NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY
TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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National Round Table on the Environment and the Economy
Table ronde nationale sur l'environnement et l'économie

On the road to Brazil

THE EARTH SUMMIT

Foreword by
Pierre Marc Johnson

United Nations Association
in Canada

On the Road To Brazil

The Earth Summit

National Round Table on the Environment and the Economy
Table ronde nationale sur l'environnement et l'économie

Canadian Catalogue Information in Publication Data

On the road to Brazil: The Earth Summit
(National Round Table series on Sustainable Development)
Selection of papers prepared for the United Nations conference to be held in Brazil in June 1992
ISBN 1-895643-08-2
1. Environmental protection. 2. Natural Resources - Management.
3. Economic development - environmental aspects.
I. National Round Table on the Environment and the Economy (Canada).
II. Series.

HC79.E5051991 333.7 C92-093203-7

Book Design, Typesetting and Graphic Consultants for Series:
sla Graphicus *Specialists in environmental graphic design*
Sims Latham Group, 680 Queens Quay West, Suite 702,
Toronto, Ontario, M5V 2Y9 Tel: (416) 586-0065

Cover
Zebra Photo Design Studio with sla Graphicus

This book has been set in New Century Schoolbook, Helvetica and printed on Environmental Choice paper containing over 50% recycled content, including 5% post-consumer fibre, using vegetable inks. The cover board also has recycled content and is finished with a water based, wax free varnish. Printed and bound in Canada by The Alger Press.

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Foreword

The United Nations Conference on Environment and Development will be both the unfolding of an unprecedented process and the beginning of an essential starting point in global awareness and commitment.

We live in a world of perpetual complexities and ever-binding relationships amongst peoples, territories and resources. The timely addressing of global issues in this publication are part - even if modestly - of the exceptional process leading to the Rio Conference.

Since the publication of the Brundtland Report *Our Common Future,* a series of conferences, seminars, international gatherings of specialists, scientists, business organizations and voluntary organizations accompanied meetings of U.N. organizations, sectoral and regional. The result, as of now, has been an unique sharing, across the globe, of data, problem definitions, and alternative means of action, in an almost simultaneous time frame.

In Rio, some of these actors, and many of their findings, will converge in a demanding exercise reserved for heads of states and of governments. The Secretariat of the Conference, under the outstanding leadership of Maurice Strong, will have furnished them with abundant and precise matter for discussion and decision.

The commitments of governments and institutions will take place in a setting that provides ample space

for the expression of political will. Some protocols and conventions could be reached by June '92. The effort of finding a common definition of responsibilities, and of the challenges on Sustainable Development, will take the form of a Charter or Declaration. As to specific interventions on issues not covered by international conventions, they will be addressed in Agenda 21, a series of proposed actions bringing us to the 21st century.

If all these issues are to be tackled with some success for the six billion citizens of Earth, we cannot escape the necessity to look deeply into the institutions that provide action at the international level and the equity that is essential to a better North-South equilibrium in terms of financial and technological flows.

The papers gathered in this publication intend to clarify some of these necessities, trends and unavoidable choices. We hope they are useful to the reader.

Pierre Marc Johnson
Vice-Chairman of the National Round Table
on the Environment and the Economy
&
Special Advisor to the Secretary-General of the
United Nations Conference on Environment and
Development

Quotes on the Summit

If we don't tackle global environmental problems in Rio, then I ask "When will we do it?"
Nobody can say for sure what is too late, but it is very hard to envisage another opportunity like the one we will have in Rio next year.
The stakes are high. The evidence is strongly persuasive that we must take fundamental action.
I have to believe that the leaders of the world will rise to that responsibility.
Maurice Strong
Secretary-General, UNCED

There must be some kind of mechanism so that the Third World can get the technology they need to protect the environment.
So far, we don't see that the developed countries are really serious.
We want actions not words.
Hussein Haniff
Counsellor
Malaysian Mission to the United Nations

It is difficult to exaggerate the importance of the issue of biodiversity.
We are really talking about life on Earth.
John Herity
Environment Canada

The key issue of financial and technical resources is politically an extremely difficult question, and one which down the line will probably be the make-or-break element.
Jean-Claude Faby
UNCED

I don't think the world can afford a failure. If we continue to develop the way we have for the past fifty years, then the planet is in trouble. Striking a bargain at Rio is going to be difficult. All I can tell you is that we can't go on the way we are - and everybody knows it.
Victor Buxton
Environment Canada

I would like UNCED to come up with realistic deadlines for dealing with environmental problems. The longer we wait, the harder it will be to do anything.
Debra MacKillop
Canadian Environmental Youth Alliance

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Introduction

The first ever "Earth Summit" which will take place in Rio de Janeiro from 1 to 12 June 1992, cannot be considered just another international conference. Also known as the United Nations Conference on Environment and Development (UNCED), this summit will be the largest international conference ever organized.

It will seek agreement on concrete measures which will serve to reconcile the world's economic activities with the need to protect the planet and ensure a sustainable future for all people.

The conference aims include stimulating action to reverse the current environmental degredation, adopting what will become the "Earth Charter", a moral framework for environment and development, Agenda 21, an environmental action plan for the 21st century, covering forests, desert recovery, environmental incentives and so on.

As Maurice Strong, a Canadian who is the Secretary-General of the conference stated:

> *The primary goal of the Summit will be to lay the foundation for a global partnership between developing and more industrialized countries, based on mutual need and common interests, to ensure the future of the planet.*

All Heads of State are expected to attend the summit but the general public and all large or small

organizations worldwide should be concerned by the issues of UNCED. How can they play a role and influence the governments to play a positive and substantial role in ensuring the success of the first Earth Summit?

The first step is to become well informed on the issues. Part one of this book is devoted to the key topics which will be under discussion and negotiation at UNCED. These papers were produced by the United Nations in Canada for dissemination across Canada and we are pleased to be able to reproduce them here.

Part Two of the book looks at the issues from a Canadian perspective. The papers by David Runnalls and Brent Herbert-Copley raise important issues for Canadians to consider as they take their place with the citizens of other countries in trying to protect the planet for future generations, in the context of economic survival in their own time.

PART ONE

The Issues

Environment and Development
The living and working conditions of the poor and human health and the quality of life.

Protecting the Atmosphere
Protection of the atmosphere by combatting climate change, depletion of the ozone layer and transboundary air pollution

Protecting the Oceans
Protection of the oceans and all kinds of seas, including enclosed and semi-enclosed seas, and coastal areas, and the protection, rational use and development of their living resources

Waste Management
The environmentally sound management of wastes, particularly hazardous wastes, and of toxic chemicals, as well as prevention of illegal international traffic in toxic and dangerous products and wastes

Land Resources
The protection of land resources by combatting deforestation, and drought

Biological Diversity
Genetic resources, wildlife areas, and biological diversity

Freshwater Resources
Protection of the quality and supply of freshwater resources

Biotechnology
Environmentally sound management of biotechnology

1 Environment and Development

Our Common Future

A few years before the UN General Assembly issued its call for the UNCED, it had asked a group of 21 respected men and women drawn from various walks of life and all parts of the world to examine the twin issues of environmental degradation and economic development. After months of work under the leadership of Gro Harlem Brundtland, the Prime Minister of Norway, this World Commission on Environment and Development presented its report, *Our Common Future,* to the General Assembly in 1987.

The Commission declared that the environment - where we all live - and development - "what we all do in attempting to improve our lot within that abode" - are inseparable. The key to a harmonious balance between the two is Sustainable Development": the concept that nature must be used "on a basis that can be sustained into the distant future".

Sustainable Development was launched as a concept in 1981 with the publication of the World Conservation Strategy report by three international organizations: the UN Environment Program (UNEP), the International Union for the Conservation of Nature and the World Wildlife Fund. The Strategy recognized that the planet's capacity to support people is being undermined by poor land management, profligate use of resources and the sort of grinding

poverty that forces people to destroy the very resources they need to survive.

Jim MacNeill, the Canadian who served as Secretary-General to the Brundtland Commission, has observed:

> *Sustainable Development means the kind of economic development that lives off the Earth's interest, without encroaching on its capital. It also means investing to sustain and even enhance our ecological capital, so that future dividends can be ensured and enlarged.*

In order to achieve this kind of balance, certain fundamental issues must be addressed by the UNCED. These include the relationships between and among population growth, urbanization, poverty, human health, the environment and the quality of life.

Population Growth and Poverty

World population has been growing steadily for centuries, but in recent times it has increased at a much faster rate than before.

Around 1850 the world's population reached 1.2 billion. By 1950 - roughly a century later - it had doubled. Only four decades later, global population had more than doubled again, reaching 5.16 billion in 1989.

In fact, during the past decade, most countries' population growth rates have started to fall. But

because a large portion of the population is in its reproductive years, even these countries are continuing to grow rapidly. Such rapid growth puts extraordinary pressure on food supply, land use, and the natural resource base - forests, soils, water and fisheries - in short, on virtually every aspect of the environment. A vicious cycle is created in which the interconnections between too many people, too little land and too few resources are so intricate and complex that it is difficult to distinguish cause from effect.

Certainly, poverty and underdevelopment abet rapid population growth. "Who has the largest families?" asked the late Indian Prime Minister Indira Gandhi, and replying to her own question, said, "the poor, and they look at the child as an extra pair of hands." Children are often an important source of income through their work within or outside the home. Later on as adults, they offer a social safety net for their aging parents that most governments of poor countries are simply unable to provide.

At the same time, rapid population growth also leads to poverty. There are more hungry people today than ever before.

In 1980, 340 million people in 87 developing countries were not getting enough calories to prevent stunted growth and serious health risks. In terms of sheer numbers, this represented a 14% increase over 1970.[1] More recently, the World Bank estimated that 950 million people still consumed too few calories to support an active working life.[2]

Poverty itself pollutes the environment. Africa is the most tragic example of environmental bankruptcy where, because of inappropriate policies and practices, too much was taken from the land. The outcome, as the famine of the 1980s demonstrated, was disaster. The Brundtland report noted:

> *Those who are poor and hungry will often destroy their immediate environment in order to survive: They will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities. The cumulative effect of these changes is so far-reaching as to make poverty itself a major global scourge.*[3]

Environmental Refugees

Among the many results of environmental bankruptcy is the phenomenon of environmental refugees who flee from land whose productivity has deteriorated beyond the point where it can support them. No one has reckoned the number of environmental refugees worldwide, but hundreds of thousands of people were displaced from the Sahel alone during the recent prolonged drought. Many headed for nearby cities, some of which are growing 10-20% each year. Most environmental refugees end up in sub-standard shantytowns on the edges of cities, in "transit" camps that become permanent fixtures on the landscape (and that depend on regular outside relief), or in other rural areas, where the newly increased level of demand leads to further degradation.[4]

Structural Adjustment

In recent years, the difficulties of many developing country governments in coping with the spiralling demands of rapid population growth, poverty and environmental degradation have been compounded by the impact of structural adjustment programs. Much of the developing world has been left with little alternative to adopting austere adjustment programs as a condition of financial support from the International Monetary Fund and the World Bank in an effort to stave off balance of payments crises, meet debt obligations, and lay the foundation for growth.

Typical measures in an adjustment package include currency devaluation, removal of subsidies on staple foodstuffs and deep cuts in government spending, often on social services. Inevitably, the cuts in social spending have resulted, at least in the short term, in less affordable food, medicine and education for much of the population in the Third World. There is evidence that poverty levels have increased in many countries under structural adjustment programs.[5]

Urbanization

Urban areas in most developing countries are growing rapidly.

The urban population of the Third World now stands at 1.3 billion and is expected to grow by nearly another billion by the year 2005.[6]

It is estimated that by the year 2000, 47% of the world population will be urban. In more developed countries, nearly 75% will be urbanized, while only in Africa and South Asia will less than half the population reside in urban areas.[7]

Urbanization usually accompanies economic development. The populations of most of the developed countries were over 60% urban in 1985. By contrast, of the nine countries with less than 10% of their population living in urban areas, seven had a Gross National Product (GNP) per capita of less than U.S. $600. Similarly, within developing countries, rural dwellers tend to be poorer than their urban counterparts and are more likely to lack access to drinking water, sanitation, and other services.

Unfortunately, these services are also often unavailable in the expanding urban slums, where many people who migrate from rural areas settle. The perception that urban areas offer greater opportunities has resulted in a tide of urban migration, putting incredible pressure on city governments to provide services which are already stretched thin. An estimated 40% of the urban population in less developed countries lives in slum and squatter areas with minimal housing and services. By the end of this century, the World Bank estimates that more than half the households in developing countries living in absolute poverty - that is, in or near subsistence - will be concentrated in urban areas.

Yet a report by the UN Development Program has observed:

> *Few governments have effective programs to reduce urban poverty, leaving the poor to fend for*

themselves - to provide their own shelter, to find their own work in the informal sector and even to grow their own subsistence and market foodcrops.[8]

Cities are often centres of innovation. They transform resources into productive goods and services that contribute strongly to national economic production. Although agriculture is still the major employer in many developing countries, only in a few countries does it contribute more than half the gross domestic product (only seven in 1985, all among the poorest). Cities contribute to economic growth by providing economies of scale and proximity that allow industry and commerce to flourish, by supporting modern social services and production facilities that generate employment, and by offering a wide variety of commercial and personal services unavailable elsewhere.

Large cities are important markets for agricultural goods. Their continued growth intensifies rural land use in surrounding areas, increasing pressure to change crop mixes and characteristics and promoting more intensive agriculture. Many of these changes increase agricultural productivity and raise the incomes of farmers living on the periphery of cities. But as the Food and Agriculture Organization (FAO) points out, "urban growth feeds on many of the same inputs and resources that are essential to agriculture" and it is especially competitive with agriculture for the use of arable land.

In particular, *rapid* urbanization can be a curse. Megacities especially have created serious social, economic and physical problems in some developing countries. Many have economic bases too weak to

absorb the vast numbers of workers joining the labour force. Congestion and high density living promote air and water pollution and physical deterioration. Among the problems are the following:

- untreated domestic sewage and sediments and toxic materials seeping into rivers and bays severely damaging aquatic life;
- urban growth on ecologically fragile land can create serious physical problems - parts of Bangkok are sinking at faster rates than Venice, during its worst period, due to overuse of groundwater;
- solid waste disposal remains a terrible problem - many cities simply leave it to decompose or dump it untreated;
- air quality standards are far worse than those of developed countries and well below internationally accepted standards for good health: coal and wood burning is widespread; more lax standards for automobile emissions and polluting industries.

During the 1970's, governments tried various approaches to contain rapid urbanization. Many have sought to create a more balanced distribution of urban population in secondary cities and towns dispersed broadly throughout the country. Often these approaches were stillborn because they failed to recognize the basic problem was poverty and they failed to make use of the potentialities of the communities.

Gradually, a new approach, the "enabling strategy" evolved, which draws on the essential

resourcefulness of people. It aimed to make things easier for the people to improve their shelter conditions, for example, on their own. This new philosophy is one of the basic principles of the UN's Global Strategy for Shelter to the Year 2000, which was adopted by the UN General Assembly in 1988 and is now being applied by many different countries.

The Strategy:

- aims for shelter for all by the year 2000;
- promotes an enabling approach whereby governments enable the people to improve their shelter situation themselves, by making it easier to:

  obtain security of tenure and other legal requirements,
  work with appropriate building codes,
  have access to finance for housing, and
  have access to low-cost building materials;
- harnesses the energies and skills of the people themselves to improve their homes through the enabling approach, involving the participation of the community, especially women.

Human Health and the Quality of Life

Health is a basic human need and integral to the quality of life. The relation of health to Sustainable Development is reciprocal: Sustainable Development depends on the good health of productive people, while the protection of health by meeting basic health needs such as food, drinking water and shelter ultimately involves the sustainable use of natural resources. It also requires the control of endemic

diseases in relation to development, improvements in the working environment, the prevention of environmental health risks, and the protection of specific groups such as mothers and children.

The leading causes of death provide a sharp contrast between the developing and developed countries. In the developing world, infectious and parasitic diseases cause 40% of all deaths. By contrast, cardiovascular diseases account for half the deaths in industrialized countries - twice as many as cancers, the second major cause of death.

Despite adequate food supplies at the global level, hunger and malnutrition are a leading health problem in the developing world. An estimated 950 million people - nearly 20% of the world population - do not consume enough calories for an active working life. Moreover, calories and protein supplies are on a downward trend in sub-Saharan Africa and southern Asia.

The most common tropical diseases are water related - caused by the absence of potable water and adequate sanitation or transmitted through insects and parasites.

In the developing world, 80% of all illness is attributed to unsafe and inadequate water supplies and sanitation.

Measures to reduce these diseases are obvious. They include improvement of water quality and

quantity, sanitation and sewage disposal practices, and protecting water sources from contamination. According to the World Health Organization (WHO), over 1 billion people need adequate and safe water, and over 1.5 billion need adequate sanitation.[9]

At the same time, education is another prerequisite for positive health and population conditions. In particular, the education of women can have a multiplier effect since it is a critical force in improving women's status as well as the survival of their children. It helps women gain the knowledge and confidence to make use of available health services for their children and themselves and is an important factor in reducing fertility rates. Unfortunately, the education of females lags behind that of males in many developing countries.

One area where such education has already had a significant impact is in the use of contraceptives. Contraceptive use allows women greater control over their fertility and, by enabling child spacing and preventing unwanted births, can reduce both maternal and child mortality rates. Contraceptives are used increasingly throughout most parts of the world, with Africa a notable exception. Many governments promote contraceptive programs as one means of reducing population growth and its demands on social and environmental resources.

The AIDS Pandemic

Since it was first identified in 1981, AIDS (acquired immune deficiency syndrome) has spread rapidly throughout the world.

By the end of 1987, 129 nations had reported a

cumulative total of 73,000 cases to WHO. Seventy-five per cent of these were in North and South America.

However, AIDS cases are grossly underreported in many parts of the world, particularly Africa and Latin America. WHO estimates that about 150,000 cases may have occurred since the beginning of the worldwide pandemic.

AIDS is caused by a retrovirus - the human immunodeficiency virus (HIV). An estimated 5-10 million people are carriers of HIV. Although many will not develop symptoms of the disease until several years after they are infected, recent studies suggest that virtually all individuals infected with HIV go on to develop AIDS.

The costs of AIDS in developing countries is likely to be high. Unlike many diseases that favour the old or the young, AIDS primarily strikes young and middle-aged adults, 20-49 years old, the most vital segment of the population. The potential loss of a sizeable share of this population raises the possibility of social, economic and even political destabilization.

Prevention is the only known way to stop the spread of AIDS since a vaccine is not expected until the mid-1990's at the earliest.

WHO has created a special program to provide technical and financial support to strengthen the 150 national AIDS committees. Many countries have prepared short-term plans for prevention and control programs and some have completed three- to five-year plans.[10]

Child Health

In developing nations, 14-15 million children under the age of five die every year from diarrhea, measles, and other diseases frequently associated with poverty, overcrowding and malnutrition.

About 60% of childhood diarrheal deaths result from acute dehydration that can be prevented with good nutrition and oral rehydration therapy (ORT) - the ingestion of a simple solution of water, salts, and carbohydrates (e.g., sugar, rice powder). WHO estimates that ORT saves half a million children from death each year. International and national efforts to increase ORT usage are on the rise. By the end of 1987, more than 100 countries had begun national programs. However, the therapy is still not in widespread use: only 8% of children in Africa and 23% in Asia have access to centres dispensing ORT.

WHO and the United Nations Children's Fund (UNICEF) have begun a global campaign to immunize all children against six target diseases: tetanus, measles, polio, diphtheria, pertussis, and tuberculosis. Immunization programs have largely eliminated these diseases from industrialized countries, but they continue to claim an estimated 3.5 million children's lives in developing countries, while leaving an equal number blind, crippled or mentally retarded.[11] UNICEF estimates that, if progress can be maintained, the 1980 figure of almost 5 million child deaths a year from vaccine-preventable diseases could be reduced to perhaps 250,000 or less by the year 2000.[12]

UN Efforts

The United Nations system, particularly the WHO, but also a variety of other UN agencies such as UNICEF and UNFPA (the UN Fund for Population Activities) are concerned with the linkages between health, environment and development. They have been working hard to ensure that basic health needs are met and that people are protected against environmental health risks which originate with the development process itself. In the spring of 1990, the WHO established a Commission on Health and Environment in order to conduct a comprehensive review and assessment of the consequences to human health of present and predicted environmental factors associated with socioeconomic development. Four separate expert panels address "developmental driving forces" on energy, urbanization, food and agriculture, and industry - and their impacts on health.

Work has been proceeding on developing internationally agreed food standards and maximum residue levels for pesticides and other agro-chemicals, and on establishing maximum levels for environmental contaminants. This is being conducted by the Joint WHO/FAO *Codex Alimentarius* Commission. Environmental health management is also being addressed through world-wide networks which are being set up by WHO for education, training and research in environmental health. These networks will be used for the purpose of strengthening local capacities in education, training and research on environmental pollution and related health problems.

Health Issues at UNCED

Among the gaps which remain and which the UNCED should address are the following:

- ***insufficient integration, nationally and internationally, between health, development and environmental policies, institutions and activities;***
- ***insufficient linkages among health, environment, human settlements and development-related institutions, at the national level;***
- ***lack of epidemiological information from developing countries on health effects of environmental hazards;***
- ***insufficient attention paid to monitoring and assessing the impact of pesticides, fertilizers and industrial activities on human and environmental health;***
- ***development of an economically efficient integrated pest management system package adapted to local agro-ecological and socioeconomic conditions in rural areas;***
- ***insufficient information, monitoring, assessment and evaluation of impacts of development actions and hazards on health;***
- ***worldwide harmonization of health-related standards.***

The major challenge of the 1992 UN Conference on Environment and Development will be to harmonise the needs of the poor with the long-term requirements of a sustainable world.

Among the relationships that are expected to be addressed are the following:

1 the relationship between poverty and environmental degradation;

2 the relationship between demographic pressures, unsustainable consumption patterns and environmental degradation;

3 the relationship between the lack of economic growth in most developing countries and the degradation of the environment;

4 the relationship between inappropriate patterns of growth and development and the degradation of the environment;

5 the relationship between the external indebtedness of developing countries, the phenomenon of net transfers of resources from developing to developed countries and their ability to contribute fully and in accordance with their capacities and responsibilities to global efforts to protect and enhance the environment;

6 the relationship between the international economic climate, including the need to reverse the terms of trade when these are unfavourable to developing countries, and the degradation of the environment;

7 the relationship between environment, development and market mechanisms;

8 the relationship between economic and social conditions at the national and international levels and the protection of the environment.

Development Issues at the UNCED

Specific areas of action include the following:

- ***improve coordination of work in the UN system on the eradication of poverty and improvement of the living and working environment;***
- ***involve NGOs in implementation of more effective, community-level programmes and increase funding of their work;***
- ***incorporation and adaptation of environmental impact assessment techniques to agricultural and rural development;***
- ***assessment of the environmental impacts of structural adjustment on agriculture and rural development;***
- ***development of sustainable water supply and sanitation policies, and of programmes for recycling of solid wastes;***
- ***promotion and exploitation of the self-reliant capacity of communities to improve services, attitudes and environmental conditions that are important to health.***

A great uncertainty about the Brazil Conference is whether critical linkages will be made between environment and development issues. There has been a strong tendency, particularly in the United States, to treat the UNCED strictly as a conference about environment, with little reference to fundamental and abiding questions of poverty and inadequate development that afflict much of the

Third World. The necessary synthesis - Sustainable Development - remains more a slogan than a working proposition. The challenge of Brazil will be to make the concept of sustainability and Sustainable Development a vital reality both of planning and practice in every part of the world.

Endnotes

1 The World Commission on Environment and Development, *Our Common Future,* 1987, p. 29.
2 The World Resources Institute and the International Institute for Environment and Development, *World Resources 1988-89,* New York, p. 51.
3 *Our Common Future, op. cit.*, p. 28.
4 *World Resources 1988-89, op. cit.*, p. 228.
5 See for example, "Engendering Adjustment for the 1990s", Report of a Commonwealth Expert group, 1989, pp. 68-71.
6 United Nations Development Programme, *Human Development Report 1990,* p. 85.
7 *World Resources 1988-89, op. cit.*, p. 37.
8 *Human Development Report, op. cit.*, p. 85.
9 *World Resources 1988-89, op. cit.*, pp. 25-6.
10 *World Resources 1988-89, op. cit.*, pp. 27-8.
11 *ibid.*, p. 26
12 UNICEF, *The State of the World's Children,* 1989, p. 3.

2 Protecting the Atmosphere

The Challenge

Climate is the result of a series of complex interactions between the atmosphere, the ocean and land. The earth's atmosphere is largely transparent to short-wave energy from the sun. Some of this energy is reflected back into space, but some is absorbed by the earth's surface and clouds and reradiated as heat. Several gases absorb this heat and, in turn, warm the atmosphere.

This warming or "greenhouse effect" is essential for life on earth. Without it, the earth's surface would be about 35 degrees cooler and life as we know it would be impossible.[1]

But in recent years, there is considerable evidence that the earth has begun to warm more quickly than ever before. Several of the "greenhouse gases" that contribute most to the heat-trapping ability of the atmosphere have been increasing rapidly as a result of human activities. A swift increase in average temperatures could result in major disruptions of weather patterns and living conditions around the world.

The major greenhouse gases are water vapour, carbon dioxide, methane and several others, including chlorofluorocarbons (CFCs) - the gases released during the production of foam and the use of refrigerants. CFCs are doubly dangerous since they are also consuming the protective stratospheric ozone layer,

which prevents harmful ultraviolet rays from reaching the earth's surface.

The consequences of the thinning of the ozone layer are life-threatening on a global scale. They include greater incidence of skin cancer, suppression of the body's immune systems, reduced crop yields, and increased threats to marine life because of the sensitivity of phytoplankton to ultraviolet rays.

About half of the human-induced increase in greenhouse gases comes from carbon dioxide (CO_2), largely from the burning of fossil fuels (coal, oil, natural gas) and the large-scale clearing of forests. The amount of CO_2 in the atmosphere remained around 275 parts per million (ppm) for thousands of years until about the mid-nineteenth century. Since then, it has increased to 350 ppm and is presently increasing at 2.5 ppm per year.[2]

According to present estimates, a continuing swift rise in CO_2 concentrations should lead to increases in average temperatures of 0.3 degrees Celsius per decade - greater increases than the world had known in the past 10,000 years of human history.

The consequences would be immense. They would include a substantial rise in sea level which would be catastrophic for low-lying areas, especially if coupled with greater probability of storm surges. Caribbean islands depend heavily on their beaches for employment and foreign exchange. Yet their beaches average only 20 meters in width and will withdraw by one meter for every centimeter rise in sea levels.

Other countries could lose coastal areas containing much of their population and economic wealth. Some islands would be threatened by extinction.[3]

Global warming would also increase the likelihood of droughts and, therefore, of desertification in agricultural areas the world over. On the other hand, it could encourage agriculture to migrate closer to the poles as summer growing seasons lengthened.

Another threat to the earth's atmosphere is air pollution which knows no national boundaries or regional constraints. Air pollutants are killing trees and lakes and damaging buildings and cultural treasures, sometimes thousands of miles from their source.

Acid rain has been a point of controversy between Canada and the United States for several years. It is also a serious problem in Europe, causing particular devastation to forests. Fifty million hectares or 35% of Europe's forests are estimated to be damaged, dead or dying.[4]

Global warming, ozone depletion and air pollution all arise from the same causes: the growth of human population and wealth. They are rooted in industrialization, technological change, energy dependence, striving for economic growth, and a multitude of other ways in which humans try to improve their quality of life.

Progress on Ozone

"The ozone hole is the smoking gun," which provides "real proof that humans threaten life on earth," remarks Michael Oppenheimer, a senior scientist at the Environmental Defense Fund in the United

States.[5] Because of the potentially disastrous consequences of ozone depletion, there has been a relatively swift policy response to man-made chlorofluorocarbons (CFCs) and other substances (e.g., fire-extinguishing chemicals called halons) that are major contributors to depletion of the ozone layer.

Yet even the progress on ozone depletion has taken well over a decade to achieve. In part because of the limitations of the scientific data, it was 1985 before the first convention to deal with ozone depletion was achieved. Since then, increasing concerns about the rapidity of ozone depletion led in 1987 to the *Montreal Protocol on Substances that Deplete the Ozone Layer*, which called for 50% reductions in CFC emissions by the year 2000. It came into effect on January 1, 1989, but the ink was barely dry before nations began meeting again in order to try to strengthen its provisions.

The result was a still more drastic accord that 93 nations signed in London in June 1990. They committed to phasing out completely the production and use of CFCs by the year 2000, although developing countries are given a 10-year grace period, obliging them to halt production before the year 2010. In addition, the new agreement called for a ban on halons by 2000, while two other chlorine-based chemicals are to be sharply restricted.[6]

Most significant of all, a new international body was created to administer a fund that will be used to help poor countries make the transition to technologies free of CFCs. The new fund - of up to U.S.$240 million for the first three years - is being financed by industrialized countries; its establishment brought major developing countries like China and India -

which had not agreed to sign the Montreal Protocol - into accepting the provisions of the revised protocol and recommending its ratification by their respective governments.

The results of the London Conference will have a major influence on other negotiations on atmospheric protection - and there are plenty of them. Many hope that the experience with ozone depletion may serve as a model for other negotiations on climate change. The key question is whether the richer countries are willing to assist developing countries with financing and technology transfer at less than commercial cost in order to ensure strong programs of prevention.

Ozone Depletion Issues

Among the key outstanding issues which UNCED will be expected to address are the following:

- finding ways and means of monitoring compliance with existing international conventions and agreements;
- finding ways of ensuring technology transfer to assist developing countries to meet global standards for ozone depletion, including intellectual property rights and ways of involving industry.

Meeting the Challenge

The challenges of global warming, ozone depletion and transboundary air pollution reflect, in essence, a conflict between two vast and complex systems: the planet's ecological system and the human

socioeconomic system. The momentum of these systems already guarantees some change, although how much remains uncertain. But delays will almost certainly ensure that the effects are greater and last longer.

Our knowledge of the main global weather processes is considerable. It has permitted the construction of "general circulation models", using supercomputers, which give indications of the global climate to be expected if greenhouse gases double during the next half century. However, these models remain at an early stage of development and the complexity of the weather system is such that some effects are more dependable than others.

For example:

> *forecasts in changes in sea level are probably more reliable than those of the climate of land areas; estimates of air temperature are more reliable than estimates of precipitation; and forecasts of latitudinal (North-South) changes are more reliable than attempts to predict the changes from East to West across a continent.*[7]

These variations do not diminish the significance of the circulation models, but they do highlight the difficulties of basing policy on predictions of climate that remain speculative. The only justification for doing so is the enormity of the problems we face.

Fundamentally, climate change is being caused by the developed countries and the solution must come from them. One expert has argued, "the prudent course is to take some action early in the hope of cutting off the worst possible outcomes. The imprudent

course is to do nothing, awaiting a more complete confirmation of the models."[8]

Another complication is the profound difference between developing and industrialized countries in both causes and consequences.

Today, the developing world accounts for about one-third of all greenhouse gas emissions but, as population and economic development both increase, its contribution will swell.

Yet reducing greenhouse gases is not a priority among many developing countries. Some countries see themselves as winners from warming, benefiting from longer, more productive growing conditions.

Even if developing countries do accept the gravity of the challenge, they will need substantial monies, skilled labour and advanced technology in order to meet their targets.[9]

Their involvement is crucial. Any reductions in fossil fuel emissions by industrialized countries could soon be wiped out by increases in only a handful of developing countries.

China alone, with one of the largest reserves of coal in the world, plans 200 new coal-fired stations in the future.

> *The problem is not that [developing countries] can prevent an agreement being reached, but that they can refuse to sign, ratify or implement an agreement unless and until their economic and other concerns have been addressed.*[10]

What Will the Brazil Conference Do?

The leaders of the Group of 7 leading industrial countries, at the Paris Summit of July 1989, declared in their final communiqué that "the conclusion of a framework or umbrella convention on climate change to set out general principles or guidelines is urgently required."

Anticipating their concerns, two UN agencies (the World Meteorological Organization and the UN Environment Program) set up in 1988 the Intergovernmental Panel on Climate Change (IPCC) with a mandate to provide a firmer assessment of the scientific basis for climate change.

The IPCC established three sub-groups, each of which prepared reports for the second World Climate Conference in Geneva in the fall of 1990.

Among their findings was that emissions of greenhouse gases, if left uncontrolled, would result in global mean temperature increases of up to three degrees Celsius and sea level rises of up to three quarters of a metre by the end of the next century.

Negotiations to discuss an international convention on climate change opened in Washington, D.C. in February 1991 under the auspices of the U.N. General Assembly.

The theory is that a framework convention would contain appropriate commitments for action to combat climate change and its adverse effects and would consider the particular needs and development priorities of developing countries to assist them in

grappling with the threats of climate change and participating in the solutions.

This would be followed as soon as possible by protocols that could include more obligations (i.e., targets and timetables).

Climate Change Issues

Among the issues that UNCED or negotiations leading up to or parallel with UNCED will need to address are the following:

- ***an appropriate global warming index, with practical limits which still minimize risks;***
- ***establishing global and fair national targets based on the index. This will require estimating each country's emissions for a baseline year;***
- ***evaluating whether and how credits should be given to national governments for actions taken prior to when the convention enters into force - for example, reforestation, CFC reductions, perhaps even nuclear power if that is considered appropriate;***
- ***assessing the needs of developing countries;***
- ***evaluating alternative administrative and enforcement mechanisms. This could include a system of international emissions trading by which different companies have the choice of achieving emission reductions in greenhouse gases either at their own facilities or by purchasing allowances from other companies, whichever is more economical.***

Transboundary Air Pollution Issues

The major issues include:

- ***broadening participation by more countries in existing legal agreements or facilitating new regional agreements beyond those in North America and Europe - this may be preferable to "globalizing" existing ones;***
- ***seeking technologies for cutting down air pollution and improving the harmonization worldwide of currently-existing technical emission standards;***
- ***promoting new strategies for energy efficiency and rational energy use and eliminating economic incentives and subsidies for fossil fuels.***

The Challenge Remains

Meeting the challenge of global warming will not be easy. The uncertainties of predictions make consensus difficult to reach.

Reaching any kind of agreement will depend on the answers to two big questions:

1 When it comes to emission reductions, who should be how virtuous?
2 How are developing countries who sign going to be compensated?

In the first instance, energy-efficient countries like Japan will be reluctant to make the same

percentage cuts as inefficient ones like Canada. Britain has announced a later date for stabilizing its emissions (2005) than its partners in the European Community (2000). Nor can Third World countries all be treated alike. Some, such as Brazil with its burning forests, send up a huge amount of greenhouse gases; others hardly any. Even agreeing on the figures of who emits how much will be difficult because of the complexity of the calculations.

Yet the reality is that the major commitment must come from developed countries whose inordinate use of fossil fuels is the principal cause of the crisis. Their commitment to reducing their emissions is the single most important step.

The second question is also hard to answer. Although the revised Montreal Protocol (the London agreement) provides for compensation to developing countries, the Americans, who previously had been the most adamantly opposed to this approach, firmly stated that in accepting it, they did not regard it as a precedent. Yet the fact remains that by striking a bargain in the ozone negotiations, a deal was reached which included both India and China whose involvement is vital and who up until then had been hold-outs.

Moreover, in Eastern Europe payments by the victims of air pollution will soon be common. Already, Sweden helps Poland with technology to prevent acid rain, while other Western European governments are considering similar arrangements. "They reckon that a dollar spent in Eastern Europe buys far more

improvement in air quality than one spent at home."[11] However, clearly if deals are to be struck, the bargaining is going to be very tough.

In the face of these challenges, one knowledgeable observer has offered the following warning:

> *Unless overwhelmed by a strong and enduring public consensus or by political leadership not yet in evidence, the political processes within and among nations are not likely to bring forth substantial policy action until the uncertainties surrounding climate change are greatly reduced, and probably not until evidence of warming is palpable. This conclusion holds, even though the earth's climate may sustain irreversible changes if some of the forecasts are correct.*[12]

Against that rather grim prediction, the only remedy is one offered by the Canadian journalist and filmmaker Boyce Richardson in a recent book with the suggestive title, *Time to Change.* He suggested that the essential ingredient of hope for the global future was

> *an informed and active citizenry hounding its governments to do what has to be done.*[13]

Endnotes

1 Eugene B. Skolnikoff, "The Policy Gridlock on Global Warming," *Foreign Policy*, Summer 1990, p. 77.

2 Jim MacNeill, Peter Winsemius, Taizo Yakushiji, *Beyond Interdependence: The Meshing of the*

World's Economy and the Earth's Ecology, A Report to the Trilateral Commission, 1990, p. 9.

3 *ibid.*, pp. 10-11.

4 *ibid.*, p. 6.

5 Michael L. Wald, "Guarding Environment: A World of Challenges," *The New York Times*, April 22, 1990, p. A1.

6 The two chemicals (methyl chloroform and carbon tetrachloride) are used as solvents and cleaning agents. Participants agreed to reduce methyl chloroform by 70% by the year 2000 and by 100% in 2005. Production of carbon tetrachloride is to be reduced 85% by 1995 and 100% by 2000. *The New York Times*, June 30, 1990, p. A1.

7 C. Ian Jackson, "What's A Trillion?", *Policy Options*, July/August 1990, pp. 11-12.

8 MacNeill, *op. cit.*, p. 13.

9 Skolnikoff, *op. cit.*, pp. 84-85.

10 MacNeill, *op. cit.*, p. 54.

11 "A cool look at hot air," *The Economist*, June 16, 1990, p. 20.

12 Skolnikoff, *op. cit.*, p. 88.

13 Boyce Richardson, *Time to Change* 1990.

3 Protecting the Oceans

Why are the Oceans Important?

Very simply, life on our planet depends on the oceans. Water constantly evaporates from these vast bodies to become clouds and vapour in the atmosphere. This falls as rain and provides us with the fresh water needed for agriculture, industry and human uses.

The "hydrological cycle" also moves nutrients through the soil, along rivers and into lakes supporting a rich variety of aquatic life. Thus plant life thrives on land and in the sea, feeding animal life and producing the oxygen needed for all animals to survive.

Physically, the seas act as a giant reservoir for heat from the sun. Their movements help moderate the planet's temperatures and shape our climate.

Without the atmosphere and the oceans, the effective surface temperature of the world would plunge from the present 15°C to a frigid -25°C. And without water circulation, the human and industrial wastes that have for generations been dumped into the seas would gradually build up and poison both land and air.

Oceans are also a major source of food and employment and balance of trade. Fish and other aquatic animals account for an average of 17% of the animal protein found in all human diets.

Over 30 countries get more than one-third of this protein from seafood - not just nations with huge commercial fishing fleets, but also many developing states in Africa and Asia.

In short, the oceans are a highly productive system which continuously recycles the chemicals necessary for living organisms to survive. However, development in many ways is now threatening the oceans and other seas. The threats are numerous: the unmanaged growth of cities with their large-scale dumping of raw sewage; intensive agricultural practices leading to runoff of fertilizers and feedlot wastes; marine transportation; the destruction of forests; and river basin development are among the assaults.

Although the oceans are vast, they are not infinite in their resources or in what they are able to bear. Change takes place gradually in the open seas and the risks are numerous. The fate of the oceans and the future of our planet are intimately related.

Why are Coastal Zones Especially Important?

Coastal zones are home to the oceans' bounty. Here microscopic plants and the small animals which feed on them flourish. These zones are the hatcheries and feeding grounds for important fish and shellfish species. They are home for 30,000 species of mollusc and almost all species of crustaceans. Coastal zones have also attracted many varieties of birds, animals and, perhaps the greatest potential threat, human beings.

Seven out of ten people in the world live within 80 kilometres of a coast. Almost half the world's cities with populations of over one million people are sited in and around the tide-washed river mouths known as estuaries.

It is in coastal zones that humans put the most pressure on the marine environment, where 90% of the world's fish are caught. It is the site of our homes, a major source of food, a favoured place for recreation, and a popular garbage dump. Large numbers of people with their diverse demands on the environment can themselves cause significant unforeseen changes in coastal ecologies.

The Mediterranean, however, provides an illustration of what can be done, at least in theory, to protect coastal areas against the worst excesses of human use and abuse, despite large populations. For over 4,000 years, this sea has been the crossroads of European, Middle Eastern and North African civilizations. It remains highly important today, bordered as it is by 120 cities with a coastal population of at least 100 million and with over 20% of the world's oil traffic crossing its waters.

For years, most of the municipal waste which flooded into the Mediterranean was untreated or inadequately processed. Pollutants such as mercury, lead, used motor oil and pesticides had been found in its waters. By 1975 the situation was considered critical.

That year the United Nations Environment Programme (UNEP) began to shape a plan of action

for the Mediterranean by bringing together countries bordering on the Mediterranean and the European Economic Community (EEC). Protocols were signed against dumping from ships and aircraft and for cooperation in pollution emergencies. Lists of banned substances were established to regulate dumping, while less noxious but still dangerous materials were to be strictly controlled.

Currently, Mediterranean governments are involved in their most ambitious project so far. This involves placing anti-pollution devices in all factories, regular inspections of facilities, and installing pipelines to take sewage out to sea beyond bathing and shellfish waters. By the time the project is completed, it is estimated that the cost will exceed US$10 billion.

The Mediterranean is far from being the only large body of water to be endangered. UNEP has initiated a Regional Seas Programme which now brings together over 130 states bordering 11 different shared seas around the world. It provides the impetus for bringing governments together to develop a flexible legal framework within which further agreements can be negotiated as needs allow and politics require. No less than 14 UN agencies and over 40 international and regional organizations participate in the world-wide program.[1]

Although international conventions are important, the fact is that huge investments are needed to roll back land-based pollution in regional seas.

All the regulations and international standards in

the world are of little use if there is no money or provisions to do effective monitoring of what actually happens. The massive Canada-United States clean-up of the Great Lakes, which cost $8.85 billion over 15 years for partial treatment of municipal and industrial wastes, amply demonstrates the financial burden.[2]

The Need for Fisheries Management

After 1970, the expansion of world fisheries, which had begun following the Second World War, levelled off.[3] The average annual increase in catches fell from 6-7 per cent to about one per cent as more and more stocks were depleted and fewer new species were brought into the fishery. Over-exploitation threatens many stocks. Several of the world's largest fisheries - the Peruvian anchoveta, several North Atlantic herring stocks, and the Californian sardine - have collapsed.

Concern among coastal states about the depletion of their fisheries was one factor leading to the establishment of the Exclusive Economic Zone (EEZ) under the Law of the Sea negotiations. The EEZ permits coastal states to exercise sovereign rights over the management of national resources, living and non-living, in the waters, sea-bed, and subsoil, up to 200 nautical miles from their shorelines.

The idea behind the EEZ was that coastal states would introduce effective conservation and management measures within the zone in exchange for control of the activities of foreign fishermen there. But industrial countries have been much more successful in doing this than developing countries. In the north-west Atlantic, the annual catch by long-

range fleets declined from over 2 million tons before 1974 to about a quarter of a million tons in 1983, while the share of the catch taken by Canada and the United States rose from less than 50 to over 90 per cent.

By contrast, long-range fishing fleets from industrialized countries still catch about 5 million tons annually in developing regions.

Lack of local capital, and lack of expertise in things like processing and marketing, has had a debilitating effect on the capacity of developing countries to take advantage of their own resources.

Even in Canada, however, the crisis in the fisheries is clear. Northern Gulf of St. Lawrence cod has fallen drastically in numbers, haddock stocks are at dangerously low levels, and catches of snow crab in the Gulf of St. Lawrence have declined by more than 50 per cent. Consumers see the crisis reflected in availability and prices.

For those whose livelihood depends on harvesting the seas or processing the catch, the crisis is much more acute: it can mean the loss of jobs, the destruction of communities, the end of a way of life.

In Canada, the government has responded in several ways. New conservation measures are being developed regarding minimum fish size, mesh size and gear type. Higher penalties are being proposed for those caught fishing illegally, and monitoring,

surveillance and patrol activities are to be improved or increased. Canada is also conducting a diplomatic and public information campaign in Europe to influence those nations that persist in overfishing the stocks in international waters which straddle Canada's 200-mile zone. It is hoped that an international regime can be put in place so that stocks will be given the chance to rebuild.

International Efforts

Over the years, an impressive body of international agreements of various kinds has been concluded to deal with one or another of the varied threats which endanger the oceans and marine life. These include a series of agreements relating to oil pollution, the London Dumping Convention of 1972 to control large-scale dumping of industrial waste and sewage in the oceans, as well as conventions to prevent marine pollution from land-based sources.

The 1982 UN Convention on the Law of the Sea provides a comprehensive framework of international law to protect the oceans and seas. It is designed as an umbrella for further global, regional and national actions such as UNEP's Regional Seas Program which has already been described. The U.N. system also provides coverage of most environmental issues relating to oceans and seas and an extensive network of coordinating mechanisms such as periodic inter-agency meetings.

Nevertheless, many problems and considerable discrepancies remain. For example, compliance with internationally agreed rules to prevent marine pollution from ships[4] is hampered by a lack of

monitoring to measure compliance, as well as effective enforcement and education.

Negotiations must be pursued to ensure that existing fishery stocks are equitably distributed among competing interests, so that overfishing is curbed and depleted stocks rebuilt.

Gaps in the present legal framework pertaining to the oceans and seas must also be identified - a painstaking task in itself because of the wide variety of conventions and agreements in place which cover different geographic areas and different subject matter.

Issues at UNCED:

- ***the need to accelerate monitoring and assessment of the oceans, including the impact of climate change;***
- ***encouraging ratification and adoption of existing treaties (e.g., 1972 London Dumping Convention) and negotiation of new agreements on new problems;***
- ***incomplete coverage, particularly in developing countries, of existing agreements. Such deterioration hits hardest the poorest of the poor, through over-exploitation of fisheries stocks and the destruction of nurseries.***

As more and more people expect to live off the resources of the sea and mariculture, the future of our ocean resources will be tied to appropriate controls and management. Monitoring, development of information data bases and international co-

operationin setting standards and enforcing them will be essential. It is hoped that the 1992 UN Conference on Environment and Development will give a significant boost to this important work.

Endnotes

1 World Commission on Environment and Development, *Our Common Future* Oxford, 1987, p. 270.
2 *ibid.* p. 270.
3 The following discussion owes much to *Our Common Future* pp. 264-273.
4 The most notable example is the 1972 London Dumping Convention (the Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matters) which regulates the disposal of wastes by dumping and incineration at sea.

4 Waste Management

Waste Management: An Introduction

Along with many benefits, economic growth has brought with it the twin perils of widespread use of chemicals in industry, business and the home and the enormous production of wastes of all kinds. These threats have alarming potential for harming both the environment and human health.

All countries face these problems, but some - chiefly as a result of wealth and experience - are far better equipped to deal with them than others.

In many poor countries, the rapid growth of cities and industrialization have raced ahead of the government's ability to cope with the sheer magnitude of solid wastes that are generated daily and chemicals over which they have little control.

Chemicals represent about 10% of total world trade in terms of value. An estimated 70-80,000 chemicals are now on the market - although no complete inventory has ever been done and most have never been tested for toxicity.

This situation is beginning to change as some governments move gradually towards a system of testing all new chemicals *before* they come to market.

Most industrialized countries, including Canada, have passed tough environmental laws to deal with

both chemicals and wastes. Rigid guidelines are set for the use, storage, and disposal of dangerous and toxic substances, backed up by stringent sanctions. Depending on the severity of the violation, persons not in compliance with these standards can face stiff jail sentences or heavy fines.

Disparities in International Standards

Unfortunately, there are wide differences in standards between industrialized and developing nations. Legislation protecting the environment is generally much weaker in developing countries because of the higher premium they place on economic growth. For the same reason, technical standards for handling, storing, and disposing of toxic wastes are usually lower. In addition, most Third World countries lack the resources (laboratories, trained workers) to assess the risks of chemical use and thus they have no way to control chemicals entering their borders that may have been banned elsewhere.

The result is that a number of Third World countries - particularly in Africa - have become dumping grounds for industrial wastes. Unscrupulous corporations, in addition to conducting illegal dumping domestically, also export toxic and dangerous products and wastes abroad. Moreover, legislation has not been entirely effective in reducing the amount of hazardous and toxic wastes being dumped. The Third World is further exploited by deceptive marketing, unsafe operations, and double standards.

In essence, some of the most toxic and hazardous wastes in the industrialized world are being passed

on to those countries least equipped to deal with them. The quantity of toxic waste exported is significant and will remain so as long as the trafficking is economically advantageous. As environmental restrictions have increased in Europe and North America, costs for waste disposal have soared. Quite recently, the government of Benin on Africa's west coast was accepting waste for US$3 a tonne (a metric tonne = 1000 kg or 1.102 tons). In Europe and the United States, incineration can cost as much as $2,000 a tonne.

The Organization for Economic Cooperation and Development has estimated that 2.5 million metric tonnes of toxic waste originate each year in Western Europe alone.

So far, laws against these exports have been difficult to enforce.

Illegal Traffic

The illegal international traffic also includes the export of goods rejected elsewhere as unsafe. Pesticides such as DDT and dieldrin - restricted or banned in countries with strict controls - are used extensively in developing countries. The value of such exports from the United States alone is estimated at $300 million a year. Frequently, these exports are not labelled in the language of the receiving country or they are used by illiterate or barely literate workers. In consequence, although developing countries use about one-fifth of the world's pesticides, they account for three-fifths of global pesticide-related deaths.

The operating principle behind the illegal traffic in hazardous substances seems to be "out of sight, out of mind" - the same principle which allowed the hazardous waste problem to proliferate in buried dump sights nearer to home. Unless high standards are set and enforced, then toxic nightmares like Love Canal are bound to be repeated around the world. It amounts to a high risk game of "juggle the poison" - the problem is not solved; it is merely moved around, leaving the threat to the earth's ecology intact.

International Agreements

In recent years, some progress has been made in managing the traffic in toxic wastes. More countries are clamping down on how much, if any, waste they will accept.

In 1983 the United Nations published a consolidated list (the International Register of Potentially Toxic Chemicals - IRPTC) of products which had been banned, withdrawn, severely restricted, or not approved by governments. It has since been updated twice and now includes annotated entries for some 8,000 trade names.

After a 20-month process, the United Nations Environment Program (UNEP) succeeded in obtaining the signatures of 116 countries for the landmark Basel Convention or, more accurately, the *Global Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.* It establishes four key principles:

1 The generation of hazardous waste should be reduced to a minimum at the source;

2 Such wastes should be treated as close as possible to their point of generation;

3 Hazardous wastes should be shipped only to countries with adequate treatment facilities to deal with them safely;

4 The export of hazardous wastes should be controlled by an international management system. This would provide accurate listing and identification of the wastes shipped, and require the prior informed consent of the countries of importation and transit.

Canada signed the Convention in March 1989 and is now engaged in the process of ratification, which consists of ensuring that all domestic regulations are in accord with the treaty. The Convention must be ratified by at least 20 countries before it enters into force.

The European Economic Community also signed an aid and trade agreement called Lomé IV in December 1989 which bans exports of nuclear and toxic wastes to 66 African, Caribbean and Pacific countries.

While international treaties such as these should help reduce the illegal traffic in hazardous substances, they are not enough to satisfy some environmentalists. Greenpeace and other environmental groups have called for a total ban on the export of both hazardous wastes and pesticides. This would require countries to develop and implement improved techniques to treat, detoxify or incinerate hazardous wastes within their own borders.

In the case of Canada and the United States, hazardous wastes currently go both ways and are regulated by a 1986 agreement. This bilateral agreement is based on the principle that such wastes should be treated at the nearest licensed facility, so as to minimize the distances they must travel to ensure their environmentally sound disposal. Canada does not support any bans on exports or imports of hazardous wastes, in particular those destined for recycling operation. The Canadian position is based on the following reasons:

- For economic and environmental reasons, the use of treatment facilities should be rationalized. This includes the possibility of countries agreeing bilaterally to enable hazardous waste generators to access the nearest facilities, regardless of international boundaries.
- Imposing such a ban would create a climate that would encourage illegal movement.
- Environmental and economic objectives must be balanced, particularly for hazardous recyclables.

Future Progress

The World Commission on Environment and Development, better known as the Brundtland Commission, recommended in its 1987 report, *Our Common Future*, that all governments should:

- undertake that no new chemicals be placed on international markets until the health and environmental impacts have been tested and assessed;

- reinforce on-going efforts to obtain international agreement on the selection of existing chemicals for priority testing, on criteria and procedures for their assessment, and on a system for international sharing of the tasks and the resources required;
- strictly regulate the export to developing countries of those chemicals for which authorization for domestic sale has not been sought or given, by extending requirements for prior notification and information exchange to them; and
- support the establishment in existing regional organizations of units qualified to receive such prior notification and information, to assess it and to advise governments in the region on the risks associated with the use of these chemicals, in order to permit individual governments to weigh these risks against benefits they may perceive from importation of the chemicals.

The UN system through its agencies and programs is striving to put these proposals into effect. Some of their efforts have already been described.

In addition, UN agencies are collaborating on health and environmental risk evaluation of chemicals and pesticides, on technologies for waste minimization, treatment and disposal, and on the prevention of and emergency response to technological accidents.

Issues at UNCED

It is hoped that the 1992 UN Conference on Environment and Development will be able to address the following major gaps:

- ***safe management of chemicals, including pesticides, as an integrated concept;***
- ***coordination throughout the international system to cover the issues and activities in solid waste management effectively and to monitor the efforts in developing countries;***
- ***site selection of a facility for the disposal of high-level radioactive waste;***
- ***the need to strengthen existing guidelines or conventions.***

A key element is consumer awareness about chemicals through clear packaging and labelling in local languages and through greater efforts by governments, business and non-governmental organizations to inform consumers fully of the dangers. With respect to wastes, the objective must be to reduce the amount generated and to transform more and more into resources for use and reuse.

All of these goals will involve painstaking and on-going negotiations by governments. But in order to lay the ground for progress to be made - and to sustain and capitalize on any advances - people, through organizations, at the ballot box, and as individual voices, must demonstrate their commitment and determination.

5 Land Resources

Land Resources : An Introduction

One of the major global challenges is to produce more food, pure water, fibre and timber for rapidly growing populations. Several factors, however, make this challenge seem overwhelming.

One is the surge of more and more people and their spiralling demands on the land.

Another is inappropriate farming systems such as the use of hillsides that are ill-suited to cultivation.

A third is poorly designed irrigation systems over the last couple of centuries which have led to increasing salinity of the land.

And finally, there is the potentially devastating effect of climate - witness the series of dry years in the Sahel region of Africa during the 1980's.

All of these factors have been major causes of land "degradation" - that is, soil erosion, the spread of deserts, the destruction of forests, and other abuses of land resources.

Moreover, the degradation of the natural resource base (soils, rangelands, forests and water) appears to be increasing. If this trend continues, the consequences for agriculture, forestry and whole economies could be highly negative.

The aim must surely be to ensure that these sectors remain not only productive, but indeed, increase their productivity.

Soils and Farming

According to the UN's Food and Agriculture Organization (FAO), 60% of the people of the Third World make their living directly from farming. The proportion reaches 70% in Africa and 75% in Asia.

These farmers' ability to feed themselves and to earn additional monies to improve their lot is critical to the survival of entire societies.

The challenge is enormous. First, the number of mouths to feed is growing steadily. Global population by 2025 is expected to be twice that of 1980. Second, farmers must grow their crops on roughly the same amount of land since most of the world's arable land is already under the plough or pasture. Yet as agriculture around the world becomes more intensive and as ill-advised agricultural practices such as monoculture persist (when the same crop is planted year after year), land becomes increasingly vulnerable to erosion.

Grasslands become deserts when vegetation growth is reduced to a minimum. Desertification - the making of more desert - is the result of droughts, less rainfall than usual, overuse (too much cultivation and grazing), or wind patterns.

In Africa, where the numbers of both people and animals have exploded, overgrazing in some countries is thought to exceed the carrying capacity of the range by 100 per cent.

As more and more land is brought into permanent cultivation, the pastoral herding people are forced into marginal lands. Meanwhile, the desert swiftly advances: according to the UN Environment Program (UNEP), in the early 1980s out of a total of 473 million hectares of productive drylands in Sudano-Sahelian Africa, 88% was classified as desertified.[1]

In Central America, the problem of too many people on too little land is compounded by perverse patterns of land use and distribution.

Typically, the richest farmland in the river valleys is used as pasture for cattle - land that is much better suited to basic crops for domestic consumption. Meanwhile, the small, land-poor farmers are driven either to cultivate hillsides or to cut down more forests. But the uncovered hillsides are more susceptible to erosion and soils wash away in a few years, while tropical forest soil is rarely suitable for intensive or prolonged cultivation. So the small farmers are obliged to move on, carrying their destructive habits with them.

In Asia, although the causes may be different, the consequences are depressingly similar. Loss of vegetation in India has meant that the area subject to flooding has doubled in 10 years.

This is because there is no holding capacity on the land surface to slow the runoff and the soil that accompanies it, and also because the build-up of soil

in riverbeds causes the rivers to rise to higher flood levels. Siltation has also impaired the efficiency of hydroelectric and irrigation dams.

The North American plains produce huge amounts of food, mostly for export, leading to their description as the "bread basket of the world." But they are losing their natural fertility as a result.

Much of the land currently in production is subject to erosion, especially during prolonged droughts. The possibility of a drier climate in this region has encouraged the Canadian and U.S. governments to make plans to remove the most endangered areas from production, but an integrated land-use strategy, which would provide long-term solutions, remains elusive.[2]

Forests

Forests have been described as the hearts and lungs of the world. Their heart-land description arises from the fact that most river systems originate in the forest.

Forests prevent soil erosion, maintain high water quality, and regulate the flow of water in different seasons, thus providing the bloodstream of agriculture, industry and human communities.

Trees are compared to lungs because they "inhale" carbon dioxide and "exhale" oxygen. Through the

process of photosynthesis, the carbon from carbon dioxide in the air is "fixed" (or converted to solid matter) and becomes a part of forest biomass (wood, bark, and leaves). This is an important element in the global carbon reservoir.

Forests also filter particulate pollution from the air, and improve local and regional climates. When rain falls on a forest, as much as 80% may be returned to the atmosphere by evaporation directly or through the leaf systems. Fundamentally, the forest acts as a sponge or a protective cover which stops rain from falling directly on bare land, and thereby causing excessive erosion.

Particularly in the tropics, forests are a major source of global genetic diversity.

Although tropical forests cover roughly nine per cent of the world's land area or 1.2 billion hectares, they contain over half the known plant and animal species, including 80% of the insects and 90% of the primates.

Tragically, the world is facing serious declines in forest cover. In a recent report, FAO found that annual tropical deforestation had increased from 9 million hectares in 1980 to 16.8 million in 1990. As population continues to expand, all the world's forests are threatened.

There are a number of reasons for this crisis. One is the pressure on land: small farmers in poor countries "slash and burn" forest land in order to produce more food and cash crops. This practice is doubly destructive since usually these farmers do not even gain any money from the trees felled.

Furthermore, tropical forest soils are often unsuited to agriculture and the agriculture is not sustainable for more than a few years. Land conversion to other uses is the major problem in most developing countries. In Brazil, for example, the vast majority of Amazonian deforestation is due to land conversion.

Trees are also cleared for fuelwood. Wood provides over 80% of the energy needs of Africa. According to FAO, the annual rate of fuelwood consumption now exceeds the rate at which tree stocks are either regenerating or being planted by about 30% in Africa.[3]

The consequences are already serious and potentially catastrophic. Indiscriminate forest removal on watersheds has had disastrous results: loss of soil and land productivity, sedimentation of irrigation systems and turbines, and flooding in the plains. Large-scale forest clearance also may have had a devastating impact on global genetic diversity, and on gene pools of individual species.

The greenhouse effect is also partly owing to deforestation. The earth is now warming because of an increase of carbon dioxide in the atmosphere. Forests store more carbon than any other vegetation on land. Deforestation means fewer trees are exhaling oxygen which, therefore, increases the proportion of carbon dioxide in the atmosphere. The burning of wood as fuel makes the situation worse by increasing carbon dioxide emissions. Destruction of forests over past centuries has contributed substantially to the total increase in atmospheric carbon dioxide concentration. Currently, it contributes to between

15-20% of the total greenhouse effect.[4]

Solutions?

There are many remedies available to combat desertification and many policies that will promote the sustainable management of land resources. The challenge is to put them into effect. For sensible as these alternatives may seem from a distance, their implementation on the ground frequently runs counter to entrenched economic interests, traditional customs, political inertia and a host of other obstacles.

The World Commission on Environment and Development, better known as the Brundtland Commission, observed that poverty itself is a major global scourge:

> *Environmental stress has often been seen as the result of the growing demand on scarce resources and the pollution generated by the rising living standards of the relatively affluent. But poverty itself pollutes the environment, creating environmental stress in a different way. Those who are poor and hungry will often destroy their immediate environment in order to survive: they will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities.*[5]

On the other hand, conserving the agricultural resource base has three huge benefits. First, secure resources and reasonable living lead to good husbandry and sustainable management. Second,

migration from the countryside to cities is eased and less food is imported from abroad. Third, by putting money in Third World pockets, population growth is slowed.[6]

Since the end of World War II, the number of cattle in the Sahel has increased five fold. This can be traced to the fact that the new countries nationalized land and did not allow the local population to participate in the decision-making process on how it would be used. Prior to that, each village owned or had the rights to the land. The elders made the decisions on how the land would be used and the livestock it could support. Indigenous knowledge such as this is the single best solution to land degradation. Land should be returned to the villages with the villagers themselves regulating its use.

A more sophisticated but also more costly approach is for developing countries to classify land for different uses, depending on "best use" criteria. This means taking an inventory of all the land in a country, which satellite monitoring and other new technologies make more feasible. This, combined with full public discussion and political will, would permit differentiation of infrastructure, support services, fiscal subsidies and other incentives, and regulations - depending on how the lands are designated.

At the same time, a delicate balance must be maintained for forests between sustainable development and conservation. Once again, sound policies must be based on scientific analysis of the capacity of forests and their soil to perform different functions, along with the involvement of local people who are both "victims and agents of destruction and who will bear the burden of any new management

scheme."[7]

For example, forestry can be extended into agriculture. One or more tree crops can be combined with food crops or animal raising on the same land. The agroforestry approach has been practised by traditional farmers everywhere: it is especially appropriate for small farmers and low quality lands. The challenge is to "revive old methods, improve them, adapt them to new conditions, and develop new ones."[8] On the other hand, agroforestry is not a panacea: while it can make important differences, the fact remains that there is no system at the present time that will be able to feed the predominantly urban world of the year 2000.

International Efforts

Different international mechanisms have been tried with limited success. A UN Plan of Action to Combat Desertification (PACD) was drawn up in 1977. It had three objectives:

1 to stop and then reverse the environmental processes of desertification;

2 to put in place ecologically appropriate, productive and sustainable land uses; and

3 to secure the social and economic advancement of the people affected.

Yet so far PACD is an almost unqualified failure. Combatting desertification has no immediate payoff; it is a long-term process. Both potential donor

countries and recipients tend to favour projects with more immediate economic development goals. Moreover, the lack of attention to PACD may also reflect the fact that desertification affects the poorest and least politically powerful people in a country. Unless the catastrophe is both large and upon us - as in the Sahel - governments will not commit large amounts of money to programs that have a high risk of failure.[9]

Somewhat different criticisms apply to the Tropical Forest Action Program (TFAP), which was jointly created by the UN Development Program, FAO, the World Bank and the World Resources Institute in 1985.

TFAP imposed a uniform, "top-down" planning process involving legions of foreign consultants who often had inadequate knowledge of the diverse countries' forestry institutions or practices, much less the economic, social and cultural conditions underpinning forest use. Moreover, since the planning process was almost entirely dominated by foresters, little attention was paid to the fact that virtually all deforestation in the tropics has been caused by agriculture.

A public outcry led by non-governmental organizations resulted in several reviews of TFAP and a major meeting in Geneva in March 1991 to try to thrash out a new structure that permits local people to have greater control over their own resources. A recent issue of *The New Scientist* magazine noted that the challenge is "for governments, citizens' groups, forest dwellers, conservationists, timber companies and foresters to put their heads together to devise, for their country,

a management plan that satisfies all who have an interest in the forest." Sadly, "achieving that all-important dialogue has proved to be almost impossible."[10]

Issues at UNCED

- ***increased aid from developed countries to combat soil degradation, deforestation and desertification by means of increased research, extension and money;***
- ***sustainable alternatives to shifting cultivation that would be acceptable to small farmers;***
- ***identification of economically viable soil and water conservation techniques, geared toward the needs of small farmers;***
- ***sustainable development of dryland areas with high populations, including alternative or supplementary means of livelihood;***
- ***strategies to alleviate deforestation and desertification caused by the conglomeration of refugees and their livestock in environmentally fragile areas;***
- ***the development of national soils policies to encourage sustainable agriculture practices in the developing world.***

The 1990 Houston Summit of the Group of Seven leading industrialized countries called for a convention on tropical and temperate forests to protect biodiversity and to reflect concerns about climate change. If all goes well, an International Convention on Forests could be one of the most significant

accomplishments of the UNCED.

The Food and Agriculture Organization is playing an active role in providing analytical support and developing ideas for such a convention. It is hoped that negotiations to prepare a convention will be opened by member countries as soon as possible. This would be the first in a two-step process: first, a country signs a convention or another form of legal instrument, which signals its intention to ratify; then, the country proceeds to bring its domestic laws into accord with the provisions of the instrument, at the conclusion of which ratification can take place.

Canadian Approaches

At the national level, in 1987 the Canadian Council of Forestry Ministers (representing both federal and provincial ministers) adopted, after broad public consultation, a National Forestry Sector Strategy.

At the last meeting of this Council in October 1990, it was agreed to revise the strategy. A series of regional forums is being held during 1991 in order to consult as widely as possible, with the ultimate objective being a renamed National Forest Strategy ready for adoption at a National Forestry Congress to be held in Ottawa in March 1992. This process will allow Canada to prepare internally for whatever obligations may be undertaken in agreeing at UNCED to a global convention or other kinds of legal instruments on forestry.

As for agriculture, the Canadian position is characterized by a dual approach. On the one hand, it is recognized that, in the short-term, developing countries will be obliged to practice non-sustainable

agriculture if they are to meet the daunting challenge of feeding their rapidly growing populations. On the other hand, Canada is determined to seek commitments from developing countries that they will prepare national soils policies which will gradually move their agriculture towards sustainable practices in the longer-term.

Canadian diplomacy at the UNCED and in the preparations leading up to it could play a vital role in building bridges between different national delegations on the complex interrelationship between diverse land uses and sustainable land management. How we use or abuse the soil is fundamental to how we view ourselves and the earth we inhabit.

Endnotes

1 The World Resources Institute and the International Institute for Environment and Development, *World Resources 1988-89*, New York, p. 291.
2 Constance Mungall and Digby J. McLaren, *Planet Under Stress*, Royal Society of Canada, 1990, pp. 205-206.
3 David Runnalls, "Environment and Development: A Critical Stocktaking," The North-South Institute, Briefing No. 16, p. 8.
4 Jim MacNeill, Peter Winsemius, Taizo Yakushiji, *Beyond Interdependence: The Meshing of the World's Economy and the Earth's Ecology*, A Report to the Trilateral Commission, 1990, p. 8.
5 The World Commission on Environment and Development, Our Common Future, 1987, p. 28.
6 *ibid.*, p. 129.

7 *ibid.*, p. 136.
8 *ibid.*, p. 137.
9 World Resources Institute, *op. cit.*, p. 217.
10 Omar Sattaur, "Last chance for the rainforest plan?", *The New Scientist*, March 2, 1991.

6 Biogical Diversity

Biological Diversity: An Introduction

From the depths of the ocean to the snow-capped mountain peaks, our world teems with life. A startling variety of plants, animals, and micro-organisms coexist in complex, interlocking ways in a wide range of natural habitats.

No one is even sure how many different species of living organisms share the earth with us. About 1.7 million species have been formally named, but there could be as many as 30 million other species which have not yet been identified!

Within each species, there is further diversity measured by the variation in genes among the members of a population. It is this genetic variation which determines that some roses will be red and others yellow, that some chickens will be best for producing meat and others eggs.

Biological diversity - genetic variation, the number of species, and the different ecosystems in which they coexist - is among our greatest treasures. Yet, in spite of world-wide conservation efforts, our biological resources are being lost. Delicate ecosystems, damaged by acid rain, waste disposal, and deforestation, are losing their ability to sustain life. Overharvesting and killing of some species compounds

the problem.

If present rates of extinction continue, a quarter of the world's species will be gone by the end of the century.

Why is Biological Diversity Important?

For many conservationists, there is an ethical imperative to protect all of the various biological resources of the earth. Beyond consideration of our role as human stewards, however, there are more pragmatic reasons why biological diversity is important.

In terms of agriculture, the existence of genetic diversity offers the opportunity to improve strains of crop plants and livestock and to develop "new" crop species.

In the United States, the U.S. Department of Agriculture attributes $1-billion annually of increased crop productivity to the introduction of genetic characteristics from wild species into major crop plants.

The diversity of wild plant and animal species also provides enormous potential for both the development and testing of new drugs.

More than a quarter of all prescription drugs are made from organic substances that originate in rain forests, the location offering the greatest biological diversity.

In addition, places such as parks, reserves and wildlife refuges, where people go to see wild species and other natural features, contribute enormously to the economy. Recent studies have found that wildlife-associated recreation accounts for billions of dollars spent in Canada each year. The potential of developing countries to attract foreign exchange by promoting "eco-tourism" is beginning to be realized, but much more can still be done.

Perhaps the most important reason for conserving biological diversity is that all life, including human life, depends on keeping the planet healthy. All living things interact with their environment in an interlocking way, such that the fate of one species is closely tied to that of others. We rely on our environmental resources for many benefits which we often take for granted - the biologically mediated recycling of nutrients, purifying of water, flood control, breakdown of pollutants, protection of soil, fixation of solar energy, and other life-sustaining functions.

Whenever biological diversity is lost, the overall system is stressed as it attempts to balance the new equation. Even a small change can have complex and unpredictable results.

The loss of one species, for example, could trigger an increase in other species which use the same resources, or it could led to decreases in species which preyed upon it. Considering the limitations of our existing knowledge, can we afford to squander biological resources which may be useful or even essential?

What Threatens Biological Diversity?

Despite efforts to increase awareness of the need to conserve biological diversity, many organisms continue to be exposed to a variety of human-caused threats.

The most serious of these is habitat alteration, often related to land-use changes on a regional scale which involve massive reductions in natural vegetation. Such reductions inevitably result in population declines of indigenous species, with a corresponding loss in genetic diversity and an increase in vulnerability to disease, hunting, and random population fluctuations.

Most circumstances of habitat alteration can be traced back to human population increases. As our population has increased, forests have fallen and wetlands and marshes have been lost in order to provide new land for raising crops and livestock or for urban development.

In forests where large areas have been cleared to provide fuel wood and timber, natural regeneration may not occur because seed sources may not be available and soils may have been degraded.

This is particularly true in tropical forests, where climax species have large and poorly dispersed seeds, where close interdependence with micro-organisms is probably common, and where nutrients are rapidly leached from exposed soil. The result is soil loss, droughts, floods, disrupted water supplies, and a legacy of unproductive land.

In the ocean, coral reefs are under severe assault. These fragile, species-rich ecosystems are threatened by extensive mining for concrete production and the

commercial collection of coral.

Biological diversity is threatened not only by outright physical destruction of habitat. Many habitats have been seriously polluted and degraded through chemical contamination and improper waste disposal.

Excessive commercial harvesting has caused the virtual elimination of several species. Whenever individuals are taken at a higher rate than can be sustained by the natural reproductive capacity of the species, there exists the danger of loss of biological diversity.

Another important factor is climate change, often related to changing land-use patterns. The global warming of the "greenhouse" effect will certainly have a serious impact on many ecosystems.

What Can Be Done?

Governments have adopted numerous measures to address different aspects of the problem, including national conservation programs, international conventions, and other instruments.

In Indonesia, for example, fines have been imposed and forestry licences revoked if companies are caught cutting trees smaller than the law allows, or if they overharvest the forests.

Australia wants to have its remaining rain forests included on UNESCO's World Heritage List, which would oblige the country to "preserve, conserve, and rehabilitate" forests and make them off-limits to development.

In the late 1960's, India was faced with a massive hemorrhage in its tiger population because expanding human populations were encroaching on and destroying the tiger's last sanctuaries. India rose to the challenge and launched Project Tiger in 1972.

International conventions were drafted and national laws were passed to protect the tiger, which became a symbol for all of the natural riches of wildlife and wildlands in the sub-continent.

> *Special tiger reserves were declared. More and better trained and equipped staff were put in place to manage these precious resources. Economic planners faced the challenges associated with creating the tiger reserves and the surrounding forest areas as positive features in regional land-use and economic advancement programs. No longer could clearing the jungle and killing tigers be considered the mark of progress it once had been.*[1]

Unfortunately, there is no comprehensive international program for the conservation and use of biological diversity as a component of sustainable development. Existing programs are fragmented, poorly funded, and fail to address the economic realities which lie at the root of the problem.

The sad truth is that the areas with the greatest biological diversity are frequently those with the fewest economic means to implement conservation programs. Most developing countries are faced with more immediate demands than environmental

problems, such as getting a handle on massive debts. For biologically rich but economically poor countries such as Zaire, Burma, and Indonesia, using their resources to generate income for their increasing populations has priority.

International Efforts

The conservation of biological diversity is the aim of a number of international conventions.

These include the 1946 International Convention for the Regulation of Whaling (to protect all whale species from overhunting and to establish a system of conservation), the 1971 Convention on Wetlands (to stem the progressive encroachment of wetlands, recognizing their fundamental ecological importance), the World Heritage Convention of 1972 (to promote conservation and preservation of heritage sites), the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora, and the 1979 Convention on the Conservation of Migratory Species of Wild Animals (to protect those that migrate across or near national boundaries).

The United Nations family of agencies also strives for the conservation and utilization of biological diversity through improved knowledge, assessment and monitoring of genetic resources and eco-systems. To this end, the UN seeks to encourage appropriate national and international tools and mechanisms.

International and UN efforts are guided by principles embodied in the several key documents, among them the World Charter for Nature of 1982 and the World Conservation Strategy of 1980.

The Strategy, which brought about a turning

point in thinking about economic development and protection of the biosphere, was commissioned by the UN Environment Program and prepared by three leading international non-governmental organizations.[2]

The Strategy makes conservation a primary policy concern of all economic sectors in government rather than that of one separate department.

It designs environmental policies that can "anticipate and prevent" rather than "react and cure."

National actions would conserve renewable resources like fisheries, forests, and cropland; protect natural areas; and control pollution. International actions would protect the "global commons": the atmosphere, the oceans, and the continent of Antarctica.

Unfortunately, the Strategy lacked any provision either for promotion or for monitoring progress. Perhaps as a result, it is being applied in a rather piecemeal fashion.

Some countries have endorsed it, but by and large, it is individuals and organizations that have responded to its objectives and who use it as a blueprint and checklist for policy development.

However, nearly ten years after its publication, there are 54 other Strategies under way or completed in 41 countries and the International Union for the Conservation of Nature - which helped to write the original Strategy - is setting up a data base to keep track of them.

The adoption and launching of the second World Conservation Strategy is one of the most important items on the international agenda relating to biological diversity prior to the 1992 UN Conference on

Environment and Development (UNCED) in Brazil. One of the priorities of the new Strategy will be to improve coordination and implementation of the various conservation conventions, agreements, strategies and action plans.

The Brazil Conference

The UNCED itself is expected to provide the opportunity to adopt an international framework legal instrument on biological diversity.

Already the negotiating process towards a convention has been launched under the auspices of the U.N. Environment Program.

This process is strongly supported by Canada; a convention on biological diversity could be one of the UNCED's most significant accomplishments.

At the same time, it is hoped that the UNCED will also launch international legal instruments on climate change and on forests, both of which would also have significant impact on world-wide biological diversity.

Issues at UNCED

UNCED may address a number of gaps that can be summarized in the following key points:

- ***a worldwide assessment is needed of biological diversity in order to understand better the current situation and trends, and the policies that are required;***
- ***a comprehensive national and international action plan is needed to conserve existing biological diversity;***

- ***better knowledge is needed of the economic value of biological diversity and genetic resources;***
- ***action is urgently needed to protect tropical forests which are inhabited by about 70% of the world's species, specifically:***
- ***the Tropical Forestry Action Plan remains seriously under-funded;***
- ***deforestation remains a major scourge, with government policy in many countries continuing to encourage the widespread clearing of forests, either deliberately or inadvertently;***
- ***an integrated approach is needed which strikes a balance between the needs of local populations and the protection of genetic resources.***

The conservation of biological diversity is mostly about the activity and behaviour of men and women. In order to change this behaviour for the better, the fundamental perception which must be corrected at the UNCED is the delusion that impoverished countries earn greater immediate benefits from exploiting their resources than they do from conserving them.

The challenge is to educate decision-makers and involve grassroots communities so that they realize conservation does not mean non-use, but instead, use which preserves and enhances the resource. Looked at in this way, conservation of biological diversity becomes a means of economic development and, above all, a way of sustaining planet earth.

Endnotes

1 This excerpt is taken from a review of a new book entitled *Tigers: The Secret Life* by Valmik Thapar. The review appeared in *The New York Times Book Review*, August 26, 1990, p. 3.

2 The following section on the World Conservation Strategy draws heavily from Constance Mungall and Digby J. McLaren, *Planet Under Stress*, The Royal Society of Canada, 1990, p. 207.

7 Freshwater Resources

Fresh Water: An Introduction

Water is the lifeblood of the environment, essential to the survival of all living things.

Although water covers nearly three quarters of the earth's surface in oceans as well as rivers, lakes, snow and glaciers, less than five per cent of this total exists as fresh water. Furthermore, all but a tiny fraction of fresh water is either permanently frozen or underground.

The freshwater supply is in continual motion through the hydrologic cycle, the endless circulation of water between the ocean, air, and land. Each year, the sun's heat causes some 500,000 cubic kilometres of water from the earth's surface to evaporate - 86% from the ocean and 14% from land.

An equal amount falls back to earth as rain, sleet, hail, or snow, but the process returns more water to the land than is evaporated from it. The World Resources Institute estimates that this cycle distills and transfers 41,000 cubic kilometres of water from the oceans to the continents annually. To complete the natural cycle, the water then makes its way back to the ocean as runoff.

Of this 41,000 cubic kilometres of water, almost two-thirds returns to the ocean as flood runoff and is

untappable. Another 5,000 cubic kilometres flow through uninhabited areas. The remaining 9,000 cubic kilometres constitutes the practical limit of the world's renewable freshwater supply.

Is There Enough Water to Meet Our Needs?

If the supply of freshwater was equally distributed, it would be more than adequate to sustain the world's rapidly growing population as well as the many other animals and plants which depend upon access to and use of this resource. However, because both the freshwater supply and the world's population are unevenly distributed, there are many regions which suffer from severe water shortages.

By comparing evaporation and precipitation rates, it is possible to identify water-rich and water-poor countries.

Eighty countries comprising 40% of the world's population are already experiencing serious water shortages. Africa and Asia are the continents facing the greatest water shortage.

In Africa, 30 million people have suffered malnutrition attributable to the drought of recent years. In Asia, per capita freshwater supplies are less than half the global average.

Even a water-rich country such as Canada, which possesses close to nine per cent of the world's renewable freshwater supply, suffers from geographic disparities. Some areas in the interior of British Columbia, southern prairies, and the high Arctic

receive less than 35 centimetres of annual precipitation. In addition, two-thirds of Canada's river flow runs northward, while 80% of the population lives within 200 kilometres of the Canada-U.S. border, a situation which results in occasional water shortages.

Even in the Great Lakes basin, the world's largest freshwater lake system, some areas in southern Ontario experience periodic water shortages.

In addition to distribution, it is important to look at how the water is used when considering the question of adequate supply. While many uses do little to disturb water's natural cycle, other uses - such as agricultural, industrial, and household uses - can dramatically reduce a region's immediate water supply. Most of the water used for irrigation, for example, returns to the atmosphere through evaporation and is not available for further use locally. A farmer whose sprinklers operate on well water may cause a net reduction in his region's groundwater supply.

Averaged globally, 73% of the freshwater withdrawn from the ground is used for agriculture.

As a consequence of its use in agriculture, depletion of groundwater is common in India, China and parts of the United States.

Supply problems can also occur through competing uses of the same water. While most household and

industrial uses withdraw water from its source and then return all or most of it downstream, shortages may arise at peak periods when overall demand exceeds supply. In this regard, withdrawal rates per person are important. Canadians, for example, are among the biggest water users in the world.

The average Canadian resident uses more than 70 times as much water every year as the average resident of Ghana does.

As population, industry, and agriculture expand, water for all uses will become increasingly scarce.

There are only two ways to reduce local water shortages.

The first is by increasing local supply, either by damming rivers or by withdrawing more groundwater. Since the renewable freshwater supply of an area is finite, if withdrawal continues to exceed recharge, this is essentially a short term solution.

The second, and more sustainable, solution is to increase the efficiency of water use, thereby conserving freshwater supplies locally.

The Importance of Water Quality

Assuring an adequate supply of freshwater is not the only problem facing many countries throughout the world.

There is also the serious problem of quality. Water quality has long been an issue in the developing world where three out of five persons lack access to clean water supplies.

It has been estimated that contaminated water and poor sanitation cause 30,000 deaths around the world every day - that's the equivalent of 100 jumbo jets crashing daily.

The severity of the problem is such that the United Nations declared the 1980's to be the International Drinking Water Supply and Sanitation Decade and instituted a program to provide safe drinking water and appropriate sanitation for everyone by 1990.

Yet although considerable progress has been made in countries as diverse as Indonesia, Ghana and Mexico, the recent outbreak of cholera in Peru bears terrible witness to the fact that the ambitious goals of the decade were far from being met.

Population growth, particularly in urban areas of developing countries during the decade provided an unexpected challenge. One of the significant conclusions of the decade is that the solution to ensuring safe drinking water supplies lies not just with the application of technology but with better trained people able to manage adequately water in all of its uses through an integrated approach to water management.

Although many factors affect water quality, the two major sources of freshwater pollution are traditional organic waste (human and animal excrement) and the toxic wastes generated by industry and the products of industry. Organic wastes are biodegradable, but become a problem when the quantity of waste exceeds the capacity of the water to purify itself. In India, for example, only 217 of the country's 3,119 towns and cities have even partial

sewage-treatment facilities, according to a 1986 study by the World Resources Institute. As a result, an estimated 70% of India's total surface water is polluted.

Toxic pollution - the contamination of freshwater by chemicals, radioactive materials, and heavy metals - is the most rapidly growing type of freshwater pollution.

A toxic substance may be termed persistent or non-persistent depending on how long it takes to breakdown. Both persistent and non-persistent contaminants can be harmful. Because of their longevity, however, persistent toxic substances have the greatest probability of accumulating up the food chain to hazardous levels. Once in the water, persistent substances are absorbed or eaten by microorganisms. Large numbers of slightly contaminated microorganisms are then consumed by the next level of the food web where concentration of the toxicant increases.

While toxic pollution is most often associated with industry, pesticides used to improve crop yields are also a major problem.

In most newly industrialized countries, both organic and toxic pollution are on the rise. This is due in part to the use of pesticides to feed a growing population and the desire for economic growth which have been given higher priority than the reduction of pollution.

The problem of water quality is not restricted to developing nations. One need look no further than the Great Lakes to see the severity of freshwater

pollution in the industrialized world. More than 300 chemical compounds, many dangerous to human health, have been found in the water. Cancerous tumours, thought to be linked to toxic contamination, have been found in fish of Lake Ontario.

Similarly, two rivers in the south of the Soviet Union have been virtually killed by the pesticide-laden runoff from nearby cotton fields. The area has the highest infant mortality rate in the country, which is attributed primarily to the infection and disease spread by its contaminated water.

How Can We Protect This Vital Resource?

To some extent, both the quantity and quality of freshwater resources are managed worldwide. Unfortunately, the results - particularly in terms of quality - have been inadequate.

Organic pollution is widespread in less developed countries resulting every year in the unnecessary deaths of millions of people - and children in particular - from typhoid, cholera, and other water-borne diseases. Diarrheal diseases result in the death of about five million infants and children annually.

In developed countries, toxic chemicals are freshwater's greatest threat, emanating from effluent pipes and smoke stacks of factories, seeping into groundwater from landfill sites and running off agricultural land into surface and ground water.

Globally, 25% of our rivers are dangerously polluted, as are hundreds of thousands of lakes.

In summary, developing countries face two main problems:

1 there is a shortage of water for agriculture; and

2 many people lack safe drinking water and basic sanitation.

The main problem for industrialized countries is pollution of the water resources, which has an impact on drinking water and on the proper functioning of aquatic ecosystems. In order to protect the world's freshwater and ensure clean water for all, it will be necessary to clean up the pollution that is already strangling the waterways; clamp down harder on new discharges of such poisons; and continue to educate the world population about humanity's responsibility for this life-sustaining resource.

The degradation of the world's freshwater has no respect for boundaries; after all, everyone draws from the same finite supply of renewable water.

Protection, therefore, depends on closer cooperation between governments, whether the money spent will have an immediate benefit domestically or not.

The Mar del Plata Action Plan, which was worked out under UN auspices almost fifteen years ago, provides an overall action framework for the entire international community.

Some limited progress has been achieved under this framework, most notably the accomplishments of the International Decade on Water Supply and

Sanitation which was one of the key recommendations of the Mar del Plata Action Plan, but numerous gaps remain.

Uncontrolled events, such as a global recession, large urban population growth in the developing world and severe drought in Africa, impeded progress in implementing the Mar del Plata plan.

Other problems have been widely identified, such as lack of funds and well-trained technicians and managers.

It is hoped that the 1992 UN Conference on the Environment and Development will be able to deal with these discrepancies effectively.

Issues for UNCED

- ***recognition of freshwater as a global concern and a critical factor impeding economic development in developing nations;***
- ***promotion of integrated management practices for water that recognize the ecosystem aspects of water and its value in all uses (including non-human uses) for better coordination of different water uses;***
- ***recognition of the increasing demand and competition for freshwater resources;***
- ***development of strategies to better link environmental considerations in economic decision making and more specifically, that better integrate water management with overall national development planning;***
- ***adequate pricing arrangements for water to ensure that it is being used and conserved effectively;***

- ***better long term monitoring and assessment of water, both quantity and quality aspects, globally but particular in Africa where implementation of monitoring networks lags behind other continents.***

The aim is to strike a balance between using water as a major natural resource for development and the need to safeguard water since it is a limited resource, both to protect it against pollution and to protect the habitats and species which depend on it. We must think in terms of Sustainable Development: using and managing resources and the environment in such a way that they both maintain a strong economy and preserve a healthy environment today and in the years to come.

8 Biotechnology

Biotechnology: An Introduction

Our planet is home to literally millions of life forms, many of which are too small to be seen by the naked eye. Humans have routinely used these microorganisms, or microbes, to improve their quality of life since the dawn of time.

A simple meal of bread, cheese, and beer, for example, is only possible because of the activities of microbes which turn milk into cheese, produce gases to make bread rise, and convert the sugar in barley into alcohol.

In recent years, as our knowledge of this microscopic world has increased, biotechnology - or the practical utilization of microbial, plant and animal cells - has emerged as a technique capable of conferring tremendous benefits on humanity:

- increased food production;
- reduced dependence on artificial fertilizers and pesticides;
- improved health by creating and mass-producing new drugs, antibiotics, and hormones;
- pollution control by harnessing microbes which can consume harmful wastes; and
- increased industrial capacity.

There are four basic types of biotechnology:

- *genetic manipulative,* or recombinant DNA technology;
- *cellular manipulative,* or the creation of specific substances through the fusion of normal and abnormal cells;
- *fermentative technology,* or the large scale growth of living organisms and the removal or extraction of substances as a result of this growth; and
- *enzyme technology,* or the production of substances that have the capacity to enhance chemical reactions and form any number of resulting products from various substances.

Each of these techniques offers countless opportunities for the improvement of life on Earth. Genetic engineering is the most spectacular facet of biotechnology, permitting the manipulation of the basic building blocks of life to produce desired characteristics at the cellular level.

It is only within the last 20 years that scientists have discovered they could graft totally foreign pieces of genetic information into microbes to create new life forms. In laboratories around the world, genetic engineers have already designed microbes to manufacture dozens of potentially invaluable substances, such as insulin and new drugs to combat viral diseases.

But other biotechnological techniques have been equally significant. Cellular manipulative research, for example, has open up the possibility of creating new crops which will grow more rapidly and require less fertilizer.

The exciting possibilities inherent in biotechnology arise because of the incredible diversity of microscopic life.

Microbes can be found almost everywhere, even in the most inhospitable of environments, such as ice, oil, and boiling water. In addition, some can feed on apparently non-nutritious materials, such as plastic, oil, even solid rock. This ability means microbes could be used to clean up waste oil spills or to eliminate plastic waste, something which in the absence of biotechnology is virtually non-biodegradable. Microorganisms have also been used to leach metals, such as uranium and copper, from low-grade ores.

To achieve the potential offered through biotechnology, it is essential that the Earth's biological diversity be preserved.

Biological diversity refers to genetic variation, the number of species, and the different ecosystems in which they co-exist. Although numerous conservation efforts have been launched to preserve biological diversity, biological resources are being lost at a greater than natural rate as human populations swell and little is done to change often wasteful or unthinking behaviour patterns (see Chapter 5 on biological diversity).

Can Biotechnology Be Dangerous?

The promises of biotechnology are accompanied by a range of concerns which cannot be ignored. Although the benefits are obvious, laboratory accidents, deliberate misuse of new techniques, unexpected

interactions with the environment, and the creation of products with harmful long-term effects are very real possibilities.

The potential risks, for example, posed by grafted genetic material escaping uncontrolled into wild organisms by gene transfer processes that occur naturally in the environment need evaluation before any project is undertaken. The socioeconomic and environmental risks and benefits must also be evaluated in every instance.

The potential of biotechnology being used in the development of weapons of mass or even minor destruction also deserves serious consideration. The Geneva Protocol of 1925 prohibited the use of bacteriological methods of warfare as well as chemical weapons.

By the late 1960's, however, it was widely recognized that biological weapons had even more devastating potential than chemical weapons. The result was the 1972 *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons.* In addition to the prohibitions recognized in its title, it also called for the elimination of existing weapons.

By 1975, 111 states had ratified the Convention while another 25 had signed, but the problems of verifying a country's compliance with the terms of the convention persist.

A 1986 review conference sought to recognize and allow for these problems which relate largely to confidence-building measures. Further legal steps relating to the Biological Weapons Convention are dependent upon the completion of the negotiations around a chemical weapons convention.

There are many problems that make the successful development of a biological weapon far from simple. However, the fact that research and development is still permitted for defensive purposes, and the fact that verification processes are difficult, continue to make this an area of international concern.

Biotechnology and the Third World

One of the great ironies surrounding biotechnology is that while the enormous richness of biological species and hence the required genetic diversity is largely found in the Third World, the specialized technology, skilled manpower and development capital needed for research are found almost wholly in the private sector of the industrialized world. This could easily lead to exploitation of the natural resources of developing countries in ways which only widen the development gap between North and South.

For years, wild plants and seeds have been collected freely by researchers and crossbred with crops. A Turkish variety of wheat helps give stripe-rust resistance to North America's wheat crop. An Ethiopian gene helps protect the barley crop from disease.

Plant substances have been the ingredients or inspiration for more than one-quarter of modern drugs. The National Cancer Institute in the United States alone collects thousands of plant samples each year from Asia, Africa and Latin America in its search for new cancer drugs.

The countries from which such plants are obtained have rarely been compensated, since the specimens have been treated as part of the common heritage of

mankind. Lately, however, the concept of property rights for plants has been gaining ground. Some nations are beginning to restrict access to wildlife samples or to demand compensation for their genetic resources as they do for mineral resources.[1]

Another major consideration is the impact of biotechnology on local economies. Biotechnology could erode the livelihoods of traditional producers by the development of substitute products and processes from genetic materials taken, in some instances, from those very countries.

In Kenya, for example, the government withdrew its support in 1982 for biotechnology programs creating fuel alcohol because the main raw ingredients consumed were basic food crops. Food imports soared during the period the Kenyan government supported these programs.

On the other hand, although the use of food crops for the production of fuel alcohol may result in food shortages, the possibility of hardier crops grown on previously barren land ultimately would have the opposite effect.

The long-term effect of these opposing market forces can only be guessed at. In the short-term, however, biotechnology can have detrimental effects on local and national economies and can present governments with significant dilemmas as they seek to limit the damage to their populations.

As biotechnology research advances, the world economy will be buffeted again and again by conflicting forces. As mortality rates drop due to new medicines, populations will rise, creating greater needs for energy, food, and fresh water.

United Nations Efforts

The United Nations seeks to monitor the work of the many private, public and international organizations which are involved with some aspect of biotechnological development.

The UN's family of agencies provides a variety of services relating or exploring biotechnology's interconnections with agriculture, health, industry and the environment.

Through these agencies, environmental management programs, agricultural and food production and safety systems, and the work of microbiological research centres around the world are examined and enhanced. The emphasis is on technical assistance, accelerated technological research, special training and dissemination of information.

Building on on-going work in the Organization for Economic Co-operation and Development, an inter-agency informal working group on safety in biotechnology has been set up under the auspices of the U.N. Industrial Development Organization, the U.N. Environment Program, the World Health Organization and the Food and Agriculture Organization.

It is seeking to speed the elaboration of basic safety guidelines and to prepare an international code of conduct. Its work is central to the process of preparing for UNCED itself, which will be seen by looking at the main issues at UNCED listed over the page.

Issues at UNCED

- ***elaboration of basic guidelines on safety in biotechnology;***
- ***facilitating the preparation of an international code of conduct;***
- ***assisting in the preparation of an international legal instrument on biological diversity.***

Many new developments in biotechnology are not fully appreciated (especially in all of their possible ramifications) by either governments or the public. In general, work undertaken without sufficient regard for the balance of nature, or with economic profit as the sole motive, usually brings disaster of one sort or another as a consequence.

The bottom line is that regulation, controls, and education are all important elements in any biotechnology strategy. Mishandled, any new discovery could be an environmental and economic disaster, rather than the blessing it may appear to be at the outset.

PART TWO

Options for Canada

Chapter 9
is an edited version of a paper by
Brent Herbert-Copley
of the
Social Sciences Division of the
International Development Research Centre
Technology, Environment and Development: Options for Canada at UNCED and Beyond
September, 1991

Chapter 10
is an excerpt from a paper by
David Runnalls
of the
Institute for Research in Public Policy
What Should be said at UNCED? Institutional Choices for the Rio Conference

9 Technology, Environment and Development

Brent Herbert-Copley

The debates leading up to the United Nations Conference on the Environment and Development (UNCED) have given new life to the subject of North-South technology transfer. This re-examination has focussed largely on the financial, institutional and legal mechanisms by which technologies currently applied in the North can be transferred to developing countries.

Other issues - the nature of developing country technology needs, the role of developing country research systems or the factors affecting the adoption of technology - have been downplayed.

Canada can and should provide international leadership in presenting a somewhat wider perspective, concentrating on the role of technology in promoting Sustainable Development, and the potential of international co-operation in fostering this role.

The agenda facing the international community is an increasingly broad one. Attention in the North has focussed on the 'global change' issues: ozone

depletion, greenhouse warming, deforestation and the erosion of biodiversity. Alongside these 'live' issues are a series of more 'latent' environmental problems which have important impacts in developing countries, but which have attracted far less international attention.

Addressing this second set of issues is essential if developing countries are to be engaged in global environmental action. It also underlines the intimate connection between environment and development. Efforts by the world community to tackle current environmental threats must confront the realities of burgeoning world population, of disparities in resources and opportunities within and among nations, and of the crippling effects of poverty on the environment.

What role can technology play in a poverty-focused approach to environmental protection? It is by no means a panacea to environmental problems, nor should we exaggerate the ease with which technological solutions developed in one socio-economic context can be transferred to another. Nonetheless, it is clear that any strategy to promote more sustainable patterns of development must draw upon technology. Environmental damage need not be an inevitable consequence of technological advance and economic growth.

What has until now been lacking is a commitment to pursue the host of social, legal and economic reforms needed to enable economic development, environmental protection and technological change to work toward a common end.

This too is beginning to change, and the UNCED conference is one indication of that change.

Industrialized and developing countries now agree that any environmental 'bargain' must include a commitment to provide developing countries with the financial and technological resources necessary to confront current environmental threats.

Yet the precise nature of such a commitment has proven to be one of the most thorny and divisive debates in the lead-up to UNCED.

To a large degree, discussions on transfer of 'environmentally sound' technology have mirrored earlier debates about North-South technology transfer more generally, both in the gulf separating the Northern and Southern positions, and in the nature of the issues addressed.

Northern countries have stressed the following four points:

- the need to ensure adequate financial compensation to inventors, via developing country recognition of intellectual property rights;
- a conviction that as far as possible, technology should be provided on non-concessional (commercial) terms, with no across-the-board guarantee of concessional access;
- a desire to limit the range of technologies under consideration, in particular by de-linking the climate change convention from other issues under discussion at the Summit; and,
- a preference for working through existing institutions in order to channel funds to support technology transfer activities, particularly the World Bank's Global Environmental Facility (GEF).

The Southern position, conversely, has tended to stress the following points:

- the need to secure access to the latest available technology, including proprietary technology, without conditionality in terms of reform of Southern patent legislation;
- the importance of concessional transfers, with the North bearing the brunt of the costs of providing the relevant technologies;
- the need to consider the entire range of environmentally-sound technologies, not just those of relevance to global warming; and,
- the importance of channelling funding through new institutions which would ensure an adequate voice for the developing countries in their constitution and operation.

There are, however, some emerging signs of a movement away from this North-South deadlock.

There is a somewhat tentative consensus emerging that intellectual property issues are *not* the key constraint to effective action.

There is an increased recognition in both North and South that any effective strategy must involve not only the transfer of technologies from North to South, but also the strengthening of indigenous Southern technological capabilities, through a variety of training and capacity building measures.

However, developing countries worry that industrialized country support for capacity-building and 'technology cooperation' may serve to detract attention from the crucial issues of financing and concessionality.

Bases for Action

The technology transfer debate has not converged on an agreed-upon range of choices. Instead, debate has tended to concentrate on broad principles (intellectual property rights, concessionality, 'technology cooperation').

There is a need for concrete, specific proposals which would help to bridge the gap between North and South. Discussion of concrete actions, however, must begin with a clear understanding of the nature of the problem. In this regard, earlier research on issues of science, technology and development yields several important lessons of relevance to the current debates.

Environmentally Sound Technologies

In the first place, it is important to stress that environmental "soundness" is a relative concept. There are multiple and often conflicting criteria of environmental soundness, and few technologies will be 'best' on all such criteria. Over time, judgements about environmental soundness will change and the environmental soundness of a particular technology will in practice depend crucially upon the conditions under which it operates.

It is impossible to identify in advance an exhaustive list of environmentally sound technologies, and thus to limit concessional financing to this list. Instead, identification of such technologies will be an ongoing process, which will itself demand significant effort.

The Sources of Technological Change

Much of the scope for environmental improvement will come not simply from the application of existing technologies, but rather from the development of new technologies and practices suited to local conditions, and from the efforts to improve the efficiency with which technologies are operated.

The debate must tackle not only the transfer of environmentally sound technologies, but rather the ways in which the entire vector of technological change (in both North and South) can be altered in the direction of greater environmental sustainability.

There is a need to address three separate sources of technological change:

1 *the generation of new knowledge;*

2 *the diffusion or transfer of new technologies;*

3 *the process of incremental improvements to production systems over time.*

The Market for Environmentally Sound Technologies

Early research on North-South technology transfer underlined the importance of examining the nature of the *market* for technology.

What sort of preliminary observations can we make regarding the 'market' for environmentally sound technologies facing developing countries?

A range of relevant technologies already exists. In the case of greenhouse warming, for example, these would include:

technologies to limit the use of CFCs;
energy conservation technologies;
technologies to improve the efficiency of carbon-based energy production;
non-carbon energy technologies (wind, solar);
agriculture and forest-related technologies, to improve energy efficiency, reduce methane emissions, reduce deforestation, and increase agricultural output per unit of land.

However, in many cases technologies to meet specific developing country needs either do not exist, are in the early stages of development, or will require substantial adaptation. *Developing countries cannot simply pull the necessary technologies 'off the shelf'.*

In addition, the market facing developing countries is extremely diverse. This may complicate problems of technology assessment and choice but it also suggests a relatively competitive market, in which developing countries should enjoy relatively strong bargaining power with suppliers.

Technology Transfer and Technological Capabilities

The ultimate goal of any international action in the field of environmentally-sound technology should not be to apply particular technological solutions, but rather to enhance the capabilities of developing countries to select, import, assimilate, adapt and create the relevant technologies.

In the absence of sustained efforts to build such

capabilities, transfer of novel technological systems may result in only limited and short-term improvements. Nonetheless, technology transfer is crucial to current discussions for three reasons.

1 The disparity in scientific and technological resources between North and South is acute.

2 A commitment to increase the flow of environmentally sound technology may be an important means of countering some of the other trends at work in the international technology market, such as: problems of indebtednes;, the shift of industrialized country investment away from developing countries; cutbacks in aid appropriations; and the growth of collaborative arrangements between Northern firms in ways which have largely frozen out developing countries.

3 Technology transfer and innovation are not polar opposites. Technology imports can help to strengthen indigenous technological capabilities. But this depends crucially on the local policy and institutional context, and on the specific terms and conditions under which technology is transferred.

A given technological solution needs to be matched with a concern for its integration into the local productive structure, the conditions by which it is acquired, and the extent to which 'hardware' imports are accompanied by effective transfers of knowledge and capabilities.

Pursuing Areas of Mutual Interest

Environmentally sound technologies can also result in increases in **economic** efficiency.

There is also growing recognition that technology transfer can yield benefits to suppliers far beyond the direct financial compensation involved in a given transaction:

- expansion of export opportunities for spare parts;
- increased efficiency of the transfer process itself;
- enhanced competitive position of supplier firms vis-a-vis international competitors;
- improving the productivity of input and component suppliers; and
- two-way flows of knowledge.

Transfer of technology may thus play a role in enhancing the competitiveness of Canadian environmental industries, although this does not mean that commercial advantage should be the key criteria in support to technology transfer.

Initial attention should be directed toward exploring possible 'win-win-win' solutions - that is, initiatives which meet the developmental needs of the Third World, the commercial needs of technology suppliers, and the environmental needs of the planetary ecosystem.

Attention should be directed toward overcoming the barriers - financial, informational and institutional - to the realization of 'win-win-win' solutions.

Options for Action

These are based on five broad objectives:

- clarifying the 'rules of the game' with regard to international cooperation in the transfer and development of environmentally sound technologies;
- increasing the supply of environmentally sound technologies from abroad;
- promoting the adoption and assimilation of imported technologies;
- improving needs assessment and technology choice; and,
- strengthening the innovative capabilities of developing countries in the field of environmentally sound technology.

The options presented below are, for the most part, *not* dependent upon securing a comprehensive multilateral 'bargain' between North and South. Instead, they concentrate on finite, concrete actions which should form the content of *any* program to promote the transfer and development of environmentally sound technologies to developing countries.

The options also reflect a conviction that effective action must involve a number of different actors. There is considerable scope for developing new and innovative partnerships between a variety of actors - NGOs, municipalities, professional associations - in North and South.

While there may be efficiency losses because of insufficient coordination, these are likely to be less

important than the transaction costs of negotiating more broadly-based solutions, or the danger of investing too many resources in what may turn out to be a false lead. This suggests a 'two-track' approach, in which efforts to reach a broad consensus among the relevant actors are balanced with more immediate and independent actions.

Clarifying the Rules of the Game

Attention must be given to clarifying the broad principles which should govern cooperation between North and South. *The most important and contentious points are likely to be intellectual property rights and concessionality. Canada should stake out a clear position on each of these issues, while at the same time searching for points of compromise.*

Canada should reaffirm its position that, in the case of commercially-developed, proprietary technology, recognition of intellectual property rights is essential to the continued development of much-needed technologies. At the same time, however, Canada should resist pressures to force developing countries to unilaterally extend property rights into new and controversial areas, particularly regarding living organisms.

On the issue of concessionality, the challenge is to marry Northern concerns to recognize the commercial nature of most technology transfer, with Southern demands for favourable access.

Canada should reaffirm that in the case of privately-owned technologies, market rates should form the basis for compensation to the owners of technology. On the other hand, developing countries should be provided with concessional financing in order to allow them to make such purchases, and should be assured that such financing would be additional to existing commitments for development assistance.

Finally, it is essential to recognize that the imperfect nature of some segments of the technology market means that 'market rates' may be excessive, and may be accompanied by excessively restrictive conditions of transfers. *Canada should press for renewed discussions on some form of code of conduct on technology transfer to guard against abuses of strong market positions.*

Increasing the Supply of Technology from Abroad

A long-term response to the problem of technology flows to developing countries must deal with the structural factors which limit demand for imported technology in these countries, such as small effective market size, foreign exchange constraints, lack of infrastructure, and low levels of domestic investment.

Canada should support initiatives in which negotiations between technology suppliers and recipients are separated from the financing of developing country purchases provided that developing country concerns about the governance of such institutions receive adequate attention.

Given the difficulty of reaching agreement on a comprehensive multilateral fund, *attention should also be given to more limited steps which can be taken to increase the supply of technology.*

In the case of *proprietary technologies,* intellectual property issues remain the most frequently mentioned barrier to transfer. It is doubtful that any across-the-board agreement on IP issues can be reached at UNCED, however, there may be considerable scope to increase the transfer of certain types of proprietary technologies:

- companies may be willing to transfer recently-developed technologies in cases where these do not represent part of their 'core' technological capabilities.
- there may be considerable scope for technology cooperation among non-competing users.
- there may be scope for the creation of specialized brokering services to mediate between the owners of proprietary technology and potential users in developing countries.

For *more widely available, public domain technologies,* the barriers are likely to be less legal than informational, and to some degree financial. Barriers may be particulary high in the case of small, specialized firms with little or no international experience.

Canada should explore the possibility of creating a special fund to support the involvement of such firms in supplying environmentally sound technologies.

In the case of *emerging technologies and pre-commercial research*, much depends upon whether research is primarily based in the public or private sector. In the latter case, significant progress can be made by donor countries in funding research partnerships between developing countries and Northern researchers in university or public sector institutions.

Finally, in the area of *'soft' technologies and know-how*, there are a wide variety of mechanisms to facilitate transfer. Twinning arrangements, involving long-term partnerships between Canadian and developing country institutions, may be particularly useful. Reversing the South-North flow of trained professionals ultimately depends on efforts to strengthen scientific research institutions in developing countries.

Promoting Adoption and Assimilation of Technologies

A key problem in in technolgy adoption is the frequent lack of incentives for the application of more environmentally sound techniques.

Recent debate has viewed this problem as one of 'market forces', focussing on distortions in factor prices (especially energy), on poorly developed capital markets, and on trade restrictions.

However, market-based reforms alone may be insufficient to alter patterns of technology use. A variety of non-market measures may also be needed:

- more traditional 'command and control' type regulations - in fields where market-based incentives do not function adequately;

- there may be important financial or technical bottlenecks to shifting to cleaner technologies - for example, due to the up-front investment costs of switching to new process technology, or the need for ancillary technological expertise. In such cases, public sector financial assistance, or publicly-funded R&D, may play an important role;
- developing country governments can also have a considerable effect on technology adoption by the reform of investment criteria for private sector investments, and by the judicious use of procurement provisions in public sector investment.

Canada and other donor countries can assist developing countries in promoting technology adoption in a number of ways:

- financial and technical assistance for specific aspects of policy reform (regarding investment criteria, for example, or regulatory standards);
- funding of demonstration projects illustrating the technical and economic efficiency of environmentally-sound technologies;
- financial and technical assistance to promote technology-sharing arrangements among developing country firms;
- assistance to improve the technical expertise of local and regional lending institutions in developing countries.

Attention must also be given to the *assimilation* of technologies. It is now widely accepted that

ensuring effective use is at least as important as promoting the initial adoption of technologies. A series of minor or major adaptations may be required to allow such technologies to function effectively in developing country markets.

Assimilation of imported technology is dependent upon the degree of local competition, trade, monetary and fiscal policy, and the availability of trained personnel.

However, there are a variety of more limited, concrete measures which can be undertaken:

- Canada should ensure that effective assimilation of imported technology is an explicit objective of any initiatives in the field of environmentally sound technology transfer - by building adequate training into ODA-funded projects, and by providing incentives to promote such involvement by private sector suppliers;

- an adequate supply of trained human resources is essential to effectively assimilate new technology and engender ongoing performance improvements. As a result, attention should be given to both incentives for on-the-job training, and more effective training of engineers, scientists, and technicians;

- the development of technological capabilities is often the result of idiosyncratic firm-level factors, usually related to the personality and interests of management. As a result, management training and demonstration projects may have a decisive effect on firms' technical effort.

Improving Needs Assessment and Technology Choice

Unless developing countries are able to make informed choices among the various technological options open to them, efforts to promote international technology transfer risk becoming overwhelmingly supplier-driven, geared more to transferring available technological solutions than to responding to the needs of developing countries.

An adequate basis in 'the science of the environment' is crucial if developing countries are to make adequate assessments of their technological needs. As such, the acquisition by developing countries of relevant scientific knowledge regarding environmental issues should be seen as an essential counterpart to any action on technology transfer. Given the impossibility of defining universal standards of environmental 'soundness', needs assessments will have to be explicitly geared to particular sectors and geographic locations.

Canada should support collaboration with one or more developing countries in undertaking joint needs assessments, subject to a common framework developed at a workshop of participating countries.

Successful intervention must start by identifying the felt needs of the local population, in order to ensure that chosen solutions are effectively implemented. While inventories of potentially-useful technologies are urgently required, it is crucial that needs assessment exercises not assume that solutions will be technological.

There is a need for better access to information on the range of technological options available to developing countries, and the performance characteristics of given technologies.

Canada should support efforts to ensure more effective coordination of the various initiatives, either by the creation a single clearing house and information network on environmentally sound technologies or by instituting more effective interchange among sector- and location-specific inventories.

However, sound technology choice will probably be limited by the insufficient capacity of recipient countries to *use* the information available.

In addition to support for the design and implementation of information services, donor countries like Canada can fund training support and personnel exchanges, both on a government-to-government basis and within productive enterprises. There is also a need for the design of improved teaching materials, manuals, and assessment criteria to permit the more effective evaluation of technology alternatives.

Strengthening Indigenous Innovative Capabilities

An effective response to global environmental threats ultimately must allow developing countries to create their own technological solutions. As a result, there is a clear need for support to the structures and institutions which foster innovation in developing countries.

Any strategy to improve the technological capabilities of developing countries must involve action at the production level, as well as broader-

based support to national and regional research institutes.

Also innovations result not so much from single institutions, but rather from networks of institutions so considerable emphasis should be placed on efforts to improve the capabilities of technology users and equipment suppliers and to provide effective linkages between research institutions and technology users in productive sectors.

Canada can pursue a number of independent actions to strengthen developing countries' innovative capabilities, ranging from support for twinning programs, to enhanced scholarship support for developing country students.

There is a need for new international and regional institutions charged with the furthering of environmental science, technology and policy.

The UNCED Secretariat has proposed the establishment of regional capacity-building programs to support sustainable development in developing countries, which would not require the establishment of new central institutions, but would instead involve mechanisms for coordination and cooperation among existing institutions.

While remaining open to the possibility of participating in new regional institutions, Canada should actively support the UNCED Secretariat proposal, bringing to bear its own experience (via IDRC and other institutions) in strengthening research networks in developing countries. Canada should also use its 'convening power' to bring diverse views and actors to the table, in order to discuss concrete avenues of action.

Efforts to strengthen the innovative capabilities of developing countries represent a key opportunity to broaden the basis of North-South dialogue on environmental issues, bringing to bear a more diverse set of views, and setting the stage for a variety of partnerships involving not only the federal government and its agencies, but also provincial governments, the private sector, the voluntary sector, and the academic community.

10 Toward a Canadian Strategy

David Runnalls

The warnings of the Brundtland Commission that the future will be bleak unless the world turns to a course based on Sustainable Development have not gone unnoticed in Canada. In the words of the Prime Minister:

> *We believe that there are no limits to economic growth, other than those imposed by our imagination, but we do recognize that there are real limits to natural systems and resources. This is not just about the atmosphere, it is not just about the environment, it is about the future of the planet itself. And to address the environmental agenda, it is not enough to conduct research and put out information, we also need leadership and statesmanship in the international community.* [1]

This leadership must encompass the Brundtland imperatives for Sustainable Development [...] both internationally and domestically. And most important, it must lead to the integration of environment and economic development at the highest levels of decision-making. Maurice Strong has made a start in this area by persuading the General Assembly to turn UNCED into the Earth Summit. But there remains no place in the international system where this integration can occur

on a regular basis.

This paper therefore recommends that the promotion of Sustainable Development become one of the principle cornerstones of Canadian foreign policy for the rest of this century.

Strengthening the United Nations and the multilateral system has long been a Canadian interest. The end of the Cold War may provide a unique opportunity to make giant strides in this area. And UNCED may provide the first chance to test out many of the ideas for reform.

The Earth Summit will be the first major international conference since the end of the Cold War. It will also be the largest summit meeting ever held. The Brazilian hosts estimate that at least 70 Heads of Government and heads of State will be attending.

It would be naive to assume that any major progress will be made in restructuring by that time, but it could provide a high profile opportunity for the Prime Minister to announce Canadian leadership in this area.

And it is surely in Canadian interests to play a lead role. Support for multilateral solutions to international problems is a Canadian tradition which polls show continuing into the 1990's. And despite one or two recent results, all of the polls show that Canadians still feel that the environment is an issue of paramount importance.

In fact, when questioned in an Angus Reid poll commissioned by CIDA, the majority of Canadians volunteered that the international issue which most concerned them was the threat of environmental degradation. Earlier polls taken by Environics showed

an extraordinary 85% of the public believing that environmental problems pose a major threat to the survival of mankind.

Expectations that the environment would disappear as a major issue after a recession had set in have also been proven to be unfounded by the latest Environics poll. Asked in May of this year what the major ingredients of an economic development plan for Canada should be, the largest number of respondents felt that environmental protection should be the critical ingredient.

And Canada's competitive position could be affected by a number of the international agreements being discussed. Canada's domestic economy is more affected by the use of natural resources than that of virtually any other developed country. As a result, agreements on global warming and forestry could have substantial effects on Canadian industry.

If Germany and Japan, for example, who are already considerably more efficient users of energy than Canada, unilaterally induce their industries to become even more efficient (with CO2 reduction targets, for example), then Canada could fall even farther behind in the competitiveness race unless it reacts quickly.

And as the fur and seal boycotts have shown, Canadian domestic policies which are seen to be "anti-environmental" by European and other environmental groups can easily lead to damaging boycotts of Canadian exports.

A Canadian Negotiating Strategy

Although it is beyond the scope of this paper to recommend an overall Canadian strategy for the restructuring of the multilateral system, some of the elements of such a strategy are already clear. And they coincide with a number of the areas where Canada should be attempting to make progress at UNCED.

Even under the most optimistic assumptions, restructuring of the international system will take a number of years, perhaps culminating in the international conference in 1995, the fiftieth anniversary of the San Francisco Conference, envisioned by the Stockholm Declaration. The Canadian strategy for UNCED must therefore be designed both to promote long term goals for reform and to achieve significant progress in the near term.

It is also necessary to bear in mind that the Preparatory Committee has not yet discussed the institutional agenda in any detail, and it has only begun to discuss the contents of Agenda 21. This item, intended by Strong as an action plan containing elements lasting well into the next century, will contain numerous recommendations with financial consequences.

The institutional structures which Canada finally supports will need to be adapted somewhat to the requirements set out in Agenda 21. With these caveats in mind, it is possible to set out a series of Canadian institutional objectives for UNCED.

Many of these would also apply to the long term reform process as well:

1 The establishment of a high level political forum for the integration of environment and economy and for the discussion of issues related to environment and security;

2 The development and implementation of a coordinated Canadian position on Sustainable Development throughout the multilateral system. The creation of mechanisms for the integration of environmental considerations within the programs of the international agencies;

3 Strengthening the professional competence of the U.N. Secretariats;

4 Strengthening existing institutions, such as the United Nations Environment Program, the United Nations Development Program and the World Bank;

5 Strengthening local, national and regional institutions, both governmental, and outside government, to plan and implement policies, programs and activities that are environmentally sustainable;

6 The development of mechanisms for the implementation of the global conventions;

7 Strengthening the scientific and information capacity of the multilateral system.

In Canada and in other countries, the UNCED process has stimulated an extraordinary degree of

involvement among three communities crucial to its success. Environmental and development NGOs, the private sector and the scientific community have all established special groupings to ensure their input in the decision-making process. More than 150 NGOs participated in the third Preparatory Committee meeting in Geneva.

The International Chamber of Commerce has published its Business Charter for Sustainable Development. And, under the leadership of the prominent Swiss industrialist Stefan Shmidheiny, the Business Council on Sustainable Development has drawn together more than 30 Chief Executive Officers of some of the world's largest companies (including Toyota, Dupont, Dow Chemical, Transalta Utilities and Northern Telecom) to provide a private sector counterpart to the official UNCED deliberations. And the scientific community, so critical to the evaluation of the global change issues which provide the core of UNCED's agenda, has begun to organize itself for the Rio meeting.

While NGOs have been part of the United Nations system since the adoption of the Charter, their role has been carefully circumscribed. In acknowledgement of the increasing importance and political muscle of the non-governmental community, the UNCED Secretariat has involved NGOs in all of its working groups for Agenda 21. According to the Secretary-General, this has enriched the process considerably. The Preparatory Committee sessions have attracted wide numbers of NGOs, and the rules have been set to allow opportunities for them to participate in the formal deliberations. Led by Canada, a number of the donor countries have banded together

to provide funding to enable NGOs from developing countries to play their part in the remaining PrepCom meetings and at the conference in Rio itself. U.N. reform will also need to focus on increasing the role of the non-governmental community.

UNCED has also attracted an unprecedented degree of interest from the private sector. The International Chamber of Commerce and the newly formed Business Council for Sustainable Development will be preparing interventions at the Conference. Strong has involved business representatives in the working group process for Agenda 21 as well. And everyone is agreed on the critical role of the private sector in mobilizing the large sums of capital that will be needed to restart the engine of development, as well as prepare for the transition toward more sustainable forms of energy development. Any plans for workable technology transfer will need to be based upon the central role of private industry.

The scientific community has also mobilized in support of more sustainable forms of development. The Intergovernmental Panel on Climate Change, mentioned earlier, has played the central role in reaching a consensus on global warming. The International Geosphere/Biosphere program represents an unusual degree of co-operation between the physical and biological scientists to assess the state of the planet. And the program on Human Dimensions of Global Change begins to involve the social scientists and policy community in the formulation of policies to deal with climate change and the other global changes.

Any Canadian positions on the institutional priorities for U.N. reform in general, and UNCED in particular, must be designed to take advantage of these new realities and to build them into the new institutions from the start.

Environment/Development Integration

The international system has grown in a haphazard fashion over the past 40 years. Because of the weakness of the central U.N. Secretariat and the conflicting goals of governments, the specialized agencies and their heads have come to behave like mediaeval baronies, feuding among themselves and with the centre. This situation is especially damaging to the prospects of Sustainable Development, requiring as it does the integration of both environmental and economic concerns. A number of solutions have been proposed to improve this co-ordination.

Many of these involve rejuvenating or reorganizing the existing machinery. They usually center around reform of the U.N. Economic and Social Council, the various Committees of the General Assembly and the Administrative Committee on Coordination. These are perennial favourites for any discussion of U.N. reform. Perhaps the latest round of discussions will bear fruit and new coordination machinery may emerge at the bureaucratic level. It is fair to say, however, that few are optimistic about the chances of success in the short run.

This is an important area for Canada. Canada is one of the strongest supporters, both politically and economically, of the specialized agencies. Canadian voluntary contributions to the UNDP, UNFPA and other organizations are twice the level that they

would be had the country paid its "normal" U.N. pro rata share. Coordination and efficiency are therefore in the Canadian interest.

A Canadian strategy in this area should begin with the Secretary-General. As Childers and Urquhart point out[2], the Secretary-General has considerable bureaucratic powers that have never been used in this area. If the next Secretary-General were to be chosen according to different criteria than most of his or her predecessors, many of these problems could be solved. The present system for choice of s Secretary-General is less elaborate than that used by most medium sized Canadian Universities in the selection of a President.

Canada should work with other interested countries to ensure that the next Secretary-General is chosen for his or her competence rather than for simple geographic and geopolitical reasons. Canada could also use its influence, along with that of other interested countries such as the Nordics and the Dutch, to make certain that the Director-General for International Economic and Social Co-operation is also chosen on the basis of proven merit.

This post, created to help overcome the structural weaknesses of the system, has not lived up to its expectations. The post could also be renamed, and its responsibilities reorganized accordingly, to make it into the Directorate General for Sustainable Development. It is difficult to overemphasize the importance of these two appointments.

Canada would also do well to get its own house in order. As with most other countries, the Canadian representatives to the U.N. specialized agencies are appointed and instructed by the relevant

departments. It is not unusual, therefore, to see Canadian delegates presenting incompatible views on the same subject to two different fora. If the Government of Canada wishes to see greater co-ordination among the U.N. agencies, it must demonstrate that it can do so at home.

The Round Table should advise the Prime Minister to establish a mechanism, perhaps within the PCO to ensure that all Canadian positions in the U.N., the Bretton Woods Institutions and the specialized agencies are consistent with the principles of Sustainable Development.

Even after a Secretary-General has been appointed and better co-ordination has been ensured within the Government of Canada, there is still a need for some device to bring about better co-ordination within the U.N.at the policy level And this must be done at the Ministerial level. The Nordic study on the U.N.'s development activities called for the creation of an International Development Council which would bring together Ministers of Development.[3]

A number of other reports have called for the creation of a Sustainable Development Commission, composed of Ministers of Finance or Economics, reporting directly to the General Assembly[4]. The latter would obviously carry more weight. It could also provide a more direct link to the Bretton Woods institutions, who tend to view themselves as apart from the UN, but who tend to be assuming more and more importance in the debate over Sustainable Development. A representative group of Finance Ministers meets twice a year in their capacity as members of the World Bank/IMF Development and

Interim Committees. They have discussed environment and development as they effect the World Bank in a number of these meetings. In fact, the decision to establish the Global Environmental Facility arose from one of these discussions.

Canada could propose that the World Bank Development Committee form the nucleus of a Sustainable Development Commission. It would have to be serviced by a small group, based in the central U.N Secretariat and drawing on some of the resources of the Bretton Woods institutions. The present UNCED Secretariat would serve as the nucleus of this group.

As an interim, Canada might seek to make the present coordinating mechanism more real.

Canada could join with a number of other sympathetic countries to insist in the Governing Councils of the various bodies that the agency heads personally attend meetings called by the new Secretary-General or DGIESC.

The threat of budgetary or other sanctions could go a long way to ensure better operation of the present system. Canada might also wish to consider the adoption of the smaller, more permanent executive bodies proposed in the Nordic report[5]. Similar to the system of Executive Directors in operation at the World Bank, these bodies would ensure more continuous supervision of the activities of these organizations.

Treaty Secretariats

Canada will play a critical role in the negotiations for a new convention on climate change, through its Chairmanship of Working Group 2. It should also continue to press for an eventual convention on

forests, although it seems unlikely that anything substantive can be assembled for Rio. While biological diversity seems a long shot, it is still possible.

Once a convention is negotiated and signed, there will be pressure for the creation of a Secretariat to serve it and a fund to help with its implementation. In fact, as the Beijing declaration has stipulated, it is unlikely that the developing countries will agree to any of the conventions unless there are strong indications that funds will be forthcoming.

Although each of these Secretariats will be very different, depending on the principal countries involved, *Canada should insist on four major objectives:*

1 That voting power be based on something other than financial contributions or straight calculations of population size;

2 That as far as possible, these Secretariats should rely on existing sources of expertise within the international system. Over time, this could result in the partial rationalization of a compartmentalized bureaucracy based on the compartments of the 1960's and 1970's;

3 That each Secretariat have a Canadian style "stakeholder" advisory group composed of representatives of the scientific community, the NGO community and the private sector. And that the members be chosen on merit,

4 That the policy decision making power over the fund be separated from the fiscal management

and disbursement of that fund. This would allow funds to be spent rationally through a revamped GEF or the "sourcing fund" mentioned in the finance paper.

A Global Watch System

When scientists began to sound the alarm about the possible influence of CFCs on the earth's ozone layer, few suspected the extent to which the damage had already been inflicted. The discovery of the "ozone hole" over Antarctica surprised all but a small proportion of the scientific community, let alone the policy community. Subsequent research is revealing that the deterioration of the ozone layer is proceeding even more rapidly.

The human race can ill afford many more such surprises. As mentioned before, the scientific community worldwide is developing new co-operative approaches to the identification of these problems before they occur. But there is a need for a new mechanism to bring to bear the best governmental and non-governmental scientific advice.

Canada should support proposals for an independent commission, drawing heavily on such non-governmental bodies as the International Council of Scientific Unions, the World Conservation Union (IUCN), on such U.N agencies as UNEP, WMO and the like, the expertise of the private sector and of national governments.

Such a commission could be part of the commission suggested in item 1 above or could be a separate organization designed to provide "early warning" of environmental problems, assess their risks and recommend appropriate courses of actions. Such a

body would not need an extensive secretariat nor a large budget, since it would be drawing on a great deal of ongoing work. It could, however, be politically attractive and could help to galvanize the scientific community.

All of the above recommendations are in line with Canada's traditional support of the U.N. system and both its development and peacekeeping functions. The indications from the recent polls are they would receive substantial support from the Canadian people. They might also provide some political "elbow room" - desperately needed if UNCED is to succeed. They are also in line with the principle listed above that a minimum of new institutions be created and that anything which is done can be seen to facilitate a future thoroughgoing reform of the international system.

But none of these suggestions will succeed if it is seen as an exclusive Canadian initiative. At the moment the politics of the UNCED process are bad. The two agendas have not been merged. No real progress has been made on institutional questions And U.S. resistance to discuss the financial issues has stalled progress there. This suggests an ideal role for the traditional Canadian strengths of coalition building and North/South dialogue.

Because time is short and UNCED will be conducted at the highest level, the Round Table should reiterate its belief that the Prime Minister and his office should become involved very soon.

The timing for Canadian exploratory discussions is opportune. A chance to correct some of the shortcomings in the U.N. Secretariat will arise with appointment of the first post cold war Secretary-

General. The Prime Minister will be meeting with his colleagues from the Commonwealth in October. This would not only provide an opportunity to exchange views with Prime Minister Major who was supportive of UNCED as host of the G-7 summit, it would also provide an opportunity for liaison with Australia and New Zealand, with whom Canada has been working closely throughout the PrepCom process. It would also offer the Prime Minister a representative forum of Third World members of the Preparatory process, especially India and Malaysia who have been active from the beginning.

The World Bank/IMF meetings in Bangkok, also in that month, would present an opportunity to explore some of the coordination initiatives. The Francophone summit will also offer opportunities to further hone any initiatives emerging from the Harare meeting. Finally, the visit to Canada of the President of Brazil next spring would offer the opportunity to further explore some of these issues prior to the decisive final meeting of the UNCED Preparatory Committee in March and April.

Endnotes

1 Notes for an address by the Right Honourable Brian Mulroney at the International Conference on the Changing Atmosphere, Toronto, June 27, 1988

2 Urquhart and Childers, A World in Need of Leadership; Tomorrow's United Nations, Motala, Sweden, 1990

3 The United Nations in Development; Final Report by the Nordic UN Project, Almquist and Wiksell International: Stockholm, 1991

4 Report of the Aspen Institute Working Group on International Environment and Development Policy (draft) July 25, 1991.
5 Ibid, Nordic UN Project, page 20.

On the Road to Brazil: The Earth Summit

The United Nations Conference on Environment and Development will be held in Brazil, opening on World Environment Day - June 5, 1992. It will be the first UN conference covering the entire sweep of environmental issues since the 1972 Stockholm Conference on the Human Environment. One of its objectives will be to review the current state of the environment and the changes that have occurred since Stockholm.

This book presents an overview of the main issues that will face the international decision makers at the conference: environment and development, protecting the atmosphere and the oceans, waste management, land resources, biological diversity, fresh water resources and biotechnology.

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ISBN 1-895643-08-2