in need. In late 1984, Canadians responded with an emotional outpouring of assistance to the crisis in sub-Saharan Africa. Offers of food, medical supplies, trucks, and tents flooded in. NGOs and individuals became involved in a host of ways. By mid-February 1985, public donations to NGOs totaling almost 36 million CAD had already been received (MacDonald 1985). The Government of Canada matched these donations with over 30 million CAD for approved projects. In 1991, the Government of Canada responded yet again to appeals for help, with gifts of 90 million CAD to countries in the Horn of Africa (Hossie 1991a, p. A9).

There is no doubt that the rising incidence of disaster threatens Canada's financial commitment to international development. As it is, our ODA budget has declined from 0.52 percent of the country's GDP in 1978 to 0.44 percent in 1989 (Hossie 1991b,

p. A11). If one factors in the cost of disaster relief and the increasing need for recovery and rehabilitation programs, it is obvious that there will be less that Canada can do to stop the downward spiral of environmental degradation and poverty in the South. In Africa, for instance, we have targeted 300 million CAD for a recovery program in several countries of the Sahel, and 45 percent of our aid is now directed to that continent. A list of countries that received humanitarian assistance in 1985/86 reads like a roll call of the world's poorest and most ecologically stressed nations: Angola, Bangladesh, Ethiopia, Mozambique, Pakistan, the Sudan, etc. (CIDA 1987, p. 29).

Our role as a major provider of food aid is also likely to continue. Many areas in Africa already depend heavily on outside aid for their continued survival. The World Bank predicts that the food gap on that continent, approximately 15 million tonnes in 1990, will rise to about 200 million tonnes by the year 2020 if current patterns continue (*Refugees* 1991c). In 1989/90, Canada's food aid totaled 371 million CAD, of which 169.5 million was channeled through the World Food Programme (WFP). In that year, the major recipients of Canadian food aid, both through the WFP and on a country-to-country basis, were Bangladesh (74 million CAD), Ethiopia (41 million), and Mozambique (21 million); Jamaica, Morocco, Pakistan, and the Sudan each received between 10 and 20 million CAD (CIDA 1990b).

Human-Rights Concerns

One of the clearest lessons of our case studies is the role of the state in fostering situations of poverty, inequality, and ecological decline. Yet many reactionary regimes in the South have been propped up by the North for reasons of strategic, political, or economic self-interest. During the Cold War, support of this kind reached a crescendo as the superpowers used developing nations as surrogate battlegrounds. American military assistance to El Salvador and Soviet arms sales to Ethiopia are just two of many, many examples.

For the international community at large, repressive regimes, so common in the developing world, pose a grave conundrum. Tyranny and misgovernment have a profound impact on development; yet to deny assistance to the citizens of these nations seems to penalize them doubly. Controversy over the role of aid in helping to perpetuate corrupt and totalitarian regimes was submerged by a tide of concern during the African famine of 1984; but "donor fatigue" is a natural response when crisis points come with increasing frequency and severity, and the role of national governments in these crises becomes clearer. The world community was slow to respond to appeals for food aid for Africa in 1991.

In Canada, there has been a spirited debate since the 1970s over the place of human-rights concerns in our foreign policy and ODA. Canadian churches, in particular, have long pressed the government to develop clear principles and mechanisms for promoting and protecting human rights in all of its international dealings, including its work at the UN and the World Bank (Ryan 1989, p. 424). Churches have also fought for reform of the global economy, which they view as a major obstacle on the road to human dignity and development.

In the mid-1980s, several parliamentary committees and reports addressed these questions. Although many of their specific recommendations were not adopted, the result was "a very clear commitment by the government to integrate human rights fully into Canadian foreign policy" (Ryan 1989, p. 429). But, although we have come a long way in recent years, a "wide gap remains between government rhetoric and actual practice" (Fleming 1989, p. 107). Human rights have often taken a back seat to other issues in our foreign policy: to respect for sovereignty, to Cold War perspectives, to the importance of our relationship with the US, and to Canadian economic interests (Pratt 1989, p. 176). Our actions have been highly selective; we have curtailed aid to countries with whom our relations are slight, such as El Salvador and Suriname, but not with major recipients such as Bangladesh, Indonesia, and Pakistan, which

have been accused repeatedly of human-rights violations (Keenleyside 1989, p. 340). One study claims that more than 70 percent of CIDA's budget benefits such countries (Keenleyside and Serkasevich 1990).

In practice, then, cutting Canadian aid to countries that abuse human rights would mean the outright dismantling of a large proportion of our ODA. This would be the logical outcome of Prime Minister Brian Mulroney's forceful declarations at the Commonwealth leaders' conference in October 1991 (Toronto *Globe and Mail*, 17 October 1991, p. A8):

> Canada will not subsidize repression and the stifling of democracy. We shall increasingly be channeling our development assistance to those countries which show respect for fundamental rights and freedoms.

There is no suggestion, however, that Canada change its trading practices or stop the flow of monies under the Export Development Corporation, which recently extended 1 billion CAD worth of credits and export insurance to Iran (Hanlon 1991).

El Salvador was a test case of our human-rights policies during the 1980s. At the height of the conflict in 1981, Canada suspended aid. Our policy, however, has been to reward "marked improvement," and the suspension was lifted in 1984, despite howls of outrage from sections of the Canadian public. By 1987/88, we were spending 6.6 million CAD on bilateral assistance (CIDA 1988, p. 43). The increase was short lived, however, and, by 1988/89, we had cut our assistance by 90 percent. Nevertheless, Canada has helped to ease the plight of refugees in the region both unilaterally and through humanitarian schemes through UNHCR (Dirks 1985, p. 129). Canada and Canadians have also been involved in international efforts to monitor elections and human-rights abuses in El Salvador and are playing an active role in 1992 in helping that country during the dangerous transition to peace.

One recent initiative of the Canadian government is the establishment of the International Centre for Human Rights and Democratic Development (ICHRDD). Its first president is Ed

Broadbent, former leader of the New Democratic Party of Canada. The Centre was created to support organizations and institutes around the world that "focus on the political, civil, social, cultural and economic rights of peoples and individuals" (Harper 1991). By late 1991, the Centre had distributed more than 2 million CAD, including a grant of 126 thousand CAD to the El Salvadoran Human Rights Institute (Harper 1991).

Conclusions

The mass population movements of the late 20th century are a major challenge for the global community. Refugees, in particular, often pose intractable problems and threaten the stability of entire regions. Yet, since huge areas of the globe remain vulnerable to disaster and degradation, it is likely that the numbers of refugees, environmental and otherwise, will continue to rise.

Today's migratory flows are driven in large part by declining conditions in the South and in Eastern Europe — as such, they are as much a problem of development as they are of security. Answers thus lie far more in development and assistance policies than they do in asylum, which does nothing to solve the problem of poverty (*Refugees* 1990c). What is needed are fundamental solutions to remove the root causes, to help people live securely in their home countries. If we are to learn anything from our case studies, it is the need for a very broad brush. Environmental degradation, for instance, can only be addressed if people have secure tenure to land and a say in their future, if there is a global trading system that is fair and addresses environmental concerns. In this process, human rights and democracy are every bit as important as technical solutions to agricultural difficulties or the provision of clean water.

Specific remedies are also important. Enormous amounts of money are spent each year coping with emergencies and repairing the damage wrought by natural disaster. Yet most of these disasters are easily predicted and much of their impact can be

avoided (Bender 1991, p. 182). Disaster preparedness is an essential aspect of any sustainable development strategy; in recognition of this, the United Nations has designated the 1990s as the International Decade for Natural Disaster Reduction.

Canadians are far from indifferent to the plight of the world's displaced people, and Canada's humanitarian programs will continue to be an essential part of its role on the world stage. Canada's low birth rate also ensures that immigration will play a vital role in its future. Increasingly, the new Canadians will come from the South. Increasingly, immigration and refugee policies will be shaped by pressures from those regions. Yet Canada and other countries in the North can never hope to accept more than a small fraction of those in need.

Chapter 9

Networking: the Potential Power of Indigenous Peoples' Worldwide Campaign for Rights

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Indigenous peoples are fighting to preserve their future. Yet their battle to save the rainforests, rivers, deserts, mountains, islands and arctic on which their lives depend is also humanity's struggle to safeguard the environment for all our futures.

Burger (1990)

There can be few more powerful symbols of the world's ecological crisis than the fate of its indigenous peoples. Once they were the sole inhabitants of most of the Earth's surface, where they had evolved "a judicious balance between their needs and those of nature" (Strong 1990). By the late 20th century, however, few had escaped the adverse effects of modern civilization. Yet, despite the severe disruption of their lives, elements of their basic philosophy remain and are being articulated by a host of indigenous and support groups around the world. Indigenous peoples wish to regain control over their lives, lands, and resources and to bring to bear some of their holistic, sustainable approaches to the management of human and other resources. If this movement is successful, large areas of the globe could be governed by their philosophy and there is a hope, however slender, that the tide of resource extraction, environmental degradation, and cultural erosion might be halted or at least slowed.

In this chapter, we examine the effects on indigenous peoples of the spread of industrial society. We give some idea of the growing network of indigenous organizations and groups that espouse their cause and of action at the international level. Above all, we show how this movement is affecting Canada, both in the growing assertiveness of our own indigenous peoples and in the potential that this has for resource use over much of the country.

"Canada has yet to resolve the fundamental question of how competing, and often incompatible, land and resource uses and value systems should be resolved" (Standing Committee on Aboriginal Affairs 1990, p. 17). Long-running legal and constitutional battles to resolve native claims have introduced a great deal of uncertainty into natural-resource activities and an antagonistic backlash from sectors of the Canadian population who feel threatened by the loss of jobs and business opportunities.

The events of the summer of 1990 were a shocking experience for all Canadians. Native issues were brought to the forefront both in the failure of the Meech Lake Accord and in the standoff between natives and the army at Oka, Quebec. Canada's image abroad was severely tarnished and the United Nations issued a stinging rebuke. Yet confrontation between indigenous people is hardly unique to this country and the seeds of today's situation can be found in the history of the last few centuries.

The Frontier Process: the Final Stages

European expansion from the end of the 15th century had a disastrous impact on many areas, especially in the Americas; yet, by 1820, fully half the world remained untouched by this process (Bodley 1990, p. 5). The Industrial Revolution, however, marked the beginning of the end for tribal peoples. Fueled by technological change and population increase, it unleashed a culture of consumption on the world, a culture that cries out for new lands and new resources. Since World War II, the rate of exploitation has grown exponentially. Multinational corporations have

penetrated even the most remote regions in their quest for timber, oil, and minerals. Governments, aided by development agencies and multilateral financial institutions, have built dams for power and irrigation and encouraged unsustainable land-use practices. Landless people from other regions have been moved onto tribal lands with little thought for the consequences. For indigenous peoples, social and ecological devastation has been the result.

This devastation is a product of the "frontier process," the sequence of events that happens when outsiders invade areas with low populations, abundant resources, and few or no legal restraints (Bodley 1990, p. 25). Today, a frontier exists mostly in tropical regions, especially in the rain forests — less than a century ago, there was one in the United States; the Canadian Arctic was opened to exploitation only recently. There are, however, few horizons left to conquer. For the exploiter of resources, and for native peoples, remnant areas such as Canada's old-growth forests have become even more valuable. They have also assumed significance for national security reasons. Brazil, for example, has militarized border regions in the Amazon, while Canada carries out military manoeuvres on "empty" lands, especially in the north.

Frontier resources are usually considered as free goods and any prior aboriginal occupation is ignored or downplayed. Force and deception are often used against indigenous peoples in the lawless conditions that prevail. As expansion proceeds, other means are used to deal with native peoples. Governments extend control, sometimes through treaties and agreements, but more often without. Indigenous peoples are often seen as inferior; their ways of life, inefficient and wasteful. Attempts are made to modify their culture through education, religion, and social services. Traditional political structures are usually destroyed.

A major effect of the frontier is disruption of traditional subsistence activities and incorporation into a market economy. Alterations in diet can lead to malnutrition, lowered immunity, and dental decay. Infectious diseases, such as tuberculosis, influenza, smallpox, and measles, that are new to a population often

lead to pandemics. Throughout Oceania and the Americas, at least, there were catastrophic declines in population (Roberts 1989; Bodley 1990, p. 39). Social changes include loss of self-esteem and cultural integrity, and discrimination, poverty, and unemployment are the lot of many "detribalized" indigenous peoples (Goodland 1982, pp. 23–28). Flight to urban areas is often the only choice.

The approach of governments toward the land and resources of indigenous peoples has varied greatly. In Australia, for instance, the country was declared *territorium nullius,* unoccupied territory; thus, all land rights were denied (Bodley 1990, p. 60). Even recognition in treaties, as in Canada, was insufficient to protect native resources from encroachment. Usually there was little recognition that use of land conferred property rights in the Western sense. Indigenous peoples the world over, however, continue to depend on natural resources and are demanding control and some degree of compensation for past injustices.

Indigenous People: Definition and Philosophy

Today, people who pursue an independent tribal existence number only in the thousands, yet there are around 220 million worldwide to whom the term "indigenous peoples" could be applied (Fig. 6). Definition is not easy and the most painstaking and complex descriptions inevitably include qualifiers that acknowledge the difficulties involved. The Dene of Canada have stated simply "the Dene know who they are" (Bodley 1990, p. 167), and the principle of self-definition is very important, implying a distinct culture, with all its elements.

In most cases, indigenous peoples are the original inhabitants of a region and have been overcome by conquest. Traditionally, they carried out a wide range of subsistence activities that required low-energy inputs and usually produced little in the way of surplus (Burger 1987, p. 9). Most groups were neither isolated from the outside world nor necessarily self-sufficient, as

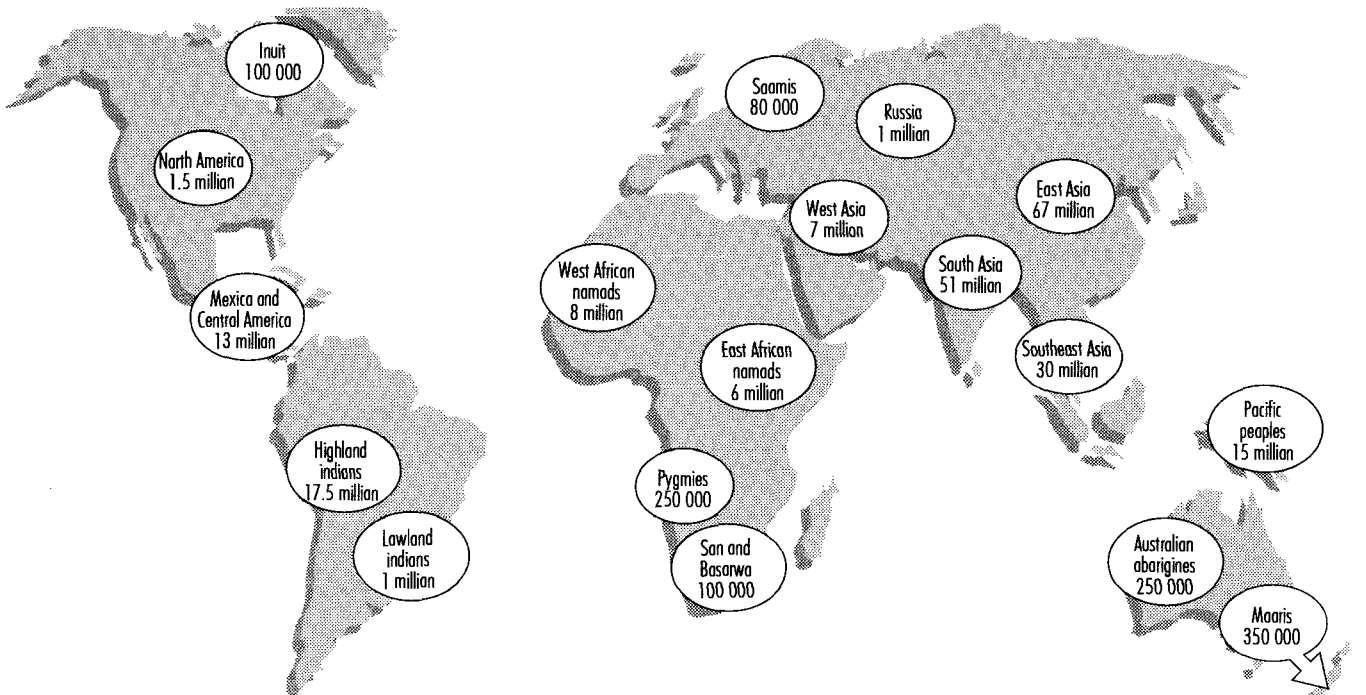

Fig. 6. Indigenous peoples of the world (source: IWGIA 1992).

extensive trading networks attest. Today, there are great differences between people living in different regions and in their experience of colonialism. In addition, many people have made a successful transition to mainstream life, yet still regard themselves as members of their native group.

Most indigenous peoples "do not have centralized political institutions and organize at the level of the community" (Burger 1987, p. 9). They are often characterized as small-scale, classless societies where decisions are made on a consensual basis. There are, however, many exceptions to this model and great variability in the type of organization that existed historically, although powerful states such as the Inca were rapidly subjugated.

Central to most definitions is the relationship of indigenous peoples to the land and its resources, as well as the cultural, philosophical, and political systems that ensured the integrity of the interaction between humans and their environment over long periods of time. To most indigenous peoples, land is imbued with a deep spiritual significance and forms the very heart of existence. It has no commercial value in the Western sense, but is owned communally, by all people now living and by past and future generations. In general, access is "controlled by a complex network of kinship relationships, the principles of which [are] often incomprehensible to outsiders" (Bodley 1990, p. 77). Huge areas are often needed to allow this system to work and there are few regions of the world where land was truly "unoccupied."

Indigenous peoples thus operate under a set of values completely alien to Western thought (Bodley 1982, p. 84), which has tended to regard resources as infinitely exploitable. They have survived in such fragile ecosystems as tropical rain forest, small islands, desert, mountains, and tundra for millennia without engendering obvious environmental breakdown, although their effect on the landscape and species composition of an area can be profound. Rather than being inefficient, their way of life *in intact systems* was highly adapted to each environment, using a wide variety of resources in a sustainable fashion to provide for all basic human needs. Indigenous peoples have an intimate

understanding of the complex ecological interrelationships of the flora and fauna, of productivity and energy flows. They know a great deal about the myriad uses of the various elements as food, drugs, poisons, building materials, etc. This vast store of knowledge is disappearing rapidly, despite its intrinsic and economic worth for all the peoples of the world.

Indigenous People Today: the South

Throughout much of the South, indigenous peoples face almost overwhelming odds. The annual yearbooks of the International Work Group for Indigenous Affairs (IWGIA), which review the triumphs and tribulations of native peoples around the world, make for sombre reading. They detail genocide, the murder of leaders, the militarization of native lands, forced relocation, and the adverse effects of development projects. In all regions, there are problems with a lack of autonomy and secure access to land. Almost nowhere have indigenous peoples benefited from decolonization. In most countries, European rulers have been replaced by dominant ethnic groups that have continued or intensified policies of repression and resource exploitation.

In Asia, where the majority of indigenous peoples live, many groups are fighting for independence. The best known of these include the hill tribes of Bangladesh and Myanmar, tribes in the Philippines and West Papua, and the East Timorese of Indonesia. The 51 million tribals of India are protected by many laws and are represented in parliament and in many organizations, yet remain socioeconomically depressed (Burger 1987, chapter 8).

Throughout much of Latin America, the glorious past of the large Indian population is extolled; but today, most Indians are marginalized in society. In South America, Indians of the highlands are culturally, linguistically, and historically fairly homogeneous, with a long history of interaction with the forces of colonialism. Extreme poverty is the fate of most rural dwellers as land concentration by *latifundistas* continues (Burger 1987, p. 88). The more than 300 distinct groups of the lowlands, however,

are facing the frontier process that their highland cousins faced centuries ago. In Central America, deprivation has long sparked protest, which has been suppressed ruthlessly. Even in Costa Rica, logging, mining, and the spread of settlement continue to erode reserves created in the 1970s. Africa's most threatened people are also those living in remote areas, especially pastoralists and hunter–gatherers.

The following brief sketches illustrate the frontier process at work today. It is no coincidence that two of the three peoples described are forest-dwellers. The urgency and severity of the situation reflect the dramatic exploitation of the world's remaining undisturbed resources. The rate of change and the powerlessness of indigenous people have ensured that they are given little opportunity to adapt more gradually to the modern world, or to have any say in decisions that affect their future or the future of the Earth's environment.

The Penan

The Penan are hunters and gatherers who live in the forests of Sarawak. They have seen their lands denuded and their livelihoods destroyed as a result of logging for the tropical timber trade. Malnutrition, disease, and water pollution are just some of the problems they face. A peaceful people, they have responded by repeatedly forming human blockades on logging roads; but they have been met with violence and arrests. The problems of the Sarawak natives have received worldwide publicity in the press and environmental groups have pleaded with the Malaysian government to stop the logging (Idris 1989, p. 4).

The Yanomami

In Brazil, the Yanomami, the largest tribe remaining in the Amazon, are in danger of extermination. Contact with them was made only in 1950, and they have maintained most of their traditional lifestyle (Simons 1988). In recent years, many tens of thousands of gold miners have flooded onto tribal lands, bringing

with them disease, particularly malaria, severe water pollution, extreme violence, and social disruption. Drugs, prostitution, and AIDS have been introduced to the area by the miners. The Yanomami have also suffered as a result of the Calha Norte Plan, a national security project that established military bases across their land. The population is declining rapidly.

There has been a huge outcry over the plight of these people. In Brazil, however, there is a powerful anti-Indian rights lobby, drawn particularly from mining and ranching interests. In November 1991, President Collor of Brazil designated 94 thousand square kilometres on the Venezuelan border as a reserve. This is in addition to the reserve of 83 thousand square kilometres already granted in Venezuela. There is intense opposition to this move by the Brazilian military. Its success is very much in doubt.

The Pastoralists of Tanzania

In Africa, there are similar problems. The pastoralists of Tanzania, mostly Masai and Barabaig, are suffering encroachment onto their traditional lands, often in the name of development. State bodies often favour settled communities over seasonal nomadism, while the need for export income has pushed the Masai and Barabaig into cattle production for sale rather than for subsistence (IWGIA 1989, p. 137). One of the effects of the CIDA-sponsored Tanzania–Canada Wheat Program, which has been running since 1968, has been the expropriation of about 260 square kilometres of land that was once Barabaig pasture (IWGIA 1989).

Indigenous Peoples in Canada

> Canada has a north–south problem, a troubling one that shames by its injustice and frustrates by its persistence. (Toronto *Globe and Mail* 1990a)

Life for the indigenous people of North America has been no less traumatic over the last 500 years than it is today for other tribal

groups at the frontier. They were deprived of their lands and culture, stripped of their self-respect, and are frequently marginalized on reserves or in city slums. The results of centuries of mistreatment can be measured in the disparities that exist between Canada's native peoples and the general population. Although health indicators have improved markedly over the last two or three decades, huge differences remain. Birth and death rates are much higher than they are in the rest of Canada. Suicide is five times more common among native men between the ages of 20 and 24 than it is among young men of that age group in general, and native Indians are three times more likely to die before they reach 35 years of age (Fine 1989). Almost a third of Indian deaths result from accident or violence, compared with 8 percent for the general population. Alcoholism is rampant and the degenerative diseases associated with a modern lifestyle are taking their toll.

Social indicators are equally troublesome. Education levels are much lower, particularly on reserves. Housing standards on reserves are often inadequate, despite some improvements in recent years. Unemployment and poverty are more frequent among native people, who are far more likely to be jailed.

This situation has its roots in the long and complex history of relations between Canada's European colonizers and aboriginal peoples. Almost all of the country was used in subsistence activities before the white man's arrival, but settlement drove indigenous peoples from the best land, greatly restricted their access to resources, and resulted in a dramatic decline in their numbers through disease. Only in the north were they able to continue their way of life, although here, too, there have been enormous changes in recent years.

From the start of British settlement, there were many attempts to deal with native peoples. The early "peace and friendship" treaties in the Maritimes did not include land transfers, but they confirmed the right of Indians to hunt and fish as usual. Settlement, however, conflicted with the indigenous peoples' use of their resources, and treaties involving land

became more important. The Royal Proclamation of 1763 affirmed that land could only be acquired by settlers if aboriginal title had been relinquished to the Crown. As the British spread west, there were many small-scale treaties in what is now southern Ontario. From 1850 on, however, a series of large-scale treaties cleared title to nearly half of Canada's land, allowing agricultural settlement on the prairies, the construction of railroads, and the opening of some of the north to mineral and oil exploration. With the 1876 Indian Act, which has been amended several times, the Canadian government assumed control of Indians and their assets, defined who was a "status" Indian, and put them in a different legal category from all other Canadians.

The First Nations surrendered much in return for very little. They were hardly players on a level playing field and the full implications of the agreements were never appreciated. Even the modest promises of the treaties often went unfulfilled (McMillan 1988, p. 296). Many reserves were never created and hunting and fishing rights have been ignored in subsequent federal legislation. Yet much of Canada, including the north, remained outside the treaty process. In British Columbia, many small, scattered reserves were granted to individual bands, but these were quite inadequate for their needs. In the Maritimes and parts of Quebec, too, there are "strong arguments that aboriginal title still exists" (Purich 1987, p. 17).

Federal government policy over the years can be viewed as geared toward the expropriation of land and resources and the destruction of indigenous culture. During the 1950s and 1960s, the process of assimilation was accelerated, culminating in the Trudeau government's 1969 White Paper, which sought to remove any special status from the nation's indigenous people, eliminating reserves and terminating treaties (Weaver 1981).

The White Paper sparked a dramatic change in the assertiveness of Canada's native people. In the courts and the media, on the streets and in the legislatures, they have slowly gained recognition and, increasingly, success in their attempts to right past wrongs. The resources involved in the many individual

battles cover the whole range of Canada's natural endowment: wildlife, fisheries, mining, forestry, and hydroelectric potential, to name a few. The issues are complex; the financial dimension, enormous. At issue is the question of aboriginal rights to lands and resources, which are deemed by natives to have existed since time immemorial and to have been affirmed in treaties. It is a question that may eventually alter the whole structure of governance in this country. The story must, however, be placed in the context of change at the international level.

The Call to Organize: Networking of Indigenous Peoples

The grim history of the world's indigenous peoples over the last 500 years would not seem to provide any grounds for optimism. Most observers in the past have assumed that all tribal groups would eventually be absorbed. Seldom were they consulted about their future. The last two decades, however, have seen the growth of hundreds of indigenous and advocacy organizations, which have grown from a purely local and regional phenomenon to become "a distinct new force in world politics" (Burger 1987, p. 44).

Several external factors influenced this development. Decolonization and the formation of more than a hundred new states raised expectations in the decades after World War II. As international air travel blossomed, there was increased awareness of other places. The 1960s and early 1970s were years of political agitation around the world by students, radicals, and the Black Power movement, among others. At the same time, some anthropologists, particularly those working in South America, became sensitized to the literal and cultural genocide they witnessed. They saw the need to abandon academic detachment and aid people in their struggles for freedom. In addition, international law was changing to reflect a new vision of human rights.

In some countries, there is a long history of indigenous organizations, but the movement that started in the 1960s "was more activist and prolific than earlier" (IWGIA 1989, p. 13). The flood of new organizations started in the North (in Australia, Canada, Scandinavia, the United States), but it spread rapidly, most notably to South America. It has not been easy for small, often traditionally hostile groups to unite in a common struggle, frequently encountering outright violence from governments and the mainstream culture. But the movement has been an invaluable tool in helping to unite indigenous peoples, raise their morale, and keep traditions alive. Worldwide, there are now over a thousand indigenous organizations (Burger 1990, p. 138).

As the 1970s progressed, regional organizations such as CRIC (Regional Indian Council of the Cauca) in Colombia and Alpromisu in Nicaragua came into being. The context of the lives of indigenous peoples varies enormously from region to region; but, as they met, there was "a recognition of shared experiences and problems" (Bodley 1982, p. 52) and a universal quest for "identity, self-determination, sovereignty and territorial rights" (IWGIA 1989, p. 13). There are many outside pressures. Churches, political organizations, academics, funding bodies, and the international drug trade all influence the movement. In addition, many groups have become involved in political struggles in their countries.

There has also been a flowering of advocacy groups concerned with indigenous peoples. Many organizations with other mandates have added native issues to their agendas. It must not be assumed, however, that the influence and philosophy of all these groups is always in the interests of indigenous peoples. Several fundamentalist Protestant missions, for instance, have been cited in severe human-rights abuses in South America (Burger 1990, p. 132).

As yet there does not exist "an established homogeneous movement" (IWGIA 1988, p. 112). Progress is certainly being made, but the huge differences in the conditions faced in each area have led to very different approaches and to political

conflicts in and between groups. There is, however, a growing network of organizations acting to influence governments and international bodies. Increasingly, there is a meshing of interests between native, human-rights, and environmental groups. Allies are being gained in the dominant societies. National governments and international bodies are being pressured to act on indigenous issues, which often involve a strong environmental component.

Regional political bodies must inevitably be drawn into the struggle. The Organization of American States (OAS) has long-established agencies involved in indigenous affairs: the Inter-American Commission on Human Rights, established in 1959, has grappled with cases of human-rights violations against forest Indian people, but has not seriously considered the basic problem of the links to land and resources, nor does it have any real power (Davis 1988, pp. 14–15). OAS is, however, moving toward a promotion of indigenous rights.

No attempt will be made to describe the many organizations involved in indigenous affairs, but several case studies have been chosen to illustrate the emphases of major regional and international indigenous groups, of NGOs, and to show what is occurring at the international level.

Regional Indigenous Organizations

Regional organizations have existed between neighbouring countries for several decades; the Nordic Saami Council, for example, was established in 1953 with representatives from Finland, Norway, and Sweden. Broader, more diverse organizations, however, have only come into being in the last two decades or so. These groups hold assemblies and conferences, publish newsletters, and seek international support.

Latin America is home to an enormous diversity of indigenous peoples who have very different experiences with the dominant society. This has led to considerable competition for support in countries by organizations claiming to represent their interests. The situation is complex and the stakes can be high.

Our interests lie with what Smith (1985) calls the "ethnic federations," which have their origins in community organizations in the frontier areas now under assault, especially in the Amazon. Decision-making in these organizations tends to be lengthy and based on consensus. At both the national and the regional levels, many groups are in their infancy and tend to be rather precarious. Many have met considerable resistance. CRIC in Colombia, for instance, has been the target of violence and militarization, but has received much international support.

For the vast majority of the world's indigenous peoples, however, regional or even national organization is almost impossible. By far the largest number live in Asia; but, in only a few of those countries are there viable indigenous organizations. Even fewer are able to attend international fora. These organizations must confront powerful interests in every culture. Most countries challenge the idea that there are indigenous peoples within their borders and often these are precisely the nations with the worst human-rights records, for example, Bangladesh, China, and Indonesia. The Philippines stands out as one country where there are many indigenous and support groups with a wide range of activities (Lynch 1987, pp. 41–42).

Most of Africa, with its long and complex history, is outside the international arena of indigenous organization and far less attention is given to the region in the literature. Here, and in Asia too, superpower politics have often meant that human-rights abuses are ignored by both states and NGOs (Sanders 1989, p. 418).

Here, we describe two regional organizations, one from the South and one from the North — the far north. They illustrate well the types of activities that such organizations carry out. The threats faced by peoples in these regions differ in degree, as do the resources available, and this is reflected in the emphases of their programs.

The Coordinadora for the Amazon Basin — COICA was founded in March 1984 as an umbrella group made up of member

organizations from Bolivia, Brazil, Colombia, Ecuador, Peru, Suriname, and Venezuela. It has become the largest and most effective group from any tropical forest area. COICA stresses participation in international fora such as the UN as a "platform for a joint struggle" (Aparicio 1989, p. 23) and feels that the best defence of the Amazonian biosphere is to gain a secure land base and to promote their own models for managing its resources. COICA helps people demarcate their lands, the first step in the process of gaining control. COICA also rejects most Western development projects. It has resolved to demand indemnity from extractive companies, to use such monies to form an economic fund for reforestation, and to reject militarization of the Amazon.

The impact of COICA can be measured by the increased attendance of government representatives at its meetings. In 1990, COICA and representatives of 14 conservation organizations, including WWF, agreed to work together to design "the best strategies for the defense of an indigenous Amazon (WWF 1990). This unprecedented alliance was spelled out in the Iquitos Declaration.

The Inuit Circumpolar Conference — The ICC is involved in a broad range of cultural, political, social, economic, and environmental issues (Sambo 1989). Founded in 1977 as a response to the threat of offshore oil development, it represents 117 thousand Inuit from Alaska, Canada, Greenland, and (as of 1992) Russia. It hopes to ensure the survival of the Inuit and their culture and values; to protect the delicate Arctic environment; to foster peaceful coexistence; to foster the use of safe and appropriate technologies; and to support collaborative research, information and cultural exchanges, and international agreements.

ICC is working on several harvesting issues, trying to ensure access for native peoples to traditional resources and, if possible, to come to joint-management agreements. This involves lobbying on such questions as migratory birds, marine mammals, whales, and other shared resources such as polar bears. The

organization is also active in land claims and issues such as oil exploration and the militarization of the region.

In 1986, ICC unveiled the Inuit Regional Conservation Strategy. This is the first attempt by an indigenous people to implement a world conservation strategy that both addresses modern-day development and aims to sustain traditional harvests. In 1989, ICC was given the prestigious Global 500 Award for this work. ICC has acquired voting rights at IUCN, seeing it as an important international forum to counter antiharvest movements and spread the word about the traditional knowledge and expertise of indigenous peoples. ICC is also active at the United Nations. Mary Simon, a Canadian, was ICC President from 1986 to 1992.

International Indigenous Organizations

Truly international bodies originated in North America in the mid-1970s. In 1974, the International Indian Treaty Council (IITC) was established in the United States by the US American Indian Movement (AIM). The World Council of Indigenous Peoples (WCIP) was the second group to be formed. It has been chosen for our short case study because of its connection to Canada. A major difficulty for these organizations remains the great diversity of indigenous peoples and the different hurdles they face. It has been hard to extend membership beyond the developed countries and Latin America because of the great difficulties involved in the countries of Asia and Africa.

The World Council of Indigenous Peoples — WCIP was founded in 1975 on the initiative of George Manuel, head of the National Indian Brotherhood of Canada, as "a permanent international organization of indigenous peoples having official status as a Non-Governmental Organization of the United Nations" (Bodley 1990, p. 175). Its headquarters is in Ottawa. WCIP is made up of five regional bodies, representing North, Central, and South America, the Nordic peoples, and the Asia–Pacific region. The last of these is, as yet, a limited initiative and there is no African

voice in the organization, but problems from all over the world are discussed.

The chief aim of WCIP is to "ensure political, economic and social justice to indigenous peoples" and "to establish and strengthen the concepts of indigenous and cultural rights" (Bodley 1982, p. 188). WCIP works actively at the United Nations and lobbies many national governments. Education and the strengthening of alliances are also major aims of the organization. There have, however, been disagreements over its basic role. Should it be a diplomatic, advocacy organization, or a more active support group for members involved in specific fights?

WCIP is a moderate voice on the world scene and receives financial support from a wide range of governments, churches, and humanitarian organizations. The Canadian government was not at first enamoured of the international activities of the Indian Brotherhood, but finally acquiesced and has provided funding through CIDA (Sanders 1989, p. 414). In 1988/89, CIDA supported WCIP's Action Plan for development in Central and South America (WCIP 1988, p. 10).

NGOs and Other Advocacy Groups

Advocacy groups provide a valuable service for indigenous peoples. They have financial resources and expertise and are willing to carry out research, often a dangerous undertaking for local people. They serve as watchdogs, publicizing human-rights violations and the adverse effects of development on indigenous peoples. They support indigenous peoples in their fight for self-determination and land rights and have been active in international fora such as the UN in pushing for legal standards. Furthermore, there is now an informal network of indigenous leaders, anthropologists, and others that can "respond almost immediately to any crisis situation" and lobby governments to improve their treatment of indigenous peoples (Bodley 1990, p. 205).

Support organizations have a long history, dating back to 1839 and the Aborigines Protection Society. Many of the new organizations date from the years around 1970. In Europe, the most important NGOs are Survival International in the UK, Gesellschaft für bedrohte Völker in Germany, the Workgroup for Indigenous Peoples in the Netherlands, and IWGIA in Denmark. In the US, Cultural Survival was established in Boston in 1972. It "serves as an advocate of the rights of ethnic minorities" and "tries to assist groups at critical phases in their relations with national societies," helping them to gain "control and influence over the direction of change and the nature of its beneficiaries" (MacDonald 1985, pp. 1–2). Cultural Survival has published extensively on the topic of indigenous peoples around the world and supports a wide range of projects aiming to help indigenous peoples, including the marketing of rain-forest products.

The International Work Group for Indigenous Affairs — IWGIA was established in 1968 in Copenhagen by a group of anthropologists (IWGIA 1989, p. 15). In the early days, IWGIA protested human-rights violations by direct intervention with national governments; but, as indigenous organizations spread into Latin America in the 1970s, it turned its attention to helping people to do this for themselves. It works closely with indigenous groups in many regions, especially in Europe.

IWGIA stresses international pressure and has played an important role in the establishment of regional and international indigenous organizations such as WCIP and CISA, the South American Indian Council. It has been active at the United Nations and, in 1989, was granted consultative status. The backbone of the organization is the publication of a series of studies and newsletters, which document the plight of indigenous peoples in all areas of the world (IWGIA 1989, p. 46).

International Agencies

Since World War II, a growing body of international law has addressed the question of human rights. Indeed, there are already

nine instruments that theoretically protect to some extent the rights of indigenous peoples as individuals, including the UN Charter itself, the Universal Declaration of Human Rights, and the Programme of Action produced by the 1978 UN Conference to Combat Racism and Racial Discrimination (ICIHI 1987, pp. 115–118). Clearly, however, they have failed in countless instances.

In recent years, several organs of the UN system have been working to develop new standards for the treatment of indigenous peoples. This movement to address group rights is a departure from the main thrust of European law and philosophy over the last two centuries, which has concentrated on the rights of the individual (Barsh 1987, p. 6). Yet much of the tension in today's world has occurred precisely because intermediate-sized groups have been ignored. Few nations are willing to grant special rights to subsets within their borders and alternate governing structures are invariably destroyed. Indigenous peoples thus face an uphill struggle in their fight for group survival.

The International Labour Organization — The ILO was concerned about the exploitation of Latin American Indians in the workforce as early as 1921 (Sanders 1989, p. 412). In 1957, the ILO adopted Convention 107 on the Protection and Integration of Indigenous and Other Tribal and Semi-Tribal Populations in Independent Countries, the only international instrument that deals exclusively with the problems of indigenous people. Convention 107 covered a wide range of issues; from today's perspective, however, it was paternalistic and did not address the question of self-determination. Furthermore, only 27 countries ever signed the document and there was no mechanism to enforce violations. Canada was never a signatory.

In June 1989, the ILO adopted a revised version, Convention 169 on Indigenous and Tribal Peoples in Independent Countries, which came into force in September 1991 after ratification by Bolivia, Colombia, Mexico, and Norway. This, too, was met with a hail of criticism from NGOs and indigenous people, who feel

that it "fails to meet the demands and aspirations of tribal peoples" (Colchester 1989). A particular worry is the ambiguous rewording of the section dealing with the right of ownership of tribal lands. Sharon Venne, a Cree, fears that "the revised text is likely to open the door to all forms of resource exploitation on indigenous lands, without indigenous consent" (Colchester 1989).

Nevertheless, progress has been made on a number of issues. The Convention respects indigenous peoples and their ways of life and suggests that they should be consulted in matters that affect them. The new law also "goes further than any other international instrument in recognizing that rights may be collective, as opposed to merely individual" (Colchester 1989). It appears to have some ability to monitor abuses in signatory countries: the ILO took part in an international lobby against Bangladesh's treatment of the tribes of the Chittagong Hill Tracts (Sanders 1989, pp. 422–427). Yet the differing attitudes of people involved in the drafting and ratification of this convention illustrate how difficult is the path that lies ahead for indigenous peoples in their struggle.

The ILO is made up of representatives of governments, workers, and employers. During the drafting of Convention 169, it allowed only a minor role to indigenous and advocacy groups, and many of the workers and employers with voting powers had little knowledge or understanding of the problems involved (IWGIA 1989, pp. 169–170). Government representatives had a wide spectrum of approaches: from progressive (Colombia and Portugal) to positions promoting state rights over indigenous rights (Bangladesh, Brazil, India, Japan, and Venezuela). Canada, however, drew the most criticism from indigenous and advocacy groups, because it tried to act as a broker between the progressive countries and those that deny human rights to indigenous peoples. Because of our influence as a country supposedly progressive in our internal policies, this had the effect of diluting many initiatives.

United Nations Working Group on Indigenous Peoples — In 1971, the UN Sub-Commission on Prevention of Discrimination and Protection of Minorities authorized a comprehensive study of the problem of discrimination against indigenous peoples. The 24-document report took over a decade to produce; yet, despite a wealth of valuable proposals and recommendations, it had little impact (Sanders 1989, p. 406).

More significant has been the UN Working Group on Indigenous Populations (UNWGIP), established in 1982 in response to international pressure. (In 1989, the highly symbolic word "Peoples" replaced "Populations" in the title. This was a symbolic victory for native peoples.) UNWGIP serves as a forum where abuses can be aired, but its main mandate is to set standards, which eventually will be spelled out in a declaration on the rights of indigenous peoples. The Working Group consists of five independent experts, one from each major region of the world.

UNWGIP is open to representatives of indigenous and advocacy organizations and even to independent scholars and observers. It is, indeed, the most open body in the United Nations system. It sets flexible criteria for the accreditation of indigenous groups and there is a small travel fund to assist indigenous organizations. As UNWGIP has met for only 5 days a year (10 days a year in 1990, 1991, and 1992), progress has been painfully slow. To complicate matters, UNWGIP must report through a hierarchy of levels in the United Nations until it reaches the General Assembly, which has the ultimate authority to make decisions. The group has no power to adjudicate complaints, so that reports of abuse are apt to lose their immediacy. In 1990, the Oka standoff in Quebec was a major topic of discussion.

The annual meetings have become very large. In 1988, representatives of 33 countries, 1 liberation movement, the ILO, 10 indigenous and 31 other NGOs with consultative status to the UN, 77 indigenous peoples' organizations, 23 other organizations and groups, and 30 individuals attended (United Nations Economic and Social Council 1988). By far the strongest

representation of indigenous groups, perhaps 80 percent, came from the Americas.

What must be emphasized is the drama of the meetings and their immense value to indigenous groups as a place where they can forge new alliances and lobby governments. Yet few of the indigenous peoples from countries that commit the worst abuses are able to attend, either for political or financial reasons. African people have almost no voice, and the situation in most Asian countries is little better. As at the ILO meetings, governments run the gamut from progressive attitudes to a complete denial of the existence of indigenous peoples within their borders. Australia, Canada, and Scandinavia have been the most involved; the US government "shows very little interest" (Sanders 1989, p. 415).

In 1988, the Draft Universal Declaration on Indigenous Rights was presented to the Working Group. It is not expected that the final document will be ready for signing until 1994 or 1995. An early draft of the articles involving land rights and resource use is shown in Table 12. A broad range of topics is addressed; yet, in the eyes of many indigenous people, there is still an immense distance left to travel (IWGIA 1989, p. 147). Plainly, the drafting of a final document that will satisfy most parties is a difficult process, but at least there is now an open discussion and participation by indigenous groups from many areas of the world. The whole problem of the implementation of any final document is another question altogether; as a declaration, rather than a convention, it will not be binding in law.

UNWGIP has also carried out a study of Indian treaties and land claims in Canada, the United States, and other countries. Needless to say, this was a contentious issue with governments (Sanders 1989, pp. 409–410; Venne 1989, p. 109). Canada, in particular, lobbied extensively to stop the inquiry, but eventually acquiesced.

The World Bank — Over the years, the World Bank has come under increasing attack for its neglect of environmental issues and indigenous peoples in the projects it finances. Transmigra-

Table 12. Excerpts from UNWGIP Draft Universal Declaration of Indigenous Rights (1989 revised version).

II (2)	The collective right to exist as distinct peoples and to be protected against genocide....
III (12)	The right of collective and individual ownership and possession of the lands which they have traditionally occupied....
III (13)	The right to recognition of their own land-tenure systems for the protection and promotion of the use, enjoyment and occupancy of the land.
III (14)	The right to special measures to ensure their control over surface resources...including flora and fauna, waters and sea ice.
III (16)	The right to protection against any action or course of conduct which may result in the destruction, deterioration or pollution of their land, air, sea ice, wildlife or other resources....
IV (18)	The right to maintain within their areas of settlement their traditional economic structures and ways of life, to be secure in the enjoyment of their own traditional and other economic activities.... In no case may an indigenous people be deprived of its means of subsistence....

tion in Indonesia, hydroelectric dams in the Philippines, the Polonoreste project in western Brazil — these and many others have directly harmed native peoples and led to environmental degradation.

In 1982, responding to worldwide pressure, the Bank released a policy paper on indigenous peoples (Goodland 1982). The negative effects of inappropriate development were discussed and new "Operational Steps for the Project Cycle" outlined, although it is not clear that the Bank has fully incorporated this approach into its recent projects. This change in direction, if real, will be the result of an unprecedented international campaign aimed at drawing attention to the failings of the multilateral development banks. This campaign included many hearings in the US Congress, articles in major newspapers, and protests by some of the indigenous peoples affected by World Bank projects, for example, at the Singrauli thermal power plant in India (Rich 1989, p. 203).

The last 20 years have thus seen a rapid and dramatic increase in the organization of indigenous peoples and the articulation of their philosophy and demands for justice. By no means has this been an easy process. The results of international pressure are, however, being seen at the national level. Canada is an excellent example of evolving attitudes, of conflicts in society resulting from the demands of indigenous peoples, and of the slow and often frustrating journey toward the resolution of at least some of the problems. The questions of control over land and resources remain central to the whole process.

Indigenous Organizations in Canada

Aboriginal organizations are a relatively new phenomenon in Canada. Historically, there were many impediments to their growth, including government policy, but small groups attempted, "with increasing urgency and frequency," to seek redress on the land-claims issue in the early years of the century, for example, in British Columbia (Cassidy and Dale 1988, p. 6). From the 1930s, regional organizations were founded in Western Canada and the decision of first federal and then provincial governments to provide funding in the early 1960s led to many more groups at regional, provincial, and national levels (Purich 1986, pp. 186–187). The foundation of the National Indian Brotherhood, formed after a split of the National Indian Council in 1968, was a particularly important event. By the late 1960s, many native organizations had acquired substantial political strength. In addition, the plight of the country's indigenous peoples was increasingly brought to public attention, resulting in the parallel growth of support groups.

Faced with the threat of the 1969 White Paper, which sought to remove any special status for aboriginal people, fledgling Indian organizations were galvanized into action. They quickly learned that they could achieve success with a vigorous program of lobbying, protests, and media attention. The White Paper was withdrawn in June 1970. Since then, there has been "a period of

enormous social change" for Canada's native peoples, triggered in part by the White Paper (Ponting 1986, p. 13).

There is great ethnic diversity in the ranks of Canada's indigenous peoples, reflecting a wealth of historical and environmental conditions. At least 50 languages, belonging to 11 language families, exist even today, although much of their traditional richness has been lost and most are endangered (McMillan 1988, p. 3). There are three major organizations that represent the aboriginal peoples of Canada at the national level:

- The Assembly of First Nations, the largest group and a powerful voice on the national scene, was formed in 1981 when the National Indian Brotherhood was reorganized. It represents Canada's status Indians and maintains that negotiations can only be carried out on a nation-to-nation basis.

- The Native Council of Canada was founded in 1971 to represent nonstatus Indians and Métis. This diverse group of people has fought to obtain constitutional and legislative recognition of their aboriginal rights, since, in general, they have failed to benefit from either mainstream society or the Indian Act.

- The Inuit Tapirisat, formed as an umbrella organization of Arctic peoples in 1971, has been active in pressing for land claims and in the constitutional debate. It is concerned with a broad range of northern issues and is pursuing ties with other Inuit. A major goal has been the creation of a homeland, Nunavut, in the eastern Arctic.

The role of Canada in the growing international movement for the recognition of indigenous peoples and their rights must be placed in the context of events in this country over the last two decades. There are three major arenas where this drama is unfolding: the land-claims process, the constitutional debate, and the courts.

Developments in Canada: 1970–1990

After many decades of frustration for native peoples, 1973 was a watershed for land claims. In that year, the Supreme Court of Canada ruled in the case of Calder v. Attorney General of British Columbia. Although the case was rejected, six of the seven judges recognized aboriginal rights and three said that such rights still exist. This recognition in law cast a shadow over public ownership of Crown lands and led the federal government at long last to initiate a comprehensive land-claims policy. The aim of this policy is to negotiate settlements in those areas of Canada where aboriginal title has not been dealt with by treaty or superseded by law (INAC 1987a, p. 9). The process deals with a wide range of highly complex issues. For native peoples, several topics are paramount:

- Their right to self-determination;
- Their right to retain ownership of their traditional lands;
- Their right to economic, social, and cultural independence;
- The amount and manner of compensation; and
- Control of resources, including wildlife, water, and subsoil rights.

For a just and honourable settlement of native claims, political will is an obvious prerequisite. Yet the funereal pace at which the unfinished business of treaty negotiation has proceeded raises doubts that such will was present. The government put limits on the number of claims that could be negotiated at one time (six); it insisted that there be a final, blanket extinguishment of all aboriginal rights as part of each settlement; it failed in the early years to include such matters as self-government or the sharing of resource management and revenues; and it appeared that the Government of Canada was willing to settle only if there was a major development project involved (notably the James Bay hydroelectric scheme). In the first 17 years of negotiation, only

three agreements were reached: the James Bay and Northern Quebec Agreement (1975), Northeastern Quebec (1978), and with the Inuvialuit of the western Arctic (1984). Yet, as the current imbroglio over James Bay has proved, these settlements have failed to provide lasting solutions.

The government also set up a specific claims process to deal with problems arising from the administration of treaties or the Indian Act. Progress on these claims has been halting, to say the least. By 1991, almost 20 years after the policy was initiated, only about 8 percent of an estimated 600 claims submitted had been settled. One type of specific claim is particularly significant — the entitlement claim, which involves land promised but never delivered to bands. On the prairies alone, many millions of hectares are at stake, but federal–provincial wrangling over the years put an effective halt to resolution of the many claims.

Another avenue taken by native groups in Canada is the fight for recognition of aboriginal rights in the Constitution. Between 1978 and 1982, this was the dominant political issue for Canada's native people (Sanders 1985, p. 151). A large-scale national and international lobby was mounted in response to attempts by the government to delay native questions to negotiations after patriation of the Constitution. The lobby included attempts to petition the Queen, members of the British Parliament, the UN, the European Community, and many others, gaining considerable support and media attention. In the end, the Constitution did include clauses recognizing and affirming existing treaty and aboriginal rights, but these were not defined. Four meetings in the mid-1980s, attended by Canada's first ministers and representatives of aboriginal groups, failed to resolve the issues.

There has been a great deal of litigation since the Constitution Act of 1982, fueled by the need to clarify the term "existing rights." The Supreme Court of Canada has ruled in several cases and indeed appears to be taking a much less restrictive approach than governments have done in the past. In 1983, it stated that "treaties and statutes relating to Indians should be liberally construed and doubtful expressions resolved in favour of the

Indians," while in 1985 it ruled that treaty rights should...be interpreted in a flexible way that is sensitive to the evolution of changes...in normal practices" (Assembly of First Nations n.d.). In early 1990, a number of judgements supported aboriginal rights. The most important was the Supreme Court of Canada decision in the Sparrow case, in which Indian requirements for fish for food, ceremonial, and social purposes were ruled to take precedence over all other claims to the fishery, subject only to conservation concerns.

To imply that the indigenous peoples of Canada speak with a unified voice would be wrong. As in all countries, it has been difficult to translate local concerns into a comprehensible and consistent general policy, and there have been sharp internal divisions over both issues and strategy over the years. Canada's native peoples are, however, united in an intense frustration that the "high hopes...for a just and honourable resolution of our problems have been sorely betrayed...since the Constitution Act was passed recognizing and affirming our aboriginal rights" (Erasmus 1989, p. 24).

In the late 1980s, the slow pace of the comprehensive claims process and the lack of progress toward self-government led to a more activist stance by groups across the country. Roadblocks against logging and mining companies, the occupation of the airbase at Goose Bay, Labrador, demonstrations, and marches became daily fare in the media. In addition, many new court cases were fielded over land claims, development projects, and other disputes.

Resource Issues and Canada's Indigenous Peoples

What must be emphasized is the huge amount of land and the wide range of resources involved in the struggle for native rights in Canada. Most of the area outside the original treaty settlements, about half of Canada, and much of the rest as well is under

consideration, although obviously native people do not expect to gain title to more than a fraction of it. Again, the issues are complex and the financial dimensions enormous. A sampling of these concerns and a few examples follow.

The harvesting of wildlife is a cornerstone of all treaties and agreements between Canadian governments and aboriginal peoples. Not only does it have great symbolic significance but it also remains an essential subsistence activity. Native peoples all over Canada are fighting to assert their rights, demanding at least a share in wildlife management. In the Maritimes, for instance, native groups set up their own conservation schemes for hunting and fishing after negotiations with federal and provincial officials broke down in late 1991. In British Columbia, there has been a bitter and protracted legal struggle over the salmon fishery.

Canada's remaining old-growth forests are the site of many battles between conflicting interests, including native land claims. Recent hot spots have included the pine forests of the Temagami area of northern Ontario (claimed by the Teme-Augama Anishnabi), the Carmanah Valley of British Columbia (claimed by the Nuu-Chah-Nulth), and northern Alberta. Compromises announced by governments have pleased few. In British Columbia, many companies have faced disruption as a result of blockades and litigation, and all potentially face uncertainty over long-term access to the resource, since almost the whole province is expected to be the subject of land-claim disputes.

Mining frequently conflicts with native interests. The expansion of uranium mining in northern Saskatchewan is a concern of indigenous, environmental, and peace organizations (Harding 1989). More than 70 percent of the population in the area is Indian, yet indigenous rights were specifically excluded in the Cluff Lake Board of Inquiry, held in 1977. Oil exploration, particularly in Alberta, has interfered with subsistence activities and has been carried out on lands claimed by native groups, such as the Lubicon Band.

Hydroelectric schemes have flooded many thousands of square kilometres of native land in most provinces. In the north,

a frequent companion is mercury pollution. Bitter controversy and debate have followed agreements reached with native groups (Waldram 1988). The proposed extension to the James Bay scheme is the most passionately argued case today, but natives from Ontario, Quebec, and Manitoba are all threatening to halt hydro development around James and Hudson bays until outstanding disputes are settled (Roberts, D. 1991).

Seldom are the issues straightforward. In the old-growth pine forest of the Temagami area of Ontario, for instance, the tangled themes include native rights, jobs in an economically depressed area, sustainable forest management, and wilderness recreation (Bendickson and Hodgins 1989). A particular worry for resource users is the possibility that, once land claims have been settled, Canada's indigenous peoples will insist on more sustainable models of resource management on their lands, such as careful selective logging, reflecting traditional philosophy. For holders of timber leases, there is the added complication that native forms of self-government, often by consensus in small groups, will mean that they have to deal with dozens of landholders and many approaches to harvesting (Watt 1990). Undoubtedly, there will be demands for a share of the profits. For an industry in crisis, the prospect is daunting. Yet the cost of inaction is also high. To quote Bill McKnight, former Minister of Indian and Northern Affairs: "I firmly believe that the lost opportunity cost, the lack of economic self-reliance, the lack of development, the inability to plan in Canada in the claimant areas, is much greater than the cost of settlement" (quoted in Cassidy and Dale 1988, p. 18).

The Present and the Future

Canada's relations with its native peoples are in a state of extreme flux. The distance covered since early 1990 could scarcely have been imagined at that time and the journey is far from over. Undoubtedly, the events of the summer of that year were a spur to change. In June, Elijah Harper, a member of the Manitoba legislature and the former chief of a Cree band, effectively

scuttled the Meech Lake Accord to amend the Constitution. The Accord was opposed by native groups on a number of grounds. They felt that it ignored native concerns and that the rules of amendment made it unlikely that aboriginal concerns would ever be addressed in the future. The tough stand on Meech and the standoff at Oka finally focused public attention on the plight of native peoples within Canada and resulted in a wave of sympathy and support from many Canadians.

The failure of Meech added fuel to the highly charged atmosphere of the Canadian constitutional debate. During the long process leading to the Charlottetown Accord of September 1992, native peoples fought hard to be recognized as full and equal partners in reforming the Constitution. Eventually, four national groups took their place at the negotiating table, and there was agreement among all parties that the inherent right to self-government should be entrenched in the Constitution. This was a major victory for Canada's indigenous peoples, since the concept had been unacceptable to both federal and provincial governments, who fear the potential for a "Swiss cheese" Canada, with multiple challenges to sovereignty by native groups.

The defeat of the constitutional referendum, however, leaves the fate of this country's native peoples in limbo and raises the spectre of increased militancy and litigation. Nevertheless, the concept of native self-government is strongly supported by a majority of Canadians, even if its full implications are but dimly perceived, and much can be achieved without constitutional change. Serious practical questions, however, have yet to be addressed.

On the land-claims front, there was already some softening of the government position after several reviews of the process in the mid-1980s. Since 1989, the pace of settlement has picked up, and the federal government has now promised to accelerate the process. In November 1992, the Inuit of the eastern Arctic ratified a massive land-claims agreement, becoming joint owners of 350 thousand square kilometres, and thus the largest landowners in the world. In exchange, the Inuit will relinquish their

claims to more than 2 million square kilometres of land. By 1999, Nunavut will be a reality. In the Yukon, native people will gain title to 41 thousand square kilometres. Huge payments are involved, and all settlements include complex arrangements for wildlife management.

The ferment of the summer of 1990, however, led to a hardening of positions on the part of native people. The Dene–Métis of the Northwest Territories refused to ratify an agreement-in-principle, despite its lucrative terms, because it involved the extinguishment of aboriginal rights. The government is now negotiating with individual groups in the region and has reached agreement with the Gwich'in Indians of the Mackenzie Delta.

British Columbia is left as the most difficult area for comprehensive land claims. Over the years, the provincial government has "been hostile at worst and lukewarm at best to claims negotiations" (Simpson 1990). In August 1990, however, the provincial government agreed to take part in land-claims negotiations. In late 1991, the new BC government went further, recognizing the political legitimacy of aboriginal title and the inherent right to self-government. But land in British Columbia is already massively committed to a host of third-party interests. The practical problems are horrendous and compensation costs promise to be far higher than in the north. An ominous sign of the difficulties ahead is the devastating setback to the native cause in the land-claims case brought by the Gitksan-Wet'suet'en. The judge in the case, which took 318 days and cost 25 million CAD, ruled that aboriginal title no longer existed (Simpson 1991).

There are other signs of change. A 3-year Royal Commission on Native Affairs, for instance, is conducting hearings across Canada; aboriginal representatives form a majority. The Indian Act is to be overhauled. In Saskatchewan, the way has been cleared for settlement of outstanding entitlement claims: 27 bands will receive a total of 393 million CAD over 15 years, enabling them to buy land.

There is also action at the local level. Since 1985, the federal government has engaged in extensive negotiations on some of

the practical and less contentious aspects of self-government. As a result, indigenous peoples across Canada are quietly gaining control of much of the day-to-day functioning of their communities. There is a great diversity in the way that Indian communities have come to the negotiating table (INAC 1987b). Some groups prefer to remain within the Indian Act, assuming more control over program delivery. Others wish to set up completely new arrangements with control over such areas as education, culture, health, economic development, and resource management. The Sechelt Indians of British Columbia, for instance, reached an agreement in 1986, while the Gitksan-Wet'suwet'en are well on the way to a broad-ranging and innovative system of local governance.

Just as there are many new arrangements for self-government at the band level, a host of models for resource management will surely evolve as land claims are settled. In *After Native Claims?*, Frank Cassidy and Norman Dale (1988) describe growing native involvement in the fishery, the forests, and nonrenewable resources of British Columbia. The study reveals a broad range of approaches, both in the models used and in the way that native groups interact with other players. There is indeed the possibility of balkanization into hundreds of jurisdictions in the future, but the authors also describe many examples of cooperation between natives, federal and provincial governments, and third parties. Although the implications for each resource sector and each region of the country are impossible to predict, a diversity of approaches is sure to emerge.

A significant factor is the "tremendous revival of interest in traditional native ways" among Canada's indigenous peoples in recent years (Cassidy and Dale 1988, p. 8). Indigenous philosophy the world over stresses the centrality of land and a concern for generations past and to come. In Canada, native peoples speak often of the need to balance environmental values against material gain. Many groups are designing sustainable development strategies. As natives gain control over more of Canada's resources, this may well influence the way in which resources are

used. But, as Cassidy and Dale (1988, p. 189) comment, aboriginal peoples "also have pressing economic needs" and some have "indicated a keen interest in acquiring timber rights and enhancing community development on the basis of logging and wood processing." Indeed, at Canoe Lake in northwestern Saskatchewan, the longest sustained logging blockade in Canada is pitting one group of local natives against another. At the heart of the dispute is a clash between those involved in clear-cutting forest and those who favour more traditional, sustainable activities (Langer 1992).

The coalition of native and environmental groups is having an enormous impact on major development projects in Canada. A series of victories in the courts is forcing federal and provincial governments to carry out extensive impact studies on controversial projects. In British Columbia, the Carrier–Sekani Tribal Council and a coalition of environmental and fishing groups took Alcan Aluminium Ltd to court over its half-built, 1 billion CAD hydroelectric project near Kitimat. In May 1991, a judge of the Federal Court of Canada ordered a full environmental review of the project. In September 1991, a full environmental review was ordered for the Great Whale project; in January, 1992, the Supreme Court of Canada, in an 8 to 1 decision, confirmed that the federal government has the constitutional right to order impact assessments of any project that impinges on any aspect of federal jurisdiction (York 1992). Only time will reveal the full implications of these decisions.

Canadian Indigenous Peoples and the International Scene

Despite the terrible acrimony of 1990, there has undoubtedly been progress toward the aspirations of native peoples in recent years. One lesson is the importance of action at the international level. The politics of embarrassment, of seeking to disgrace your opponents in a glare of publicity, can influence government policy when played out on an international stage. Canada's

indigenous peoples have used international fora such as the UN to promote their viewpoint for many years. They have developed sophisticated strategies to publicize their cases at many levels. The Cree of northern Quebec and the Lubicon Band of northern Alberta are two prominent examples.

James Bay

The Cree of northern Quebec have been battling hydroelectric development for two decades. When the first stage of the massive James Bay scheme was announced in 1971, the Cree lived in isolated communities. But they organized rapidly, fighting the project in the courts and the political arena. Eventually, they were forced to recognize the inevitability of the project. In 1975, the Cree and the Inuit of Labrador signed the James Bay and Northern Quebec Agreement.

In 1989, the Quebec government announced two new megaprojects in the region. The 12.6 billion CAD, 3 168-megawatt Great Whale Project, which will flood an area of 4 400 square kilometres, was to be completed in 1998; the 8 400-megawatt Nottaway–Broadback–Rupert development, in 2006. These projects are the central building block of the government's plan to stimulate economic growth in the province. Heavily subsidized power will be an attractive inducement to aluminum smelters and other industries willing to open plants in Quebec. Much of the cost of the project was to be borne by a 17 billion CAD contract with the New York Power Authority.

The Cree mounted an aggressive campaign, retaining one of the world's major public relations firms (McNish 1991). They gained many high-profile US allies including politicians, environmentalists, and movie stars. Demonstrations on their behalf were a regular feature of the New York scene in 1991. They testified at state legislature hearings on the financial viability of the New York power contract, challenging the economic base of the project and emphasizing conservation and more environmentally friendly sources of energy (Dougherty 1991). In February

1992, their case was supported by the International Water Tribunal in the Netherlands. James Bay was also condemned at UNWGIP meetings. In March 1992, New York State canceled its contract, placing the whole project in jeopardy. At the least, there will be major delays and increased cost.

The Lubicon Cree

The Lubicon Cree of northern Alberta have a long-standing land claims case (Churchill 1989, pp. 152–174). The Band was not originally registered under Treaty 8 because of its isolation. It thus never relinquished sovereignty, nor was it given its own reservation.

In the early 1970s, oil companies began building roads into the area and, in 1978, drilling began. Dramatic damage has been inflicted on the land and wildlife of the region. Communities have been moved. The Lubicon have been fighting for their rights in the courts ever since, with little success, and have petitioned both federal and provincial governments. The story is long and complex, but the Alberta government stalled all attempts to establish aboriginal rights in the area, questioning the very existence of the Band. In 1982, rejecting earlier offers of a small amount of land, Chief Bernard Ominayak began to press for rights to a very large area (about 65 thousand square kilometres) and for compensation of 900 million CAD as a share of oil revenues to date (Churchill 1989, p. 160).

In 1988, the provincial government entered into an agreement with Daishowa, a Japanese forestry corporation, to build the largest hardwood pulp mill in Canada. Daishowa received a timber lease on a huge area of land that neatly encompassed land claimed by the Lubicon as their traditional hunting grounds (Churchill 1989, p. 169).

The Lubicon have fielded a large campaign for public support in North America and Europe and have pursued confrontational policies. Military action has been threatened, roadblocks mounted, and logging equipment destroyed. In the mid-1980s, the Lubicon threatened a range of actions against the 1988

Calgary Olympics. In 1991, a delegation traveled to Japan to protest against Daishowa, which has now put its mill up for sale. The UN human-rights committee was petitioned. In May 1990, it ruled that "historical inequities...and certain more recent developments threaten the way of life and culture of the Lubicon and constitute a violation of Article 27" of the International Covenant on Civil and Political Rights (Toronto *Globe and Mail* 1990b).

In Canada, a stalemate has been reached over financial compensation. An outbreak of tuberculosis in 1987 highlighted the destitution, poverty, and malnutrition of the Lubicon at a time when companies were extracting about a million dollar's worth of oil from their lands each day (Richardson 1989, p. 254).

The vigorous and imaginative campaigns mounted by Canada's indigenous peoples both at home and abroad have resulted in much negative publicity for this country. Stephen Lewis, former Canadian ambassador to the UN (quoted in Hall 1989), could say, even before Oka:

> The treatment of native people was without question the Achilles heel for Canada in the human-rights arena. It undermined our influence, our prestige, our reputation. It made less compelling the human-rights arguments we were making. It was very humiliating, very embarrassing.

Pressure at the international level is, of course, only one aspect of the many dealings of Canada's native people beyond our borders. Canadians constituted a majority of indigenous representatives at the 1988 ILO meetings on Convention 107 and are very active at UNWGIP; indeed, the Grand Council of the Crees was the first organization representing a single indigenous nation to receive NGO accreditation. Indigenous representatives have actively promoted networking with peoples in many other countries, attended many conferences around the world, and sponsored international meetings in Canada. These include the First Nations Commonwealth Conference (1987), cohosted by the Chiefs of Treaty Six, which drew together Maoris, Australian aboriginals, and other Commonwealth peoples in an attempt to

influence Commonwealth leaders; Voices of the Earth: a Global Conference on Indigenous Peoples and the Environment (1991), hosted by the Lytton and Mt Currie Indian Peoples of British Columbia; and Strengthening the Spirit — Beyond 500 Years (November 1991), organized by the Indigenous Committee 500, made up of representatives of seven major Canadian native peoples' organizations.

The World Council of Indigenous Peoples was founded on Canadian initiative. Canadian support groups, including those with an environmental focus, have promoted indigenous issues such as the plight of rain forest peoples in the Amazon and Southeast Asia, as we discussed in Chapter 6. Canadians are thus at the forefront of international efforts to gather information, create strategies, and influence world opinion on indigenous issues.

Conclusions

There is no doubt that thinking on indigenous issues has come a long way in the last two decades. A large range of institutions, individuals, and solidarity groups has acted, often in concert, to mobilize public opinion around the world. Environmental, religious, and human-rights organizations have become involved. There is increasing involvement by the media and popular stars. Even in government circles, there have been changes; but many countries remain intransigent. For them, the basic problem is one of power and access to resources; governments are reluctant to cede either one to small groups. Progress has been made in some countries of the North in the settlement of land claims, but only in Greenland, a country whose population is overwhelmingly indigenous, is there home rule.

The extent to which countries are likely to respond to pressure tactics depends, of course, on the nature of the state involved. The realities of most Third World countries provide far less hope for indigenous peoples. There are, however, some signs

of hope. Colombia, in particular, has set aside large tracts as indigenous reserves. International organizations such as multilateral development banks and the United Nations are also beginning to respond to pressures to address indigenous issues. International action has even forced the banks to cancel programs, for instance, in the Amazon.

Fundamental to the cause of indigenous peoples is the question of development. Few wish to remain locked as museum pieces in isolated reserves. They seek rather the right to manage their land and resources in the way they see fit. Although there are huge differences of opinion on the path of development to follow, new approaches to resource management are emerging. An example is the growth of cooperative management strategies in the fisheries of the northwest coast of North America (Cassidy and Dale 1988; Cohen 1989). Land-claims settlements in Canada now include complex bureaucratic arrangements for shared resource management. The Inuvialuit Agreement in the western Arctic, for instance, provides a promising model. In the Amazon and elsewhere, many projects emphasize traditional land-use strategies.

International organizations such as the UN and regional indigenous and advocacy groups are helping indigenous peoples in their search for land rights and self-determination. Although international legislation has not stopped the violation of human rights in the past, instruments aimed specifically at indigenous peoples may at least influence national governments to improve their policies. Even though each of the avenues open to indigenous people at the international level has its inadequacies, the combined power of their voices is changing world opinion.

For Canada, the combination of court decisions favouring aboriginal peoples and the development of international standards emphasizing self-determination and control over traditional resources will hopefully result in policies that pay far more attention to the rights of indigenous peoples. Canada must be careful that at the least it respects the minimum standards laid down by Convention 169 and the UN Declaration of Indigenous

Rights (when finalized), even if we do not ratify these agreements. Indeed, the provisions of these documents could furnish a model for the cooperative sharing of Canada's resources between competing interests (Turpel 1992).

The 1990s have been called the "turn-around decade." For many indigenous people, survival itself is at stake; for most, the integrity of their culture and land is threatened. Although indigenous issues were covered at the Earth Summit, they were not a prominent part of the agenda. The UN General Assembly has also declared 1993 as the International Year for Indigenous Peoples, approving a motion brought by Canada.

"Only time will tell whether indigenous peoples' organizations present a coherent and global picture of our human condition and an alternative strategy for confronting it" (Burger 1987, p. 61). For all Canadians, the "circle of Confederation will not be complete until the social, economic and political marginalization of Canada's aboriginal people is reversed" (Standing Committee on Aboriginal Affairs 1990, p. 30). As Miles Richardson, Chief of the Haida Nation, has observed:

> There's a unique opportunity before us, a unique opportunity to bridge the cultural and societal gaps between two very different peoples.... The opportunities are enormous for us to move forward and be an example, a shining example, to this world on cultural and societal reconciliation. (Standing Committee of Aboriginal Affairs 1990, p. 2)

PART V

CONCLUSION

Chapter 10

The New Dialogue

It is possible to offer three scenarios of what humanity's response could be to the crisis of environment and development. These might be categorized as "muddling through," "an ordered world," and "enlightened change."

Ramphal (1992, pp. 224–225)

Canada has much to be proud of. Indeed, in the eyes of the United Nations Development Programme, there is no better place on Earth to live (UNDP 1992). Yet, as we have shown, our advantaged position cannot shield us from the realities of poverty, environmental degradation, and conflict in the countries of the South. The effects spill across our borders in many ways. They can be measured in the human suffering of refugees and economic migrants, in possible declines in our migrant songbird populations, in the drug trade, and in the growing need for humanitarian assistance and food aid. They add a new and frightening dimension to our notion of global security.

Throughout this book, we have discussed the reasons for the South's environmental crisis. We have stressed the complex web of cause and effect: the role of rapid population growth, of flawed resource policies, of corruption and repression, of the gross inequalities in and between societies. We have also emphasized the role of the North. Its profligate consumption of resources and its domination of the global economy have had a profound impact on the South and are leading to environmental damage at

the global level. In an interdependent world, our actions are coming back to haunt us.

Assigning blame, however, is no longer the most critical issue. What is at stake is how to manage humanity's shared survival, how to bridge the gap between North and South, rich and poor, how to build on the gains of the Rio Earth Summit. For this to happen, urgent action is required at many levels. Without international cooperation, the crisis can never be handled peacefully. Without concerted action by governments and the dedication of citizens in all countries, there can be no lasting solutions. In this last chapter, we briefly look at some of the successes and failures of the Earth Summit and the very real difficulties that are blocking progress toward an international compact on sustainable development. In these ongoing negotiations, Canada is playing a major role. The perception of this country as a leader, however, will inevitably be coloured by its actions at home.

The Earth Summit and the International Process

When IDRC's South–North Project began in 1989, the issues covered in this book were hardly headline material. That is no longer the case. It has been a challenge to stay abreast of the rapid shifts in attitudes, especially during the year leading up to the Earth Summit. Today, there is no question about the seriousness of the environment–development debate and the unprecedented level of involvement by people from all sectors and walks of life.

Yet what has emerged is a growing gulf between North and South. A North whose perspectives are dominated by global pollution and the erosion of biodiversity, especially in tropical rain forests. A South determined to grasp development opportunities and angered by overconsumption in the industrial countries and the injustices of the global economy. The battle lines have been drawn. To *Time* magazine, it signals "a fundamental shift in the global axis," a new polarization of international

politics that has come to replace the old East–West tensions (Elmer-Dewitt 1992, p. 22).

Over the last few years, the South has mobilized to mount a united front on the issues of environment and development. From a position of weakness, with little involvement in early negotiations on international environmental issues, there has been a growing articulation of the South's needs, an increasing sophistication and urgency to their arguments, a solidarity over many issues. Indeed, by the conclusion of the Earth Summit, there was an exuberant feeling that the negotiations had led to a revitalization of the G-77, the umbrella grouping of 128 developing countries.

Yet the Earth Summit also demonstrated that little has changed. The interregional conflict, the intransigence of several key states, the failure to achieve binding agreements with firm targets, the failure to commit money of the "right" order of magnitude — these were perhaps foregone conclusions. Worse still, the structure of the global economy remains intact.

These failures must not, however, blind us to the very real achievements of the Summit process. In a remarkably short time, the nations of the world reached consensus on an extremely complex set of documents, which, if ratified, will commit them to principles they have never before accepted. That there was consensus at all is a measure of a new dialogue between North and South, a ray of hope that the gulf can be narrowed. At least in theory, many of the concerns of the South have been addressed.

Predictably, reaction to the Earth Summit has ranged from guarded optimism to extreme disappointment. Writing in the days immediately after the close of the conference, it would be foolish to prejudge the outcome. It is far too soon to tell if these vaguely worded documents, miracles of compromise, will be replaced by firm commitments. The result, however, is that many of the mechanisms are in place. From this perspective, the Earth Summit is a way station, the catalyst for a wide range of accords that will eventually transform decision-making all over the world.

There are, however, many obstacles.

First is the question of priorities. The North currently has many other concerns. The desperate state of much of Eastern Europe and the former Soviet Union is the most obvious. A rash of ethnic violence, long suppressed, is threatening to fracture country after country in a region bristling with nuclear weapons; economic chaos is a fact of life; and environmental restoration will cost a fortune. In the United States, there is recession and the worry of an angry, inward-looking public. In Canada, our preoccupation with the Constitution, the possible break-up of the country, and the state of the national economy all make it difficult to make a vigorous commitment to help the South. Yet, somehow, money can be found to wage war against Iraq and military budgets remain high in most countries, despite the waning of the Cold War.

Another factor is the scientific uncertainty and lack of knowledge that pervades many aspects of environment and development, and the impact that this is having on political decision-makers. Global warming is the ultimate example of this problem, as we discussed in Chapter 3; but much more needs to be known about rates of species loss, deforestation, desertification, the ability of various ecosystems to absorb pollution, and so on. When it comes to practical solutions, moreover, the world does not have a textbook on sustainable development, although it is learning. There are vociferous arguments, for instance, over forestry practices, and attempts to tackle environmental problems in the past have often compounded the problem. Lack of knowledge about the intricate complexities of society is perhaps an even greater stumbling block.

There are, as well, many political hazards on the road to sustainable development. In forestry alone, the effects of powerful lobby groups and governments desperate for cash can be seen in the failure of ITTO and TFAP to make real headway. At the Earth Summit, the political realities were plain for all to see. The United States donned the mantle of "Public Enemy #1." It insisted that there be no firm targets in the Climate Change Convention; it

refused to sign the Biodiversity Convention; it obstructed progress in a host of areas. It was not alone. Saudi Arabia and a coalition of Arab countries fought to remove all references to fossil fuels and energy efficiency. India, Malaysia, and other tropical forest countries defended their absolute right to control resources. An unlikely grouping of the Vatican, several Muslim countries, and the White House made sure that little progress was made on the vital question of population. Even when the future of the planet is at stake, leaders continue to sit behind flags and to pursue narrow national interests. Sovereignty reigns supreme.

Reaching consensus on global problems is not an easy task. As we discussed in Chapter 7, there are inherent weaknesses in all international agreements and initiatives. The need for compromise between extreme positions favours the most reluctant party, and ineffective monitoring arrangements, insufficient funds, and a lack of ability to enforce infractions often make the job of implementation almost impossible. This is especially true in developing countries, but it also happens in the North, as Doug Hykle's study of Canada's compliance with CITES in the early 1980s so aptly demonstrates.

Yet pessimism about the process must not be allowed to take hold. Remarkably swift and effective action is possible when governments are convinced that catastrophe is at hand: progress is being made against ozone depletion, for instance, even if it falls short of what is needed. To build on the gains of the Earth Summit, then, there is an urgent need to set clear priorities, untangle the scientific uncertainties, and develop mechanisms to garner and distribute funds. There must be regular follow-up meetings and protocols to the conventions that set firm targets and have teeth. Since none of this is likely to happen overnight, we must promote a vision of step-wise accomplishment, progressively strengthening and tightening these international agreements, as is happening with the Montreal Protocol.

Financing the Global Bargain

For the South, however, no progress is likely until there is substantial financial assistance. At Rio, rough estimates were given of the cost of implementing Agenda 21 in developing countries: a figure of 625 billion USD per year was floated. Of this sum, 125 billion USD per year is supposed to come from the North, 70 billion USD more than total annual ODA today. The rest must be provided by the countries of the South themselves. Since it is highly unlikely that the North will produce more than a fraction of the new finances called for, at least in the near future, most of the burden must fall on the South.

For these countries, the real future lies in reforms of the global economy that help to reverse the flow of money from South to North. Improved access to the markets of industrial countries, fair prices for commodities, debt reduction, and increased private investment all promise to deliver far more significant and durable financial gains than aid could ever do. For these gains to be realized, however, Southern countries also have much work to do. As Martin Khor Kok Peng (1992, p. 55) points out:

> There is much spring-cleaning to be done within the South itself.... Power, wealth and income have to be redistributed in Third World countries, so that the interests of the majority can be adequately expressed in new development models that emphasize the satisfaction of basic and human needs and that are harmonious with the environment.

If corruption, national financial mismanagement, repression, and rapid population growth remain realities, investors and aid agencies alike may well shun the countries where they exist. The World Bank, for instance, has made it clear that loans will be linked to the strength of a country's efforts to reduce poverty.

In the meantime, there are other sources of funds. Current ODA is a gold mine waiting to be tapped: redirecting it to truly sustainable development projects could reap great rewards, especially in the provision of basic needs and the alleviation of

poverty. A first step is to assess the work of all multilateral and bilateral agencies involved in international development. The World Bank, for instance, claims to have eschewed many of its past approaches and has embraced sustainable development as its rubric.

Worldwide military spending continues to sap about 1 trillion USD per year from the global economy. Although interest in the "peace dividend" appears to have waned in the wake of new outbreaks of ethnic violence and the Iraqi invasion of Kuwait, redirecting these inflated budgets remains an essential task.

National Policies

There is no dearth of prescriptions for the future. The new World Conservation Strategy and Agenda 21, for instance, both provide wide-ranging action plans for governments and people. In early 1992 alone, significant new books on the topic include *For Earth's Sake*, by the Commission on Developing Countries and Global Change (1992); *Changing Course. A Global Business Perspective on Development and the Environment*, by S. Schmidheiny (1992) with the Business Council for Sustainable Development; *Sourcebook on Sustainable Development* by the International Institute for Sustainable Development (IISD 1992); *Earth in the Balance. Ecology and the Human Spirit*, by US Vice-President Al Gore (1992); and the World Bank's 1992 development report, *Development and the Environment*.

Undoubtedly, for the nations of the North, action must begin at home. If we think only of the IPCC estimates of immediate cuts in greenhouse gas emissions needed just to stabilize the composition of the atmosphere — 60 percent for carbon dioxide, for instance — it is obvious that major changes are in store. This is especially true if the greatest reductions are to be borne by the industrialized nations.

In every country, there must be fundamental reforms in the way resources are treated. Robert Repetto (1990), of the World

Resources Institute, feels that productivity will be raised and the economy strengthened if distortions in economic policies and inefficiencies in the use of natural resources are eliminated. Policies should vigorously promote energy efficiency and encourage the move to more environmentally benign sources; pollution must be reduced; and all nations must learn to use their water, soils, and forests more sustainably. Yet the changes must go much, much further. For Canadians and others in the industrial North, there can only be significant progress toward the goal of sustainable development when we accept a new definition of prosperity, when we come to treasure lifestyles of "sophisticated modesty" (in Maurice Strong's words), when we eliminate the poverty in our midst.

This view of the challenges ahead for Canada, however, contradicts in many ways the message about the future that is most commonly heard today. Ours is a society built on consumerism and the business ethic, and the message we hear is all about productivity and the need to compete in a global marketplace. Yet free trade in a world where capital is mobile and comparative advantage is constantly shifting is no picnic, and the painful restructuring of our economy that is accompanying this process has become a major worry for Canada in the 1990s. Trade, which drives much of the engine of our economy, poses many dilemmas for sustainable development, as we discussed in Chapter 5.

Rarely, however, does the debate over Canada's future incorporate the precepts of sustainability. Never does it pose the question: If we in the North are to make dramatic cuts in our use of resources and, at the same time, buy far more goods from the South, what will this do to our own production and employment levels? Plainly, for resource-based economies like Canada's, already castigated for their policies in forestry and agriculture, major adjustments lie ahead. Paramount is the need to move to a form of growth that is less dependent on energy and raw materials.

How, then, does Canada rate at home and abroad?

Canada and Sustainable Development

Canada is an established and valuable player in the diplomacy of the environment. By all accounts, our participation at the Earth Summit and the climate change negotiations was impressive. We were, for instance, the first country to agree to sign the Biodiversity Convention, acting in the face of American opposition. We are leading the fight for an effective international agreement on forests. We championed the participation of a wide range of grass-roots organizations and were major supporters of the Global Forum, a huge gathering of environmentalists, international institutions, and many others that ran parallel to the Rio Summit.

Real leadership, however, goes far beyond gestures on the world stage. Deeds, not words, must be the true measure of our commitment to sustainable development, which was spelled out by Prime Minister Mulroney as early as 1988 (quoted in Environment Canada 1990a, p. i):

> Our basic principle will be...sustainable development...in considering any development, any project, any program, we will make its environmental consequences as fundamental a test as we now apply to its economic feasibility. Economic development and a clean and healthy environment are allies, not enemies....

Canada has backed up this pledge by endorsing an extraordinary number of international declarations over the last few years. Now, the Mulroney government has signed, and hopes to ratify quickly, all of the agreements reached at the Earth Summit: Agenda 21, the Rio Declaration, the Climate Change Convention, the Biodiversity Convention, and the Statement of Forest Principles. At home, it has undertaken to speed up the land-claims process and, during negotiations toward the Charlottetown Accord to amend the Constitution, it accepted the concept of the inherent right of aboriginal self-government. The full implications of all these agreements are but dimly perceived as yet. However watered-down the final Rio documents might

appear, however lacking in firm targets and timetables, they nevertheless commit this country to some very substantial changes, which must eventually be translated into national laws and policies.

Canada's first attempt to design a national sustainable development strategy is set out in Canada's Green Plan (Canada 1990a), which contains over 120 new and continuing initiatives affecting more than 40 agencies and departments. Our Green Plan is commendable — it is often held up as a model by people beyond our shores. Yet, although some progress has been made toward its goals, critics charge that the document is vague and overly cautious, reflecting the powerful forces arraigned against change. There is evidence to support these claims.

First is the financial commitment in this country to sustainable development. The initial investment of 3 billion CAD over 5 years in the Green Plan must be compared with more than 6 billion CAD targeted for submarines and the projected costs of several energy megaprojects: 5 billion CAD for Hibernia off-shore oil and the 13 billion CAD or more that Great Whale will cost Hydro Quebec. Furthermore, a web of expensive subsidies, taxes, and other incentives continues to favour resource extraction and inefficient energy use; only minuscule amounts of money have been devoted to alternative energy sources (other than nuclear power), energy conservation, or organic agriculture, although that is changing.

This situation is partly the result of the influence of lobby groups, partly because decision-making in many policy areas is fragmented and irrational. Each department has a separate agenda; each province, a different perspective. In addition, a welter of competing demands means that it is almost impossible to establish clear national priorities for funding or to develop logical policies in such areas as land and energy use or the elimination of poverty. The devolution of even more power to the provinces proposed in the Charlottetown Accord would have added to the problem. This raises serious questions about Canada's ability to carry out its domestic obligations under

Agenda 21 and the conventions on climate change and biodiversity, let alone the Green Plan, a far less ambitious undertaking. Already, it is obvious that it will be difficult for Canada to reach its stated and modest goal of stabilizing carbon dioxide at 1990 levels by the year 2000, although technically this should be very easy. Time is also running out in the race to set aside 12 percent of Canada's land area.

This is not to deny that there is progress. Public awareness has risen dramatically. Recycling programs are in place in many areas. Power corporations have begun to promote energy conservation. The Government of British Columbia has started to restrict logging in that province. In addition, many federal and provincial departments, local governing bodies, and sections of the business community have embarked on initiatives that purport to introduce sustainable development into their activities. Indeed, the concept has supposedly cut a broad swathe across departments as diverse as Health and Welfare, Forestry Canada, and Industry, Science and Technology.

When it comes to our new obligations to help developing countries, Prime Minister Mulroney announced at Rio that Canada would increase its development assistance payments to the proposed target figure of 0.7 percent of GNP from the current level of 0.44 percent, although no timetable has been given. It is difficult not to be skeptical about this promise; it has been made before. Indeed, Canada's ODA has actually declined as a percentage of GNP in recent years. Savage cuts to many programs have greatly reduced our ability to help developing countries. At the same time, the rising need for humanitarian aid in the South is likely to divert more and more money from development budgets.

Nevertheless, a valuable start was made at the Rio Summit. The Prime Minister offered to wipe out all outstanding debt owed by Latin American countries to Canada if those countries invest an equivalent amount in sustainable projects. He pledged 50 million CAD in humanitarian assistance to countries in southern Africa afflicted by severe drought; he promised to increase

Canada's aid to forest management in the South; and he promised to make an initial donation of 25 million CAD to the pilot phase of the Global Environment Facility of the United Nations.

More exciting, IDRC — Canada's International Development Research Centre — already internationally respected for its innovative research into small-scale, grass-roots techniques that target basic needs, is to be transformed into a capacity-building institution for sustainable development with a budget exceeding a billion dollars over the coming decade. The UN has been invited to propose candidates for IDRC's 10 external board members. This is precisely the sort of area where comparatively small investments can reap large rewards, where Canada can show true leadership in helping developing countries attain sustainable development.

For Canada, then, there is an enormous task at hand: to tackle the challenge of sustainable development and to strive for healthy resources and healthy communities both at home and abroad. This country must work hard to honour the many commitments it has made. It must not back away from the targets it has set. In addition, it must continue to work strenuously at the international level to develop new agreements and ensure that those already in place are strengthened and supported by the financial resources they need.

Three Pathways to the Future

For countries in both the North and the South, the alternative is obvious. If the world continues to "muddle through," sweeping problems under the rug, lurching from crisis to crisis, doing too little, too late, then disaster is unavoidable. To David Suzuki, who has done more than anyone to educate Canadians on the issues of environment and development, we are in a huge car heading for a wall at 160 kilometres per hour. Most of us are bickering over our seats in the car. Some are confident that we can smash

through the wall unscathed. A very few, however, are screaming that we should stop (CBC "Midday," 15 June 1992).

In closing, we would like to draw attention to an important new work that epitomizes attempts to design a new global partnership. In *Our Country, the Planet: Forging a Partnership for Survival* (1992), Shridath (Sunny) Ramphal, President of the World Conservation Union and former Secretary-General of the British Commonwealth, offers humanity three pathways to the future.

The first, appropriately, he calls "muddling through" (pp. 216–234). In this scenario, uncertainty is used as an excuse for inaction on global problems, even though the issues are well known. Little is done to reduce carbon dioxide emissions. Development and poverty alleviation in the South remain peripheral concerns, except where individual countries are important for other reasons. GATT "staggers through the 1990s," the debt problem persists, and so on. To Ramphal this reflects a dangerous mixture of inertia and optimism, "a refusal by governments to face up to the implications of maltreatment of the planet...an aversion to change on the part of those who prosper...a perpetual deferment of hard choices." He paints a grim picture of the outcome.

Perhaps as dangerous is "an ordered world" (pp. 234–240). This scenario raises the possibility that Western countries, flushed with their apparent victory in the Cold War, try to "tackle the problems of global insecurity and environmental threat directly and on their own terms." They become global policeman, with little regard for sovereignty. Powerful institutions dominated by the North, such as the IMF and the World Bank, set the agenda. Direct intervention in developing countries, "green conditionality," and sanctions become the order of the day. There are financial incentives in the form of aid if nations adopt the environmental standards and democratic norms espoused by the North. Although there appears to be real progress for a few years, it is only a facade. Animosity builds against this new form of imperialism, against imposed solutions, few of which are

compatible with local conditions. Eventually, "an ordered world" disintegrates.

Missing from both these pictures is a sense of trust, a spirit of cooperation and shared responsibility, a recognition of our common destiny. Ramphal's third scenario, "enlightened change" (pp. 241–269), builds on the dreams of those who worked to establish the United Nations. It is a world of collective security where confrontation and exorbitant military spending die away. A world where "certain dominant ideas — the enthusiasm for democratic political systems, for liberal-market economics, and for sustainable development — reinforce each other, providing powerful synergies in both developed and developing countries." In this world, the North moves quickly to less energy-intensive forms of growth and shoulders the burden of helping the South to reduce carbon dioxide emissions, fight poverty, and halt environmental degradation. Strong and effective conventions on global warming and biodiversity, developed in a more cooperative fashion, set firm quantitative targets for each country. The South pledges to play its part in return for reforms in the global economy that allow access to the markets of the North and reverse the flow of money from South to North. There is a shared understanding that overcoming poverty is "as important an environmental objective as direct action to reduce carbon-dioxide emissions."

Sunny Ramphal is no starry-eyed optimist. He is the only person who has served on all five independent international commissions on global issues, so has a wise and acute sense of the possible. He realizes that progress would be halting and fraught with difficulty at first. Mass poverty and demographic trends, for instance, are not problems that will disappear overnight. Neither will repressive governments. But the ground swell of enthusiasm for change amongst peoples all over the world gives a measure of hope.

Undoubtedly, the key to enlightened change is partnership — partnership between peoples, communities, and governments, and links between all levels of organization. For Canada,

perhaps the most fascinating question of all is the route that its indigenous peoples will take as they regain control over their lives and resources. Whatever the outcome, the progress they have made in their struggle for self-government and the recognition of their inherent rights underlines the growing importance of a new level of organization in the world. Indeed, one of the most important legacies of the 1992 Rio Earth Summit may well be the enormous boost it gave to networking amongst NGOs, business and trade union groups, and many others. The Global Forum, with its 20 thousand or so participants, provided an unparalleled opportunity for NGOs representing a myriad of regions and viewpoints to share information, make contacts, and plan for the future. As we discussed in Chapter 9, these networks are a potent new force on the world scene, a powerful means of communication between North and South. They promise to be prime actors in the realization of Agenda 21, working not just as watchdogs, but as valuable partners with governments.

Yet, however great the promise of these networks of committed people, the responsibility for genuine international cooperation still lies overwhelmingly with the governments of the North. The election of Bill Clinton and Al Gore in the United States may be exactly the catalyst that is needed to make real progress. For Canada to play its part, it must rise above its preoccupations and adopt "policies that are premised not on short-term national self-interest, but on the long-term health of all humanity and of the Earth itself" (Khor Kok Peng 1992, p. 56). For reasons of history, wealth, and its status as a caring nation, Canada and Canadians must play an important role in the transition to enlightened change.

Acronyms and Abbreviations

AIDS	acquired immune deficiency syndrome
AIM	American Indian Movement
ASEAN	Association of South East Asian Nations
CAD	Canadian dollar
CFC	chlorofluorocarbon
CIDA	Canadian International Development Agency
CIREFCA	International Conference on Central American Refugees, Returnees and Displaced People
CISA	South American Indian Council
CITES	Convention on International Trade in Endangered Species
COICA	Coordinadora for the Amazon Basin
CRIC	Regional Indian Council of the Cauca
CWS	Canadian Wildlife Service
EIA	environmental impact assessment
EMDI	Environmental Management Development in Indonesia
EPA	Environmental Protection Agency

FAO	Food and Agricultural Organization of the United Nations
FMLN	Farabundo Marti National Liberation Front
G-7	Group of 7
G-77	Group of 77
GATT	General Agreement on Tariffs and Trade
GCM	general circulation model
GDP	gross domestic product
GNP	gross national product
HIV	human immunodeficiency virus
ICC	Inuit Circumpolar Conference
ICHRDD	International Centre for Human Rights and Democratic Development
ICRAF	International Center for Research in Agroforestry
IDRC	International Development Research Centre
IISD	International Institute for Sustainable Development
IITC	International Indian Treaty Council
ILO	International Labour Organization
IMF	International Monetary Fund
INC	Intergovernmental Negotiating Committee
INGO	international nongovernmental organization
IPCC	Intergovernmental Panel on Climate Change
ITTA	International Tropical Timber Agreement
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature and Natural Resources

IWGIA	International Work Group for Indigenous Affairs
NAFTA	North American Free Trade Agreement
NASA	National Aeronautics and Space Administration
NFAP	National Forestry Action Plan
NGO	nongovernmental organization
NSERC	Natural Sciences and Engineering Research Council of Canada
OAS	Organization of American States
ODA	official development assistance
OECD	Organisation for Economic Cooperation and Development
OPEC	Organization of Petroleum-Exporting Countries
RCMP	Royal Canadian Mounted Police
SADCC	Southern African Development Coordination Committee
SIDA	Swedish International Development Authority
SWCC	Second World Climate Conference
TFAP	Tropical Forestry Action Plan
TMF	tropical moist forest
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
Unesco	United Nations Educational, Scientific and Cultural Organisation

UNHCR	United Nations High Commissioner for Refugees
UNRWA	United Nations Relief and Works Agency for Palestine and Refugees in the Near East
UNWGIP	United Nations Working Group on Indigenous Peoples
USAID	United States Agency for International Development
USD	United States dollar
UV	ultraviolet
WCED	World Commission on Environment and Development
WCIP	World Council of Indigenous Peoples
WCWC	Western Canada Wilderness Committee
WFP	World Food Programme
WHO	World Health Organization
WHSRN	Western Hemisphere Shorebird Reserve Network
WMO	World Meteorological Organization
WRI	World Resources Institute
WRM	World Rainforest Movement
WTMU	Wildlife Trade Monitoring Unit
WWF	World Wildlife Fund

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In June 1992, world leaders met in Rio de Janeiro at the first Earth Summit. As never before, this event focused attention on the worldwide crisis in environment and development. It also accented a new polarization in world politics: the growing tension between South and North.

A New Kind of Sharing examines many of the issues that were tackled in Rio and looks at their implications for Canadians. Global warming, ozone depletion, the exploitation of tropical forests, the refugee crisis, immigration policies, and the plight of our indigenous peoples: many parallels exist between conditions in the South and in Canada, reflecting our interdependence and mutual vulnerability.

A New Kind of Sharing explores some of the greatest challenges facing Canada today. Canadians, like all inhabitants of the industrialized North, cannot insulate themselves from global change. We are part of the problem and must be part of the solution.

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