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DEVELOPMENT AND INTERNATIONAL ECONOMIC CO-OPERATION: ENVIRONMENT

Report of the World Commission on Environment and Development

Note by the Secretary-General

1. The General Assembly, in its resolution 38/161 of 19 December 1983, inter alia, welcomed the establishment of a special commission that should make available a report on environment and the global problématique to the year 2000 and beyond, including proposed strategies for sustainable development. The commission later adopted the name World Commission on Environment and Development. In the same resolution, the Assembly decided that, on matters within the mandate and purview of the United Nations Environment Programme, the report of the special commission should in the first instance be considered by the Governing Council of the Programme, for transmission to the Assembly together with its comments, and for use as basic material in the preparation, for adoption by the Assembly, of the Environmental Perspective to the Year 2000 and Beyond.

2. At its fourteenth session, held at Nairobi from 8 to 19 June 1987, the Governing Council of the United Nations Environment Programme adopted decision 14/14 of 16 June 1987, entitled "Report of the World Commission on Environment and Development" and, inter alia, decided to transmit the Commission's report to the General Assembly together with a draft resolution annexed to the decision for consideration and adoption by the Assembly.

3. The report of the World Commission on Environment and Development, entitled "Our Common Future", is hereby transmitted to the General Assembly. Decision 14/14 of the Governing Council, the proposed draft resolution and the comments of the Governing Council on the report of the Commission can be found in the report of the Governing Council on the work of its fourteenth session. 1/

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* A/42/150.

Notes

1/ Official Records of the General Assembly, Forty-second Session, Supplement No. 25 (A/42/25).

ANNEX

Report of the World Commission on Environment and Development

"Our Common Future"

Members of the Commission

Chairman: Gro Harlem Brundtland (Norway)
Vice Chairman: Mansour Khalid (Sudan)

Susanna Agnelli (Italy)
Saleh A. Al-Athel (Saudi Arabia)
Bernard Chidzero (Zimbabwe)
Lamine Mohammed Fadika (Côte d'Ivoire)
Volker Hauff (Federal Republic of Germany)
Istvan Lang (Hungary)
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Margarita Marino de Botero (Colombia)
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Saburo Okita (Japan)
Shridath S. Ramphal (Guyana)
William D. Ruckelshaus (USA)
Mohamed Sahnoun (Algeria)
Emil Salim (Indonesia)
Bukar Shaib (Nigeria)
Vladimir Sokolov (USSR)
Janez Stanovnik (Yugoslavia)
Maurice Strong (Canada)

Ex Officio

Jim MacNeill (Canada)

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Throughout this report, quotes from some of the many people who spoke at WCED public hearings appear in boxes to illustrate the range of opinions the Commission was exposed to during its three years of work. They do not necessarily reflect the views of the Commission.

ACRONYM LIST AND NOTE ON TERMINOLOGY

ATS	Antarctic Treaty System
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CIDIE	Committee of International Development Institutions on the Environment
CMEA	Council for Mutual Economic Assistance
DIESA	United Nations Department for International Economic and Social Affairs
ECB	United Nations Environment Coordination Board
ECE	Economic Commission for Europe
EEC	European Economic Community
EEZ	Exclusive Economic Zones
ELC	Environment Liaison Centre
FAO	Food and Agriculture Organization of the United Nations
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GEMS	Global Environment Monitoring System
GESAMP	Group of Experts on Scientific Aspect of Marine Pollution
GNP	gross national product
GRID	Global Resource Information Database
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ICSU	International Council of Scientific Unions
IDA	International Development Association
IGBP	International Geosphere Biosphere Project (of ICSU)
IIASA	International Institute for Applied Systems Analysis

IIED	International Institute for Environment and Development
ILO	International Labour Organization
IMF	International Monetary Fund
IOC	Intergovernmental Oceanographic Commission
ITU	International Telecommunications Union
IUCN	International Union for the Conservation of Nature and Natural Resources
IWC	International Whaling Commission
LDC	London Dumping Convention
MVA	manufacturing value added
NASA	National Aeronautics and Space Administration
NCS	National Conservation Strategies
NGO	non-governmental organizations
NICs	newly industrialized countries
NUSS	Nuclear Safety Standards
OECD	Organization for Economic Co-operation and Development
ODA	Official Development Assistance
PPP	Polluter Pays Principle
TNCs	transnational corporations
UNCHS	United Nations Centre for Human Settlements (HABITAT)
UNCTAD	United Nations Conference on Trade and Development
UNDA	United Nations Disarmament Association
UNDRO	Office of the United Nations Disaster Relief Co-ordinator
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNIDO	United Nations Industrial Development Organization

WHO	World Health Organization
WMO	World Meteorological Organization
WRI	World Resources Institute
WWF	World Wildlife Fund

The grouping of countries in the presentation of data is indicated in the appropriate places. The term 'industrial countries' generally encompasses the UN categories of developed market economies and the socialist countries of Eastern Europe and the USSR. Unless otherwise indicated, the term 'developing country' refers to the UN grouping of developing-country market economies and the socialist countries of Asia. The term 'Third World', unless the context implies otherwise, generally refers to the developing-country market economies as defined by the UN.

Unless indicated otherwise, tons are metric (1,000 kilogrammes, or 2,204.6 pounds). Dollars are current U.S. dollars or U.S. dollars for the year specified.

CHAIRMAN'S FOREWORD

"A global agenda for change" - this was what the World Commission on Environment and Development was asked to formulate. It was an urgent call by the General Assembly of the United Nations:

- to propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond;

- to recommend ways concern for the environment may be translated into greater co-operation among developing countries and between coun ries at different stages of economical and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development;

- to consider ways and means by which the international community can deal more eff tively with environment concerns; and

- to help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and aspirational goals for the world community.

When I was called upon by the Secretary-General of the United Nations in December 1983 to establish and chair a special, independent commission to address this major challenge to the world community, I was acutely aware that this was no small task and obligation, nd that my day to day responsibilities as Party leader made it seem plainly prohibitive. What the General Assembly asked for also seemed to be unrealistic and much too ambitious. At the same time, it was a clear demonstration of the widespread feeling of frustration and inadequacy in the internat nal community about our own ability to address the vita global issues and deal effectively with them.

That fact is a compelling reality, and should not easily be dismissed. Since the answers to fundamental and serious concerns are not at hand, there is no alternative but to keep on trying to find them.

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All this was on my mind when the Secretary-General presented me with an argument to which there was no convincing rebuttal: No other political leader had become Prime Minister with a background of several years of political struggle, nationally and internationally, as an environment minister. This gave some hope that the environment was not destined to remain a side issue in central, political decision making.

In the final analysis, I decided to accept the challenge. The challenge of facing the future, and of safeguarding the interests of coming generations. For it was abundantly clear: We needed a mandate for change.

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We live in an era in the history of nations when there is greater need than ever for co-ordinated political action and responsibility. The United Nations and its Secretary-General are faced with an enormous task and burden. Responsibly meeting humanity's goals and aspirations will require the active support of us all.

My reflections and perspective were also based on other important parts of my own political experience: the preceding work of the Brandt Commission on North-South issues, and the Palme Commission on security and disarmament issues, on which I served.

I was being asked to help formulate a third and compelling call for political action: After Brandt's Programme for Survival and Common Crisis, and after Palme's Common Security, would come Common Future. This was my message when Vice Chairman Mansour Khalid and I started work on the ambitious task set up by the United Nations. This report, as presented to the UN General Assembly in 1987, is the result of that process.

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Perhaps our most urgent task today is to persuade nations of the need to return to multilateralism. The challenge of reconstruction after the Second World War was the real motivating power behind the establishment of our post-war international economic system. The challenge of finding sustainable development paths ought to provide the impetus - indeed the imperative - for a renewed search for multilateral solutions and a restructured international economic system of co-operation. These challenges cut across the divides of national sovereignty, of limited strategies for economic gain, and of separated disciplines of science.

After a decade and a half of a standstill or even deterioration in global co-operation, I believe the time has come for higher expectations, for common goals pursued together, for an increased political will to address our common future.

There was a time of optimism and progress in the 1960s, when there was greater hope for a braver new world, and for progressive international ideas. Colonies blessed with natural resources were becoming nations. The ideals of co-operation and sharing seemed to be seriously pursued. Paradoxically, the 1970s slid slowly into moods of reaction and isolation while at the same time a series of UN conferences offered hope for greater co-operation on major issues. The 1972 UN Conference on the Human Environment brought the industrialized and developing nations together to delineate the "rights" of the human family to a healthy and productive environment. A string of such meetings followed: on the rights of people to adequate food, to sound housing, to safe water, to access to means of choosing the size of their families.

The present decade has been marked by a retreat from social concerns. Scientists bring to our attention urgent but complex problems bearing on our very survival: a warming globe, threats to the Earth's ozone layer, deserts consuming agricultural land. We respond by demanding more details, and by assigning the problems to institutions ill equipped to cope with them. Environmental degradation, first seen as mainly a problem of the rich nations and a side effect of industrial wealth, has become a survival issue for developing nations. It is part of the downward spiral of linked ecological and economic decline in which many of the poorest nations are trapped. Despite official hope expressed on all sides, no trends identifiable today, no programmes or policies, offer any real hope of narrowing the growing gap between rich and poor nations. And as part of our "development", we have amassed weapons arsenals capable of diverting the paths that evolution has followed for millions of years and of creating a planet our ancestors would not recognize.

When the terms of reference of our Commission were originally being discussed in 1982, there were those who wanted its considerations to be limited to "environmental issues" only. This would have been a grave mistake. The environment does not exist as a sphere separate from human actions, ambitions, and needs, and attempts to defend it in isolation from human concerns have given the very word "environment" a connotation of naivety in some political circles. The word "development" has also been narrowed by some into a very limited focus, along the lines of "what poor nations should do to become richer", and thus again is automatically dismissed by many in the international arena as being a concern of specialists, of those involved in questions of "development assistance".

But the "environment" is where we all live; and "development" is what we all do in attempting to improve our lot within that abode. The two are inseparable. Further, development issues must be seen as crucial by the political leaders who feel that their countries have reached a plateau towards which other nations must strive. Many of the development paths of the industrialized nations are clearly unsustainable. And the development decisions of these countries, because of their great economic and political power, will have a profound effect upon the ability of all peoples to sustain human progress for generations to come.

Many critical survival issues are related to uneven development, poverty, and population growth. They all place unprecedented pressures on the planet's lands, waters, forests, and other natural resources, not least in the developing countries. The downward spiral of poverty and environmental degradation is a waste of opportunities and of resources. In particular, it is a waste of human resources. These links between poverty, inequality, and environmental degradation formed a major theme in our analysis and recommendations. What is needed now is a new era of economic growth growth that is forceful and at the same time socially and environmentally sustainable.

Due to the scope of our work, and to the need to have a wide perspective, I was very much aware of the need to put together a highly qualified and influential political and scientific team, to constitute a truly independent Commission. This was an essential part of a successful process. Together, we should span the globe, and pull together to formulate an interdisciplinary, integrated approach to global concerns and our common future. We needed broad participation and a clear majority of members from developing countries, to reflect world realities. We needed people with wide experience, and from all political fields, not only from environment or development as political disciplines, but from all areas of vital decision making that influence economic and social progress, nationally and internationally.

We therefore come from widely differing backgrounds: foreign ministers, finance and planning officials, policymakers in agriculture, science, and technology. Many of the Commissioners are cabinet ministers and senior economists in their own nations, concerned largely with the affairs of those countries. As Commissioners, however, we were acting not in our national roles but as individuals; and as we worked, nationalism and the artificial divides between "industrialized" and "developing", between East and West, receded. In their place emerged a common concern for the planet and the interlocked ecological and economic threats with which its people, institutions, and governments now grapple.

During the time we met as a Commission, tragedies such as the African famines, the leak at the pesticides factory at Bhopal, India, and the nuclear disaster at Chernobyl, USSR appeared to justify the grave predictions about the human future that were becoming commonplace during the mid-1980s. But at public hearings we held on five continents, we also heard from the individual victims of more chronic, widespread disasters: the debt crisis, stagnating aid to and investment in developing countries, falling commodity prices and falling personal incomes. We became convinced that major changes were needed, both in attitudes and in the way our societies are organized.

The question of population - of population pressure, of population and human rights - and the links between these related issues and poverty, environment, and development proved to be one of the more difficult concerns with which we had to struggle. The differences of perspective seemed at the outset to be unbridgeable, and they required a lot of thought and willingness to communicate across the divides of cultures, religions, and regions.

Another such concern was the whole area of international economic relations. In these and in a number of other important aspects of our analysis and recommendations, we were able to develop broad agreement.

The fact that we all became wiser, learnt to look across cultural and historical barriers, was essential. There were moments of deep concern and potential crisis, moments of gratitude and achievement, moments of success in building a common analysis and perspective. The result is clearly more global, more realistic, more forward looking than any one of us alone could have created. We joined the Commission with different views and perspectives, different values and beliefs, and very different experiences and insights. After these three years of working together, travelling, listening, and discussing, we present a unanimous report.

I am deeply grateful to all the Commissioners for their dedication, their foresight and personal commitment to our common endeavour. It has been a truly wonderful team. The spirit of friendship and open communication, the meeting of minds and the process of learning and sharing, have provided an experience of optimism, something of great value to all of us, and, I believe, to the report and its message. We hope to share with others our learning process, and all that we have experienced together. It is something that many others will have to experience if global sustainable development is to be achieved.

The Commission has taken guidance from people in all walks of life. It is to these people to all the peoples of the world that the Commission now addresses itself.

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In so doing we speak to people directly as well as to the institutions that they have established.

The Commission is addressing governments, directly and through their various agencies and ministries. The congregation of governments, gathered in the General Assembly of the United Nations, will be the main recipients of this report.

The Commission is also addressing private enterprise, from the one-person business to the great multinational company with a total economic turnover greater than that of many nations, and with possibilities for bringing about far-reaching changes and improvements.

But first and foremost our message is directed towards people, whose well-being is the ultimate goal of all environment and development policies. In particular, the Commission is addressing the young. The world's teachers will have a crucial role to play in bringing this report to them.

If we do not succeed in putting our message of urgency through to today's parents and decision makers, we risk undermining our children's fundamental right to a healthy, life-enhancing environment. Unless we are able to translate our words into a language that can reach the minds and hearts of people young and old, we shall not be able to undertake the extensive social changes needed to correct the course of development.

The Commission has completed its work. We call for a common endeavour and for new norms of behaviour at all levels and in the interests of all. The changes in attitudes, in social values, and in aspirations that the report urges will depend on vast campaigns of education, debate and public participation.

To this end, we appeal to "citizens" groups, to non-governmental organizations, to educational institutions, and to the scientific community. They have all played indispensable roles in the creation of publi awareness and political change in the past. They will play a crucial part in putting the world onto sustainable development paths, in laying the groundwork for Our Common Future.

The process that produced this unanimous report proves that it is possible to join forces, to identify common goals, and to agree on common action. Each one of the Commissioners would have chosen different words if writing the report alone. Still, we managed to agree on the analysis, the broad remedies, and the recommendations for a sustainable course of development.

In the final analysis, this is what it amounts to: furthering the common understanding and common spirit of responsibility so clearly needed in a divided world.

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Thousands of people all over the world have contributed to the work of the Commission, by intellectual means, by financial means, and by sharing their experiences with us through articulating their needs and demands. I am sincerely grateful to everyone who has made such contributions. Many of their names are found in Annexe 2 of the report. My particular gratitude goes to Vice Chairman Mansour Khalid, to all the other members of the Commission, and to Secretary General Jim MacNeill and his staff at our secretariat, who went above and beyond the call of duty to assist us. Their enthusiasm and dedication knew no limits. I want to thank the chairmen and members of the Intergovernemental Inter-sessional Preparatory Committee, who co-operated closely with the Commission and provided inspiration and support. I thank also the Executive Director of the United Nations Environment Programme, Dr. Mostafa Tolba, for his valuable, continuous support and interest.

Gro Harlem Brundtland
Oslo, 20 March 1987

FROM ONE EARTH TO ONE WORLD

An Overview by the World Commission on Environment and Development

1. In the middle of the 20th century, we saw our planet from space for the first time. Historians may eventually find that this vision had a greater impact on thought than did the Copernican revolution of the 16th century, which upset the human self-image by revealing that the Earth is not the centre of the universe. From space, we see a small and fragile ball dominated not by human activity and edifice but by a pattern of clouds, oceans, greenery, and soils. Humanity's inability to fit its activities into that pattern is changing planetary systems, fundamentally. Many such changes are accompanied by life-threatening hazards. This new reality, from which there is no escape, must be recognized - and managed.

2. Fortunately, this new reality coincides with more positive developments new to this century. We can move information and goods faster around the globe than ever before; we can produce more food and more goods with less investment of resources; our technology and science gives us at least the potential to look deeper into and better understand natural systems. From space, we can see and study the Earth as an organism whose health depends on the health of all its parts. We have the power to reconcile human affairs with natural laws and to thrive in the process. In this our cultural and spiritual heritages can reinforce our economic interests and survival imperatives.

3. This Commission believes that people can build a future that is more prosperous, more just, and more secure. Our report, Our Common Future, is not a prediction of ever increasing environmental decay, poverty, and hardship in an ever more polluted world among ever decreasing resources. We see instead the possibility for a new era of economic growth, one that must be based on policies that sustain and expand the environmental resource base. And we believe such growth to be absolutely essential to relieve the great poverty that is deepening in much of the developing world.

4. But the Commission's hope for the future is conditional on decisive political action now to begin managing environmental resources to ensure both sustainable human progress and human survival. We are not forecasting a future; we are serving a notice - an urgent notice based on the latest and best scientific evidence - that the time has come to take the decisions needed to secure the resources to sustain this and coming generations. We do not offer a detailed blueprint for action, but instead a pathway by which the peoples of the world may enlarge their spheres of cooperation.

I. THE GLOBAL CHALLENGE

1. Successes and Failures

5. Those looking for success and signs of hope can find many: infant mortality is falling; human life expectancy is increasing; the proportion of the world's adults who can read and write is climbing; the proportion of children starting school is rising; and global food production increases faster than the population grows.

6. But the same processes that have produced these gains have given rise to trends that the planet and its people cannot long bear. These have traditionally been divided into failures of 'development' and failures in the management of our human environment. On the development side, in terms of absolute numbers there are more hungry people in the world than ever before, and their numbers are increasing. So are the numbers who cannot read or write, the numbers without safe water or safe and sound homes, and the numbers short of woodfuel with which to cook and warm themselves. The gap between rich and poor nations is widening - not shrinking - and there is little prospect, given present trends and institutional arrangements, that this process will be reversed.

7. There are also environmental trends that threaten to radically alter the planet, that threaten the lives of many species upon it, including the human species. Each year another 6 million hectares of productive dryland turns into worthless desert. Over three decades, this would amount to an area roughly as large as Saudi Arabia. More than 11 million hectares of forests are destroyed yearly, and this, over three decades, would equal an area about the size of India. Much of this forest is converted to low-grade farmland unable to support the farmers who settle it. In Europe, acid precipitation kills forests and lakes and damages the artistic and architectural heritage of nations; it may have acidified vast tracts of soil beyond reasonable hope of repair. The burning of fossil fuels puts into the atmosphere carbon dioxide, which is causing gradual global warming. This 'greenhouse effect' may by early next century have increased average global temperatures enough to shift agricultural production areas, raise sea levels to flood coastal cities, and disrupt national economies. Other industrial gases threaten to deplete the planet's protective ozone shield to such an extent that the number of human and animal cancers would rise sharply and the oceans' food chain would be disrupted. Industry and agriculture put toxic substances into the human food chain and into underground water tables beyond reach of cleansing.

8. There has been a growing realization in national governments and multilateral institutions that it is impossible to separate economic development issues from environment issues; many forms of development erode the environmental resources upon which they must be based, and environmental degradation can undermine economic development. Poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader

perspective that encompasses the factors underlying world poverty and international inequality.

9. These concerns were behind the establishment in 1983 of the World Commission on Environment and Development by the UN General Assembly. The Commission is an independent body, linked to but outside the control of governments and the UN system. The Commission's mandate gave it three objectives: to re-examine the critical environment and development issues and to formulate realistic proposals for dealing with them; to propose new forms of international cooperation on these issues that will influence policies and events in the direction of needed changes; and to raise the levels of understanding and commitment to action of individuals, voluntary organizations, businesses, institutes, and governments.

10. Through our deliberations and the testimony of people at the public hearings we held on five continents, all the commissioners came to focus on one central theme: many present development trends leave increasing numbers of people poor and vulnerable, while at the same time degrading the environment. How can such development serve next century's world of twice as many people relying on the same environment? This realization broadened our view of development. We came to see it not in its restricted context of economic growth in developing countries. We came to see that a new development path was required, one that sustained human progress not just in a few places for a few years, but for the entire planet into the distant future. Thus 'sustainable development' becomes a goal not just for the 'developing' nations, but for industrial ones as well.

2. The Interlocking Crises

11. Until recently, the planet was a large world in which human activities and their effects were neatly compartmentalized within nations, within sectors (energy, agriculture, trade), and within broad areas of concern (environment, economics, social). These compartments have begun to dissolve. This applies in particular to the various global 'crises' that have seized public concern, particularly over the past decade. These are not separate crises: an environmental crisis, a development crisis, an energy crisis. They are all one.

12. The planet is passing through a period of dramatic growth and fundamental change. Our human world of 5 billion must make room in a finite environment for another human world. The population could stabilize at between 8 and 14 billion sometime next century, according to UN projections. More than 90 per cent of the increase will occur in the poorest countries, and 90 per cent of that growth in already bursting cities.

13. Economic activity has multiplied to create a $13 trillion world economy, and this could grow five- or tenfold in the coming half century. Industrial production has grown more than fiftyfold over the past century, four-fifths of this growth since 1950. Such figures reflect and presage profound impacts upon the

The World Commission on Environment and Development first met in October 1984, and published its Report 900 days later, in April 1987. Over those few days:

* The drought-triggered, environment-development crisis in Africa peaked, putting 35 million people at risk, killing perhaps a million.

* A leak from a pesticides factory in Bhopal, India, killed more than 2,000 people and blinded and injured over 200,000 more.

* Liquid gas tanks exploded in Mexico City, killing 1,000 and leaving thousands more homeless.

* The Chernobyl nuclear reactor explosion sent nuclear fallout across Europe, increasing the risks of future human cancers.

* Agricultural chemicals, solvents, and mercury flowed into the Rhine River during a warehouse fire in Switzerland, killing millions of fish and threatening drinking water in the Federal Republic of Germany and the Netherlands.

* An estimated 60 million people died of diarrhoeal diseases related to unsafe drinking water and malnutrition; most of the victims were children.

biosphere, as the world invests in houses, transport, farms, and industries. Much of the economic growth pulls raw material from forests, soils, seas, and waterways.

14. A mainspring of economic growth is new technology, and while this technology offers the potential for slowing the dangerously rapid consumption of finite resources, it also entails high risks, including new forms of pollution and the introduction to the planet of new variations of life forms that could change evolutionary pathways. Meanwhile, the industries most heavily reliant on environmental resources and most heavily polluting are growing most rapidly in the developing world, where there is both more urgency for growth and less capacity to minimize damaging side effects.

15. These related changes have locked the global economy and global ecology together in new ways. We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress - degradation of soils, water regimes, atmosphere, and forests - upon our economic prospects. We have in the more recent past been forced to face up to a sharp increase in economic interdependence among nations. We are now forced to accustom ourselves to an accelerating ecological interdependence among nations. Ecology and economy are becoming ever more interwoven - locally, regionally, nationally, and globally - into a seamless net of causes and effects.

16. Impoverishing the local resource base c/ impoverish wider areas: deforestation by highland farmers causes flooding on lowland farms; factory pollution robs local fishermen of their catch. Such grim local cycles now operate nationally and regionally. Dryland degradation sends environmental refugees in their millions across national borders. Deforestation in Latin America and Asia is causing more floods, and more destructive floods, in downhill, downstream nations. Acid precipitation and nuclear fallout have spread across the borders of Europe. Similar phenomena are emerging on a global scale, such as global warming and loss of ozone. Internationally traded hazardous chemicals entering foods are themselves internationally traded. In the next century, the environmental pressure causing population movements may be increase sharply, while barriers to that movement may be even firmer than they are now.

17. Over the past few decades, life-threatening environmental concerns have surfaced in the developing world. Countrysides are coming under pressure from increasing numbers of farmers and the landless. Cities are filling with people, cars, and factories. Yet at the same time these developing countries must operate in a world in which the resources gap between most developing and industrial nations is widening, in which the industrial world dominates in the rule-making of some key international bodies, and in which the industrial world has already used much of the planet's ecological capital. This inequality is the planet's main 'environmental' problem; it is also its main 'development' problem

18. International economic relationships pose a particular problem for environmental management in many developing countries. Agriculture, forestry, energy production, and mining generate at least half the gross national product of many developing countries and account for even larger shares of livelihoods and employment. Exports of natural resources remain a large factor in their economies, especially for the least developed. Most of these countries face enormous economic pressures, both international and domestic, to overexploit their environmental resource base.

19. The recent crisis in Africa best and most tragically illustrates the ways in which economics and ecology can interact destructively and trip into disaster. Triggered by drought, its real causes lie deeper. They are to be found in part in national policies that gave too little attention, too late, to the needs of smallholder agriculture and to the threats posed by rapidly rising populations. Their roots extend also to a global economic system that takes more out of a poor continent than it puts in. Debts that they cannot pay force African nations relying on commodity sales to overuse their fragile soils, thus turning good land to desert. Trade barriers in the wealthy nations - and in many developing nations - make it hard for African nations to sell their goods for reasonable returns, putting yet more pressure on ecological systems. Aid from donor nations has not only been inadequate in scale, but too often has reflected the priorities of the nations giving the aid, rather than the needs of the recipients.

The Commission has sought ways in which global development can be put on a sustainable path into the 21st Century. Some 5,000 days will elapse between the publication of our report and the first day of the 21st Century. What environmental crises lie in store over those 5,000 days?

During the 1970s, twice as many people suffered each year from 'natural' disasters as during the 1960s. The disasters most directly associated with environment/development mismanagement - droughts and floods - affected the most people and increased most sharply in terms of numbers affected. Some 18.5 million people were affected by drought annually in the 1960s, 24.4 million in the 1970s. There were 5.2 million flood victims yearly in the 1960s, 15.4 million in the 1970s. Numbers of victims of cyclones and earthquakes also shot up as growing numbers of poor people built unsafe houses on dangerous ground.

The results are not in for the 1980s But we have seen 35 million afflicted by drought in Africa alone and tens of millions affected by the better managed and thus less-publicized Indian drought. Floods have poured off the deforested Andes and Himalayas with increasing force. The 1980s seem destined to sweep this dire trend on into a crisis-filled 1990s.

20. The production base of other developing world areas suffers similarly from both local failures and from the workings of international economic systems. As a consequence of the 'debt crisis' of Latin America, that continent's natural resources are now being used not for development but to meet financial obligations to creditors abroad. This approach to the debt problem is short-sighted from several standpoints: economic, political, and environmental. It requires relatively poor countries simultaneously to accept growing poverty while exporting growing amounts of scarce resources.

21. A majority of developing countries now have lower per capita incomes than when the decade began. Rising poverty and unemployment have increased pressure on environmental resources as more people have been forced to rely more directly upon them. Many governments have cut back efforts to protect the environment and to bring ecological considerations into development planning.

22. The deepening and widening environmental crisis presents a threat to national security - and even survival - that may be greater than well-armed, ill-disposed neighbours and unfriendly alliances. Already in parts of Latin America, Asia, the Middle East, and Africa, environmental decline is becoming a source of political unrest and international tension. The recent destruction of much of Africa's dryland agricultural production was more severe than if an invading army had pursued a scorched-earth policy. Yet most of the affected governments still spend far more to protect their people from invading armies than from the invading desert.

23. Globally, military expenditures total about $1 trillion a year and continue to grow. In many countries, military spending consumes such a high proportion of GNP that it itself does great damage to these societies' development efforts. Governments tend to base their approaches to 'security' on traditional definitions. This is most obvious in the attempts to achieve security through the development of potentially planet-destroying nuclear weapons systems. Studies suggest that the cold and dark nuclear winter following even a limited nuclear war could destroy plant and animal ecosystems and leave any human survivors occupying a devastated planet very different from the one they inherited.

24. The arms race - in all parts of the world - pre-empts resources that might be used more productively to diminish the security threats created by environmental conflict and the resentments that are fuelled by widespread poverty.

25. Many present efforts to guard and maintain human progress, to meet human needs, and to realize human ambitions are simply unsustainable - in both the rich and poor nations. They draw too heavily, too quickly, on already overdrawn environmental resource accounts to be affordable far into the future without bankrupting those accounts. They may show profits on the balance sheets of our generation, but our children will inherit the losses. We borrow environmental capital from future generations with no intention or prospect of repaying. They may damn us for our spendthrift ways, but they can never collect on our debt to them. We act as we do because we can get away with it: future generations do not vote; they have no political or financial power; they cannot challenge our decisions.

26. But the results of the present profligacy are rapidly closing the options for future generations. Most of today's decision makers will be dead before the planet feels the heavier effects of acid precipitation, global warming, ozone depletion, or widespread desertification and species loss. Most of the young voters of today will still be alive. In the Commission's hearings it was the young, those who have the most to lose, who were the harshest critics of the planet's present management.

3. Sustainable Development

27. Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to

fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.

28. Meeting essential needs requires not only a new era of economic growth for nations in which the majority are poor, but an assurance that those poor get their fair share of the resources required to sustain that growth. Such equity would be aided by political systems that secure effective citizen participation in decision making and by greater democracy in international decision making.

29. Sustainable global development requires that those who are more affluent adopt life-styles within the planet's ecological means - in their use of energy, for example. Further, rapidly growing populations can increase the pressure on resources and slow any rise in living standards; thus sustainable development can only be pursued if population size and growth are in harmony with the changing productive potential of the ecosystem.

30. Yet in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. We do not pretend that the process is easy or straightforward. Painful choices have to be made. Thus, in the final analysis, sustainable development must rest on political will.

4. The Institutional Gaps

31. The objective of sustainable development and the integrated nature of the global environment/development challenges pose problems for institutions, national and international, that were established on the basis of narrow preoccupations and compartmentalized concerns. Governments' general response to the speed and scale of global changes has been a reluctance to recognize sufficiently the need to change themselves. The challenges are both interdependent and integrated, requiring comprehensive approaches and popular participation.

32. Yet most of the institutions facing those challenges tend to be independent, fragmented, working to relatively narrow mandates with closed decision processes. Those responsible for managing natural resources and protecting the environment are institutionally separated from those responsible for managing the economy. The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must.

33. There is a growing need for effective international cooperation to manage ecological and economic interdependence. Yet at the same time, confidence in international organizations is diminishing and support for them dwindling.

34. The other great institutional flaw in coping with environment/development challenges is governments' failure to make the bodies whose policy actions degrade the environment responsible for ensuring that their policies prevent that degradation. Environmental concern arose from damage caused by the rapid economic growth following the Second World War. Governments, pressured by their citizens, saw a need to clean up the mess, and they established environmental ministries and agencies to do this. Many had great success - within the limits of their mandates - in improving air and water quality and enhancing other resources. But much of their work has of necessity been after-the-fact repair of damage: reforestation, reclaiming desert lands, rebuilding urban environments, restoring natural habitats, and rehabilitating wild lands.

35. The existence of such agencies gave many governments and their citizens the false impression that these bodies were by themselves able to protect and enhance the environmental resource base. Yet many industrialized and most developing countries carry huge economic burdens from inherited problems such as air and water pollution, depletion of groundwater, and the proliferation of toxic chemicals and hazardous wastes. These have been joined by more recent problems - erosion, desertification, acidification, new chemicals, and new forms of waste - that are directly related to agricultural, industrial, energy, forestry, and transportation policies and practices.

36. The mandates of the central economic and sectoral ministries are also often too narrow, too concerned with quantities of production or growth. The mandates of ministries of industry include production targets, while the accompanying pollution is left to ministries of environment. Electricity boards produce power, while the acid pollution they also produce is left to other bodies to clean up. The present challenge is to give the central economic and sectoral ministries the responsibility for the quality of those parts of the human environment affected by their decisions, and to give the environmental agencies more power to cope with the effects of unsustainable development.

37. The same need for change holds for international agencies concerned with development lending, trade regulation, agricultural development, and so on. These have been slow to take the environmental effects of their work into account, although some are trying to do so.

38. The ability to anticipate and prevent environmental damage requires that the ecological dimensions of policy be considered at the same time as the economic, trade, energy, agricultural, and other dimensions. They should be considered on the same agendas and in the same national and international institutions.

39. This reorientation is one of the chief institutional challenges of the 1990s and beyond. Meeting it will require major institutional development and reform. Many countries that are too poor or small or that have limited managerial capacity will find it difficult to do this unaided. They will need

financial and technical assistance and training. But the changes required involve all countries, large and small, rich and poor.

II. THE POLICY DIRECTIONS

40. The Commission has focused its attention in the areas of population, food security, the loss of species and genetic resources, energy, industry, and human settlements - realizing that all of these are connected and cannot be treated in isolation one from another. This section contains only a few of the Commission's many recommendations.

1. Population and Human Resources

41. In many parts of the world, the population is growing at rates that cannot be sustained by available environmental resources, at rates that are outstripping any reasonable expectations of improvements in housing, health care, food security, or energy supplies.

42. The issue is not just numbers of people, but how those numbers relate to available resources. Thus the 'population problem' must be dealt with in part by efforts to eliminate mass poverty, in order to assure more equitable access to resources, and by education to improve human potential to manage those resources.

43. Urgent steps are needed to limit extreme rates of population growth. Choices made now will influence the level at which the population stabilizes next century within a range of 6 billion people. But this is not just a demographic issue; providing people with facilities and education that allow them to choose the size of their families is a way of assuring - especially for women - the basic human right of self-determination.

44. Governments that need to do so should develop long-term, multifaceted population policies and a campaign to pursue broad demographic goals: to strengthen social, cultural, and economic motivations for family planning, and to provide to all who want them the education, contraceptives, and services required.

45. Human resource development is a crucial requirement not only to build up technical knowledge and capabilities, but also to create new values to help individuals and nations cope with rapidly changing social, environmental, and development realities. Knowledge shared globally would assure greater mutual understanding and create greater willingness to share global resources equitably.

46. Tribal and indigenous peoples will need special attention as the forces of economic development disrupt their traditional life-styles - life-styles that can offer modern societies many lessons in the management of resources in complex forest, mountain, and dryland ecosystems. Some are threatened with virtual extinction by insensitive development over which they

have no control. Their traditional rights should be recognized and they should be given a decisive voice in formulating policies about resource development in their areas. (See Chapter 4 for a wider discussion of these issues and recommendations.)

2. Food Security: Sustaining the Potential

47. Growth in world cereal production has steadily outstripped world population growth. Yet each year there are more people in the world who do not get enough food. Global agriculture has the potential to grow enough food for all, but food is often not available where it is needed.

48. Production in industrialized countries has usually been highly subsidized and protected from international competition. These subsidies have encouraged the overuse of soil and chemicals, the pollution of both water resources and foods with these chemicals, and the degradation of the countryside. Much of this effort has produced surpluses and their associated financial burdens. And some of this surplus has been sent at concessional rates to the developing world, where it has undermined the farming policies of recipient nations. There is, however, growing awareness in some countries of the environmental and economic consequences of such paths, and the emphasis of agricultural policies is to encourage conservation.

49. Many developing countries, on the other hand, have suffered the opposite problem: farmers are not sufficiently supported. In some, improved technology allied to price incentives and government services has produced a major breakthrough in food production. But elsewhere, the food-growing small farmers have been neglected. Coping with often inadequate technology and few economic incentives, many are pushed onto marginal land: too dry, too steep, lacking in nutrients. Forests are cleared and productive drylands rendered barren.

50. Most developing nations need more effective incentive systems to encourage production, especially of food crops. In short, the 'terms of trade' need to be turned in favour of the small farmer. Most industrialized nations, on the other hand, must alter present systems in order to cut surpluses, to reduce unfair competition with nations that may have real comparative advantages, and to promote ecologically sound farming practices.

51. Food security requires attention to questions of distribution, since hunger often arises from lack of purchasing power rather than lack of available food. It can be furthered by land reforms, and by policies to protect vulnerable subsistence farmers, pastoralists, and the landless - groups who by the year 2000 will include 220 million households. Their greater prosperity will depend on integrated rural development that increases work opportunities both inside and outside agriculture. (See Chapter 5 for a wider discussion of these issues and recommendations.)

3. Species and Ecosystems: Resources for Development

52. The planet's species are under stress. There is a growing scientific consensus that species are disappearing at rates never before witnessed on the planet, although there is also controversy over those rates and the risks they entail. Yet there is still time to halt this process.

53. The diversity of species is necessary for the normal functioning of ecosystems and the biosphere as a whole. The genetic material in wild species contributes billions of dollars yearly to the world economy in the form of improved crop species, new drugs and medicines, and raw materials for industry. But utility aside, there are also moral, ethical, cultural, aesthetic, and purely scientific reasons for conserving wild beings.

54. A first priority is to establish the problem of disappearing species and threatened ecosystems on political agendas as a major economic and resource issue.

55. Governments can stem the destruction of tropical forests and other reservoirs of biological diversity while developing them economically. Reforming forest revenue systems and concession terms could raise billions of dollars of additional revenues, promote more efficient, long-term forest resource use, and curtail deforestation.

56. The network of protected areas that the world will need in the future must include much larger areas brought under some degree of protection. Therefore, the cost of conservation will rise - directly and in terms of opportunities for development foregone. But over the long term the opportunities for development will be enhanced. International development agencies should therefore give comprehensive and systematic attention to the problems and opportunities of species conservation.

57. Governments should investigate the prospect of agreeing to a 'Species Convention', similar in spirit and scope to other international conventions reflecting principles of 'universal resources'. They should also consider international financial arrangements to support the implementation of such a convention. (See Chapter 6 for a wider discussion of these issues and recommendations.)

4. Energy: Choices for Environment and Development

58. A safe and sustainable energy pathway is crucial to sustainable development; we have not yet found it. Rates of increase in energy use have been declining. However, the industrialization, agricultural development, and rapidly growing populations of developing nations will need much more energy. Today, the average person in an industrial market economy uses more than 80 times as much energy as someone in sub-Saharan Africa. Thus any realistic global energy scenario must provide for substantially increased primary energy use by developing countries.

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59. To bring developing countries' energy use up to industrialized country levels by the year 2025 would require increasing present global energy use by a factor of five. The planetary ecosystem could not stand this, especially if the increases were based on non-renewable fossil fuels. Threats of global warming and acidification of the environment most probably rule out even a doubling of energy use bared on present mixes of primary sources.

60. Any new era of economic growth must therefore be less energy-intensive than growth in the past. Energy efficiency policies must be the cutting edge of national energy strategies for sustainable development, and there is much scope for improvement in this direction. Modern appliances can be redesigned to deliver the same amounts of energy-services with only two-thirds or even one-half of the primary energy inputs needed to run traditional equipment. And energy efficiency solutions are often cost-effective.

61. After almost four decades of immense technological effort, nuclear energy has become widely used. During this period, however, the nature of its costs, risks, and benefits have become more evident and the subject of sharp controversy. Different countries world-wide take up different positions on the use of nuclear energy. The discussion in the Commission also reflected these different views and positions. Yet all agreed that the generation of nuclear power is only justifiable if there are solid solutions to the unsolved problems to which it gives rise. The highest priority should be accorded to research and development on environmentally sound and ecologically viable alternatives, as well as on means of increasing the safety of nuclear energy.

62. Energy efficiency can only buy time for the world to develop 'low-energy paths' based on renewable sources, which should form the foundation of the global energy structure during the 21st Century. Most of these sources are currently problematic, but given innovative development, they could supply the same amount of primary energy the planet now consumes. However, achieving these use levels will require a programme of coordinated research, development, and demonstration projects commanding funding necessary to ensure the rapid development of renewable energy. Developing countries will require assistance to change their energy use patterns in this direction.

63. Millions of people in the developing world are short of fuelwood, the main domestic energy of half of humanity, and their numbers are growing. The wood-poor nations must organize their agricultural sectors to produce large amounts of wood and other plant fuels.

64. The substantial changes required in the present global energy mix will not be achieved by market pressures alone, given the dominant role of governments as producers of energy and their importance as consumers. If the recent momentum behind annual gains in energy efficiency is to be maintained and extended, governments need to make it an explicit goal of their policies for energy pricing to consumers. Prices needed to encourage the adoption of energy-saving measures may be achieved through several means. Although the Commission expresses no preference, 'conservation pricing' requires that governments take a long-term

view in weighing the costs and benefits of the various measures. Given the importance of oil prices on international energy policy, new mechanisms for encouraging dialogue between consumers and producers should be explored.

65. A safe, environmentally sound, and economically viable energy pathway that will sustain human progress into the distant future is clearly imperative. It is also possible. But it will require new dimensions of political will and institutional cooperation to achieve it. (See Chapter 7 for a wider discussion of these issues and recommendations.)

5. Industry: Producing More with Less

66. The world manufactures seven times more goods today than it did as recently as 1950. Given population growth rates, a five- to tenfold increase in manufacturing output will be needed just to raise developing world consumption of manufactured goods to industrialized world levels by the time population growth rates level off next century.

67. Experience in the industrialized nations has proved that anti-pollution technology has been cost-effective in terms of health, property, and environmental damage avoided, and that it has made many industries more profitable by making them more resource-efficient. While economic growth has continued, the consumption of raw materials has held steady or even declined, and new technologies offer further efficiencies.

68. Nations have to bear the costs of any inappropriate industrialization, and many developing countries are realizing that they have neither the resources nor - given rapid technological change - the time to damage their environments now and clean up later. But they also need assistance and information from industrialized nations to make the best use of technology. Transnational corporations have a special responsibility to smooth the path of industrialization in the nations in which they operate.

69. Emerging technologies offer the promise of higher productivity, increased efficiency, and decreased pollution, but many bring risks of new toxic chemicals and wastes and of major accidents of a type and scale beyond present coping mechanisms. There is an urgent need for tighter controls over the export of hazardous industrial and agricultural chemicals. Present controls over the dumping of hazardous wastes should be tightened.

70. Many essential human needs can be met only through goods and services provided by industry, and the shift to sustainable development must be powered by a continuing flow of wealth from industry. (See Chapter 8 for a wider discussion of these issues and recommendations.)

6. The Urban Challenge

71. By the turn of the century, almost half of humanity will live in cities; the world of the 21st century will be a largely

urban world. Over only 65 years, the developing world's urban population has increased tenfold, from around 100 million in 1920 to 1 billion today. In 1940, one person in 100 lived in a city of 1 million or more inhabitants; by 1980, one in 10 lived in such a city. Between 1985 and the year 2000, Third World cities could grow by another three-quarters of a billion people. This suggests that the developing world must, over the next few years, increase by 65 per cent its capacity to produce and manage its urban infrastructure, services, and shelter merely to maintain today's often extremely inadequate conditions.

72. Few city governments in the developing world have the power, resources, and trained personnel to provide their rapidly growing populations with the land, services, and facilities needed for an adequate human life: clean water, sanitation, schools, and transport. The result is mushrooming illegal settlements with primitive facilities, increased overcrowding, and rampant disease linked to an unhealthy environment. Many cities in industrial countries also face problems - deteriorating infrastructure, environmental degradation, inner-city decay, and neighbourhood collapse. But with the means and resources to tackle this decline, the issue for most industrial countries is ultimately one of political and social choice. Developing countries are not in the same situation. They have a major urban crisis on their hands.

73. Governments will need to develop explicit settlements strategies to guide the process of urbanization, taking the pressure off the largest urban centres and building up smaller towns and cities, more closely integrating them with their rural hinterlands. This will mean examining and changing other policies - taxation, food pricing, transportation, health, industrialization - that work against the goals of settlements strategies.

74. Good city management requires decentralization - of funds, political power, and personnel - to local authorities, which are best placed to appreciate and manage local needs. But the sustainable development of cities will depend on closer work with the majorities of urban poor who are the true city builders, tapping the skills, energies and resources of neighbourhood groups and those in the 'informal sector'. Much can be achieved by 'site and service' schemes that provide households with basic services and help them to get on with building sounder houses around these. (See Chapter 9 for a wider discussion of these issues and recommendations.)

III. INTERNATIONAL COOPERATION AND INSTITUTIONAL REFORM

1. The Role of the International Economy

75. Two conditions must be satisfied before international economic exchanges can become beneficial for all involved. The sustainability of ecosystems on which the global economy depends must be guaranteed. And the economic partners must be satisfied

that the basis of exchange is equitable. For many developing countries, neither condition is met.

76. Growth in many developing countries is being stifled by depressed commodity prices, protectionism, intolerable debt burdens, and declining flows of development finance. If living standards are to grow so as to alleviate poverty, these trends must be reversed.

77. A particular responsibility falls to the World Bank and the International Development Association as the main conduit for multilateral finance to developing countries. In the context of consistently increased financial flows, the World Bank can support environmentally sound projects and policies. In financing structural adjustment, the International Monetary Fund should support wider and longer term development objectives than at present: growth, social goals, and environmental impacts.

78. The present level of debt service of many countries, especially in Africa and Latin America, is not consistent with sustainable development. Debtors are being required to use trade surpluses to service debts, and are drawing heavily on non-renewable resources to do so. Urgent action is necessary to alleviate debt burdens in ways that represent a fairer sharing between both debtors and lenders of the responsibilities and burdens.

79. Current arrangements for commodities could be significantly improved: more compensatory financing to offset economic shocks would encourage producers to take a long-term view, and not to overproduce commodities; and more assistance could be given from diversification programmes. Commodity-specific arrangements can build on the model of the International Tropical Timber Agreement, one of the few that specifically includes ecological concerns.

80. Multinational companies can play an important role in sustainable development, especially as developing countries come to rely more on foreign equity capital. But if these companies are to have a positive influence on development, the negotiating capacity of developing countries vis à vis transnationals must be strengthened so they can secure terms which respect their environmental concerns.

81. However, these specific measures must be located in a wider context of effective cooperation to produce an international economic system geared to growth and the elimination of world poverty. (See Chapter 3 for a more detailed discussion of issues and recommendations on the international economy.)

2. Managing the Commons

82. Traditional forms of national sovereignty raise particular problems in managing the 'global commons' and their shared ecosystems - the oceans, outer space, and Antarctica. Some progress has been made in all three areas; much remains to be done.

83. The UN Conference on the Law of the Sea was the most ambitious attempt ever to provide an internationally agreed regime for the management of the oceans. All nations should ratify the Law of the Sea Treaty as soon as possible. Fisheries agreements should be strengthened to prevent current overexploitation, as should conventions to control and regulate the dumping of hazardous wastes at sea.

84. There are growing concerns about the management of orbital space, centering on using satellite technology for monitoring planetary systems; on making the most effective use of the limited capacities of geosynchronous orbit for communications satellites; and on limiting space debris. The orbiting and testing of weapons in space would greatly increase this debris. The international community should seek to design and implement a space regime to ensure that space remains a peaceful environment for the benefit of all.

85. Antarctica is managed under the 1959 Antarctica Treaty. However, many nations outside of that pact view the Treaty System as too limited, both in participation and in the scope of its conservation measures. The Commission's recommendations deal with the safeguarding of present achievements; the incorporation of any minerals development into a management regime; and various options for the future. (See Chapter 10 for more discussion on issues and recommendations on the management of the commons.)

3. Peace, Security, Development, and the Environment

86. Among the dangers facing the environment, the possibility of nuclear war is undoubtedly the gravest. Certain aspects of the issues of peace and security bear directly upon the concept of sustainable development. The whole notion of security as traditionally understood - in terms of political and military threats to national sovereignty - must be expanded to include the growing impacts of environmental stress - locally, nationally, regionally, and globally. There are no military solutions to 'environmental insecurity'.

87. Governments and international agencies should assess the cost effectiveness, in terms of achieving security, of money spent on armaments compared with money spent on reducing poverty or restoring a ravaged environment.

88. But the greatest need is to achieve improved relations among those major powers capable of deploying weapons of mass destruction. This is needed to achieve agreement on tighter control over the proliferation and testing of various types of weapons of mass destruction - nuclear and non nuclear - including those that have environmental implications. (See Chapter 11 for more discussion of issues and recommendations on the links between peace, security, development, and the environment.)

4. Institutional and Legal Change

89. The Report that follows contains throughout (and especially in Chapter 12), many specific recommendations for institutional

and legal change. These cannot be adequately summarized here. However, the Commission's main proposals are embodied in six priority areas.

4.1 Getting at the Sources

90. Governments must begin now to make the key national, economic, and sectoral agencies directly responsible and accountable for ensuring that their policies, programmes, and budgets support development that is economically and ecologically sustainable.

91. By the same token, the various regional organizations need to do more to integrate environment fully in their goals and activities. New regional arrangements will especially be needed among developing countries to deal with transboundary environmental issues.

92. All major international bodies and agencies should ensure that their programmes encourage and support sustainable development, and they should greatly improve their coordination and cooperation. The Secretary-General of the United Nations Organization should provide a high-level centre of leadership for the UN system to assess, advise, assist, and report on progress made towards this goal.

4.2 Dealing with the Effects

93. Governments should also reinforce the roles and capacities of environmental protection and resource management agencies. This is needed in many industrialized countries, but most urgently in developing countries, which will need assistance in strengthening their institutions. The UN Environment Programme (UNEP) should be strengthened as the principal source on environmental data, assessment, and reporting and as the principal advocate and agent for change and international cooperation on critical environment and natural resource protection issues.

4.3 Assessing Global Risks

94. The capacity to identify, assess, and report on risks of irreversible damage to natural systems and threats to the survival, security, and well-being of the world community must be rapidly reinforced and extended. Governments, individually and collectively, have the principal responsibility to do this. UNEP's Earthwatch programme should be the centre of leadership in the UN system on risk assessment.

95. However, given the politically sensitive nature of many of the most critical risks, there is also a need for an independent but complementary capacity to assess and report on critical global risks. A new international programme for cooperation among largely non-governmental organizations, scientific bodies, and industry groups should therefore be established for this purpose.

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4.4 Making Informed Choices

96. Making the difficult choices involved in achieving sustainable development will depend on the widespread support and involvement of an informed public and of NGOs, the scientific community, and industry. Their rights, roles and participation in development planning, decision-making, and project implementation should be expanded.

4.5 Providing the Legal Means

97. National and international law is being rapidly outdistanced by the accelerating pace and expanding scale of impacts on the ecological basis of development. Governments now need to fill major gaps in existing national and international law related to the environment, to find ways to recognize and protect the rights of present and future generations to an environment adequate for their health and well-being, to prepare under UN auspices a universal Declaration on environmental protection and sustainable development and a subsequent Convention, and to strengthen procedures for avoiding or resolving disputes on environment and resource management issues.

4.6 Investing in Our Future

98. Over the past decade, the overall cost-effectiveness of investments in halting pollution has been demonstrated. The escalating economic and ecological damage costs of not investing in environmental protection and improvement have also been repeatedly demonstrated - often in grim tolls of flood and famine. But there are large financial implications: for renewable energy development, pollution control, and achieving less resource-intensive forms of agriculture.

99. Multilateral financial institutions have a crucial role to play. The World Bank is presently reorienting its programmes towards greater environmental concerns. This should be accompanied by a fundamental commitment to sustainable development by the Bank. It is also essential that the Regional Development Banks and the International Monetary Fund incorporate similar objectives in their policies and programmes. A new priority and focus is also needed in bilateral aid agencies.

100. Given the limitations on increasing present flows of international aid, proposals for securing additional revenue from the use of international commons and natural resources should now be seriously considered by governments.

IV. A CALL FOR ACTION

101. Over the course of this century, the relationship between the human world and the planet that sustains it has undergone a profound change.

102. When the century began, neither human numbers nor technology had the power radically to alter planetary systems. As the century closes, not only do vastly increased human numbers and their activities have that power, but major, unintended changes are occurring in the atmosphere, in soils, in waters, among plants and animals, and in the relationships among all of these. The rate of change is outstripping the ability of scientific disciplines and our current capabilities to assess and advise. It is frustrating the attempts of political and economic institutions, which evolved in a different, more fragmented world, to adapt and cope. It deeply worries many people who are seeking ways to place those concerns on the political agendas.

103. The onus lies with no one group of nations. Developing countries face the obvious life-threatening challenges of desertification, deforestation, and pollution, and endure most of the poverty associated with environmental degradation. The entire human family of nations would suffer from the disappearance of rain forests in the tropics, the loss of plant and animal species, and changes in rainfall patterns. Industrial nations face the life-threatening challenges of toxic chemicals, toxic wastes, and acidification. All nations may suffer from the releases by industrialized countries of carbon dioxide and of gases that react with the ozone layer, and from any future war fought with the nuclear arsenals controlled by those nations. All nations will have a role to play in changing trends, and in righting an international economic system that increases rather than decreases inequality, that increases rather than decreases numbers of poor and hungry.

104. The next few decades are crucial. The time has come to break out of past patterns. Attempts to maintain social and ecological stability through old approaches to development and environmental protection will increase instability. Security must be sought through change. The Commission has noted a number of actions that must be taken to reduce risks to survival and to put future development on paths that are sustainable. Yet we are aware that such a reorientation on a continuing basis is simply beyond the reach of present decision-making structures and institutional arrangements, both national and international.

105. This Commission has been careful to base our recommendations on the realities of present institutions, on what can and must be accomplished today. But to keep options open for future generations, the present generation must begin now, and begin together.

106. To achieve the needed changes, we believe that an active follow-up of this report is imperative. It is with this in mind that we call for the UN General Assembly, upon due consideration, to transform this report into a UN Programme on Sustainable Development. Special follow-up conferences could be initiated at the regional level. Within an appropriate period after the presentation of this report to the General Assembly, an international conference could be convened to review progress made, and to promote follow up arrangements that will be needed to set benchmarks and to maintain human progress.

107. First and foremost, this Commission has been concerned with people - of all countries and all walks of life. And it is to people that we address our report. The changes in human attitudes that we call for depend on a vast campaign of education, debate, and public participation. This campaign must start now if sustainable human progress is to be achieved.

108. The members of the World Commission on Environment and Development came from 21 very different nations. In our discussions, we disagreed often on details and priorities. But despite our widely differing backgrounds and varying national and international responsibilities, we were able to agree to the lines along which change must be drawn.

109. We are unanimous in our conviction that the security, well-being, and very survival of the planet depend on such changes, now.

CHAPTER 1

A THREATENED FUTURE

1. The Earth is one but the world is not. We all depend on one biosphere for sustaining our lives. Yet each community, each country, strives for survival and prosperity with little regard for its impact on others. Some consume the Earth's resources at a rate that would leave little for future generations. Others, many more in number, consume far too little and live with the prospect of hunger, squalor, disease, and early death.

2. Yet progress has been made. Throughout much of the world, children born today can expect to live longer and be better educated than their parents. In many parts, the new-born can also expect to attain a higher standard of living in a wider sense. Such progress provides hope as we contemplate the improvements still needed, and also as we face our failures to make this Earth a safer and sounder home for us and for those who are to come.

3. The failures that we need to correct arise both from poverty and from the short-sighted way in which we have often pursued prosperity. Many parts of the world are caught in a vicious downwards spiral: Poor people are forced to overuse environmental resources to survive from day to day, and their impoverishment of their environment further impoverishes them, making their survival ever more difficult and uncertain. The prosperity attained in some parts of the world is often precarious, as it has been secured through farming, forestry, and industrial practices that bring profit and progress only over the short term.

4. Societies have faced such pressures in the past and, as many desolate ruins remind us, sometimes succumbed to them. But generally these pressures were local. Today the scale of our interventions in nature is increasing and the physical effects of our decisions spill across national frontiers. The growth in economic interaction between nations amplifies the wider consequences of national decisions. Economics and ecology bind us in ever-tightening networks. Today, many regions face risks of irreversible damage to the human environment that threaten the basis for human progress.

5. These deepening interconnections are the central justification for the establishment of this Commission. We travelled the world for nearly three years, listening. At special public hearings organized by the Commission, we heard from government leaders, scientists, and experts, from citizens' groups concerned about a wide range of environment and development issues, and from thousands of individuals - farmers,

shanty-town residents, young people, industrialists, and indigenous and tribal peoples.

6. We found everywhere deep public concern for the environment, concern that has led not just to protests but often to changed behaviour. The challenge is to ensure that these new values are more adequately reflected in the principles and operations of political and economic structures.

7. We also found grounds for hope: that people can cooperate to build a future that is more prosperous, more just, and more secure; that a new era of economic growth can be attained, one based on policies that sustain and expand the Earth's resource base; and that the progress that some have known over the last century can be experienced by all in the years ahead. But for this to happen, we must understand better the symptoms of stress that confront us, we must identify the causes, and we must design new approaches to managing environmental resources and to sustaining human development.

I. SYMPTOMS AND CAUSES

8. 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. The cumulative effect of these changes is so far-reaching as to make poverty itself a major global scourge.

9. On the other hand, where economic growth has led to improvements in living standards, it has sometimes been achieved in ways that are globally damaging in the longer term. Much of the improvement in the past has been based on the use of increasing amounts of raw materials, energy, chemicals, and synthetics and on the creation of pollution that is not adequately accounted for in figuring the costs of production processes. These trends have had unforeseen effects on the environment. Thus today's environmental challenges arise both from the lack of development and from the unintended consequences of some forms of economic growth.

1. Poverty

10. There are more hungry people in the world today than ever before in human history, and their numbers are growing. In 1980, there were 340 million people in 87 developing countries not getting enough calories to prevent stunted growth and serious health risks. This total was very slightly below the figure for 1970 in terms of share of the world population, but in terms of sheer numbers, it represented a 14 per cent increase. The World Bank predicts that these numbers are likely to go on growing.[1/]

> I think this Commission should give attention on how to look into the question of more participation for those people who are the object of development. Their basic needs include the right to preserve their cultural identity, and their right not to be alienated from their own society, and their own community. So the point I want to make is that we cannot discuss environment or development without discussing political development. And you cannot eradicate poverty, at least not only by redistributing wealth or income, but there must be more redistribution of power.
>
> Aristides Katoppo
> Publisher
> WCED Public Hearing
> Jakarta, 26 March 1985

11. The number of people living in slums and shanty towns is rising, not falling. A growing number lack access to clean water and sanitation and hence are prey to the diseases that arise from this lack. There is some progress, impressive in places. But, on balance, poverty persists and its victims multiply.

12. The pressure of poverty has to be seen in a broader context. At the international level there are large differences in per capita income, which ranged in 1984 from $190 in low-income countries (other than China and India) to $11,430 in the industrial market economies. (See Table 1.1.)

13. Such inequalities represent great differences not merely in the quality of life today, but also in the capacity of societies to improve their quality of life in the future. Most of the world's poorest countries depend for increasing export earnings on tropical agricultural products that are vulnerable to fluctuating or declining terms of trade. Expansion can often only be achieved at the price of ecological stress. Yet diversification in ways that will alleviate both poverty and ecological stress is hampered by disadvantageous terms of technology transfer, by protectionism, and by declining financial flows to those countries that most need international finance.[27]

14. Within countries, poverty has been exacerbated by the unequal distribution of land and other assets. The rapid rise in population has compromised the ability to raise living standards. These factors, combined with growing demands for the commercial use of good land, often to grow crops for export, have pushed many subsistence farmers onto poor land and robbed them of any hope of participating in their nations' economic lives. The same forces have meant that traditional shifting cultivators, who once cut forests, grew crops, and then gave the forest time to recover, now have neither land enough nor time to let forests re-establish. So forests are being destroyed, often only to create poor farmland that cannot support those who till it. Extending cultivation onto steep slopes is increasing soil erosion in many hilly sections of both developing and developed

TABLE 1.1

Population Size and Per Capita GNP by Groups of Countries

Countries	Population	Per capita GNP	Average annual growth rate of per capita GNP, 1965-84
	(millions)	(1984 dollars)	(per cent)
Low-income Economies (excl. China, India)	611	190	0.9
China and India	1,778	290	3.3
Lower Middle-income Economies	491	740	1.0
Upper Middle-income Economies	497	1,980	3.3
High-income Oil Exporters	19	11,280	3.2
Industrial Market Economies	733	11,430	2.4

Source: Based on data in World Bank, World Development Report 1986 (New York: Oxford University Press, 1986).

nations. In many river valleys, areas chronically liable to floods are now farmed.

15. These pressures are reflected in the rising incidence of disasters. During the 1970s, six times as many people died from 'natural disasters' each year as in the 1960s, and twice as many suffered from such disasters. Droughts and floods, disasters among whose causes are widespread deforestation and overcultivation, increased most in terms of numbers affected. There were 18.5 million people affected by droughts annually in the 1960s, but 24.4 million in the 1970s; 5.2 million people were victims of floods yearly in the 1960s, compared with 15.4 million in the 1970s.[3/] The results are not in for the 1980s, but this disaster-prone decade seems to be carrying forward the trend, with droughts in Africa, India, and Latin America, and floods throughout Asia, parts of Africa, and the Andean region of Latin America.

16. Such disasters claim most of their victims among the impoverished in poor nations, where subsistence farmers must make their land more liable to droughts and floods by clearing marginal areas, and where the poor make themselves more vulnerable to all disasters by living on steep slopes and unprotected shores - the only lands left for their shanties. Lacking food and foreign exchange reserves, their economically vulnerable governments are ill equipped to cope with such catastrophes.

17. The links between environmental stress and developmental disaster are most evident in sub-Saharan Africa. Per capita food production, declining since the 1960s, plummeted during the drought of the 1980s, and at the height of the food emergency some 35 million people were exposed to risk. Human overuse of land and prolonged drought threaten to turn the grasslands of Africa's Sahel region into desert.[4/] No other region more tragically suffers the vicious cycle of poverty leading to

If people destroy vegetation in order to get land, food, fodder, fuel, or timber, the soil is no longer protected. Rain creates surface runoff, and the soil erodes. When the soil is gone, no water is retained and the land can no longer produce enough food, fodder, fuel, or timber, so people need to turn to new land and start the process all over again.

All major disaster problems in the Third World are essentially unsolved development problems. Disaster prevention is thus primarily an aspect of development, and this must be a development that takes place within the sustainable limits.

Odd Grann
Secretary General, Norwegian Red Cross
WCED Public Hearing
Oslo, 24-25 June 1985

environmental degradation, which leads in turn to even greater poverty.

2. Growth

18. In some parts of the world, particularly since the mid-1950s, growth and development have vastly improved living standards and the quality of life. Many of the products and technologies that have gone into this improvement are raw material- and energy-intensive and entail a substantial amount of pollution. The consequent impact on the environment is greater than ever before in human history.

19. Over the past century, the use of fossil fuels has grown nearly thirtyfold, and industrial production has increased more than fiftyfold. The bulk of this increase, about three-quarters in the case of fossil fuels and a little over four-fifths in the case of industrial production, has taken place since 1950. The annual increase in industrial production today is perhaps as large as the total production in Europe around the end of the 1930s.[5/] Into every year we now squeeze the decades of industrial growth - and environmental disruption - that formed the basis of the pre-war European economy.

20. Environmental stresses also arise from more traditional forms of production. More land has been cleared for settled cultivation in the past 100 years than in all the previous centuries of human existence. Interventions in the water cycles have increased greatly. Massive dams, most of them built after 1950, impound a large proportion of the river flow. In Europe and Asia, water use has reached 10 per cent of the annual run-off, a figure that is expected to rise to 20-25 per cent by the end of the century.[6/]

21. The impact of growth and rising income levels can be seen in the distribution of world consumption of a variety of resource intensive products. The more affluent industrialized countries use most of the world's metals and fossil fuels. Even

Table 1-1

Distribution of World Consumption, Averages for 1980-82

Commodity	Units of Per Capita Consumption	Developed Countries (24 Per cent of Population) Share in World Consumption	Developed Countries (24 Per cent of Population) Per Capita	Developing Countries (76 Per cent of Population) Share in World Consumption	Developing Countries (76 Per cent of Population) Per Capita
		(percent)		(percent)	
Food					
Calories	Kcal/per day	34	3,395	66	2,389
Protein	gms/per day	38	99	62	58
Fat	gms/per day	53	127	47	40
Paper	kg/per year	85	123	15	8
Steel	kg/per year	79	455	21	43
Other Metals	kg/per year	86	24	14	2
Commercial Energy	mtce/per year	80	5.8	20	0.5

Source: WCED estimates based on country-level data from FAO, UN Statistical Office, UNCTAD, and American Metal Association.

in the case of food products a sharp difference exists, particularly in the products that are more resource-intensive. (See Table 1-2.)

22. In recent years, industrial countries have been able to achieve economic growth using less energy and raw materials per unit of output. This, along with the efforts to reduce the emission of pollutants, will help to contain the pressure on the biosphere. But with the increase in population and the rise in incomes, per capita consumption of energy and materials will go up in the developing countries, as it has to if essential needs are to be met. Greater attention to resource efficiency can moderate the increase, but, on balance, environmental problems linked to resource use will intensify in global terms.

3. Survival

23. The scale and complexity of our requirements for natural resources have increased greatly with the rising levels of population and production. Nature is bountiful, but it is also fragile and finely balanced. There are thresholds that cannot be crossed without endangering the basic integrity of the system. Today we are close to many of these thresholds; we must be ever mindful of the risk of endangering the survival of life on Earth. Moreover, the speed with which changes in resource use are taking place gives little time in which to anticipate and prevent unexpected effects.

24. The 'greenhouse effect', one such threat to life-support systems, springs directly from increased resource use. The burning of fossil fuels and the cutting and burning of forests release carbon dioxide (CO_2). The accumulation in the

> The remarkable achievements of the celebrated Industrial Revolution are now beginning seriously to be questioned principally because the environment was not considered at the time. It was felt that the sky was so vast and clear nothing could ever change its colour, our rivers so big and their water so plentiful that no amount of human activity could ever change their quality, and there were trees and natural forests so plentiful that we will never finish them. After all, they grow again.
>
> Today we should know better. The alarming rate at which the Earth's surface is being denuded of its natural vegetative cover seems to indicate that the world may soon become devoid of trees through clearing for human developments.
>
> Hon. Victoria Chitepo
> Minister of Natural Resources and Tourism, Government of Zimbabwe
> WCED Opening Ceremony
> Harare, 18 Sept 1986

atmosphere of CO_2 and certain other gases traps solar radiation near the Earth's surface, causing global warming. This could cause sea level rises over the next 45 years large enough to inundate many low-lying coastal cities and river deltas. It could also drastically upset national and international agricultural production and trade systems.[7/]

25. Another threat arises from the depletion of the atmospheric ozone layer by gases released during the production of foam and the use of refrigerants and aerosols. A substantial loss of such ozone could have catastrophic effects on human and livestock health and on some life forms at the base of the marine food chain. The 1986 discovery of a hole in the ozone layer above the Antarctic suggests the possibility of a more rapid depletion than previously suspected.[8/]

26. A variety of air pollutants are killing trees and lakes and damaging buildings and cultural treasures, close to and sometimes thousands of miles from points of emission. The acidification of the environment threatens large areas of Europe and North America. Central Europe is currently receiving more than one gramme of sulphur on every square metre of ground each year.[9/] The loss of forests could bring in its wake disastrous erosion, siltation, floods, and local climatic change. Air pollution damage is also becoming evident in some newly industrialized countries.

27. In many cases the practices used at present to dispose of toxic wastes, such as those from the chemical industries, involve unacceptable risks. Radioactive wastes from the nuclear industry remain hazardous for centuries. Many who bear these risks do not benefit in any way from the activities that produce the wastes.

28. Desertification - the process whereby productive arid and semi-arid land is rendered economically unproductive - and large-scale deforestation are other examples of major threats to the integrity of regional ecosystems. Desertification involves complex interactions between humans, land, and climate. The pressures of subsistence food production, commercial crops, and meat production in arid and semi-arid areas all contribute to this process.

29. Each year another 6 million hectares are degraded to desert-like conditions.[10/] Over three decades, this would amount to an area roughly as large as Saudi Arabia. More than 11 million hectares of tropical forests are destroyed per year and this, over 30 years, would amount to an area about the size of India.[11/] Apart from the direct and often dramatic impacts within the immediate area, nearby regions are affected by the spreading of sands or by changes in water regimes and increased risks of soil erosion and siltation.

30. The loss of forests and other wild lands extinguishes species of plants and animals and drastically reduces the genetic diversity of the world's ecosystems. This process robs present and future generations of genetic material with which to improve crop varieties, to make them less vulnerable to weather stress, pest attacks, and disease. The loss of species and subspecies, many as yet unstudied by science, deprives us of important potential sources of medicines and industrial chemicals. It removes forever creatures of beauty and parts of our cultural heritage; it diminishes the biosphere.

31. Many of the risks stemming from our productive activity and the technologies we use cross national boundaries; many are global. Though the activities that give ris to these dangers tend to be concentrated in a few countries, the risks are shared by all, rich and poor, those who benefit from them and those who do not. Most who share in the risks have little influence on the decision processes that regulate these activities.

32. Little time is available for corrective action. In some cases we may already be close to transgressing critical thresholds. While scientists continue to research and debate causes and effects, in many cases we already know enough to warrant action. This is true locally and regionally in the cases of such threats as desertification, deforestation, toxic wastes, and acidification; it is true globally for such threats as climate change, ozone depletion, and species loss. The risks increase faster than do our abilities to manage them.

33. Perhaps the greatest threat to the Earth's environment, to sustainable human progress, and indeed to survival is the possibility of nuclear war, increased daily by the continuing arms race and its spread to outer space. The search for a more viable future can only be meaningful in the context of a more vigorous effort to renounce and eliminate the development of means of annihilation.

4. The Economic Crisis

34 The environmental difficulties that confront us are not new, but only recently have we begun to understand their complexity. Previously our main concerns centred on the effects of development on the environment. Today, we need to be equally concerned about the ways in which environmental degradation can dampen or reverse economic development. In one area after another, environmental degradation is eroding the potential for development. This basic connection was brought into sharp focus by the environment and development crises of the 1980s.

35. The slowdown in the momentum of economic expansion and the stagnation in world trade in the 1980s challenged all nations' abilities to react and adjust. Developing countries that rely on the export of primary products have been hit particularly hard by falling commodity prices. Between 1980 and 1984, developing countries lost about $55 billion in export earnings because of the fall in commodity prices, a blow felt most keenly in Latin America and Africa.[12/]

36. As a consequence of this period of slow growth in the world economy - together with rising debt service obligations and a decline in the inflow of finance - many developing countries have faced severe economic crises. Over half of all developing countries actually experienced declining per capita GDP in the years 1982-85 and per capita GDP has fallen, for developing countries as a whole, by around 10 per cent in the 1980s. (See Table 1-3.)

Table 1-3
Annual Rate of Increase of Gross Domestic Product in Developing Countries, 1976-85

Indicator	1976-80	1981	1982	1983	1984	1985
				(per cent)		
Gross Domestic Product						
All Developing Countries	4.9	1.3	0.2	0.8	2.1	2.5
Developing Countries Excluding Large Countries	4.5	1.0	0.6	0.1	1.5	1.4
Per Capita GDP						
All Developing Countries	2.4	1.0	-2.1	-1.5	-0.2	-0.2
Developing Countries Excluding Large Countries	1.9	-1.5	-3.1	-2.4	-1.0	-1.1

Source: Department of International Economic and Social Affairs, Doubling Development Finance: Meeting a Global Challenge, Views and Recommendations of the Committee on Development Planning (New York: UN, 1986)

37. The heaviest burden in international economic adjustment has been carried by the world's poorest people. The consequence has been a considerable increase in human distress and the overexploitation of land and natural resources to ensure survival in the short term.

38. Many international economic problems remain unresolved: Developing country indebtedness remains serious; commodity and energy markets are highly unstable; financial flows to developing countries are seriously deficient; protectionism and trade wars are a serious threat. Yet at a time when multilateral institutions, and rules, are more than ever necessary, they have been devalued. And the notion of an international responsibility for development has virtually disappeared. The trend is towards a decline in multilateralism and an assertion of national dominance.

II. NEW APPROACHES TO ENVIRONMENT AND DEVELOPMENT

39 Human progress has always depended on our technical ingenuity and a capacity for cooperative action. These qualities have often been used constructively to achieve development and environmental progress: in air and water pollution control, for example, and in increasing the efficiency of material and energy use. Many countries have increased food production and reduced population growth rates. Some technological advances, particularly in medicine, have been widely shared.

40. But this is not enough. Failures to manage the environment and to sustain development threaten to overwhelm all countries. Environment and development are not separate challenges; they are inexorably linked. Development cannot subsist upon a deteriorating environmental resource base; the environment cannot be protected when growth leaves out of account the costs of environmental destruction. These problems cannot be treated separately by fragmented institutions and policies. They are linked in a complex system of cause and effect.

41. First, environmental stresses are linked one to another. For example, deforestation, by increasing run-off, accelerates soil erosion and siltation of rivers and lakes. Air pollution and acidification play their part in killing forests and lakes. Such links mean that several different problems must be tackled simultaneously. And success in one area, such as forest protection, can improve chances of success in another area, such as soil conservation.

42. Second, environmental stresses and patterns of economic development are linked one to another. Thus agricultural policies may lie at the root of land, water, and forest degradation. Energy policies are associated with the global greenhouse effect, with acidification, and with deforestation for fuelwood in many developing nations. These stresses all threaten economic development. Thus economics and ecology must be completely integrated in decision making and lawmaking processes

> How long can we go on and safely pretend that the environment is not the economy, is not health, is not the prerequisite to development, is not recreation? Is it realistic to see ourselves as managers of an entity out there called the environment, extraneous to us, an alternative to the economy, too expensive a value to protect in difficult economic times? When we organize ourselves starting from this premise, we do so with dangerous consequences to our economy, health, and industrial growth.
>
> We are now just beginning to realize that we must find an alternative to our ingrained behaviour of burdening future generations resulting from our misplaced belief that there is a choice between economy and the environment. That choice, in the long term, turns out to be an illusion with awesome consequences for humanity.
>
> Charles Caccia
> Member of Parliament,
> House of Commons,
> WCED Public Hearing
> Ottawa, 26-27 May 1986

not just to protect the environment, but also to protect and promote development. Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind.

43. Third, environmental and economic problems are linked to many social and political factors. For example, the rapid population growth that has so profound an impact on the environment and on development in many regions is driven partly by such factors as the status of women in society and other cultural values. Also, environmental stress and uneven development can increase social tensions. It could be argued that the distribution of power and influence within society lies at the heart of most environment and development challenges. Hence new approaches must involve programmes of social development, particularly to improve the position of women in society, to protect vulnerable groups, and to promote local participation in decision making.

44. Finally, the systemic features operate not merely within but also between nations. National boundaries have become so porous that traditional distinctions between matters of local, national, and international significance have become blurred. Ecosystems do not respect national boundaries. Water pollution moves through shared rivers, lakes, and seas. The atmosphere carries air pollution over vast distances. Major accidents - particularly those at nuclear reactors or at plants or warehouses containing toxic materials - can have widespread regional effects.

45. Many environment-economy links also operate globally. For instance, the highly subsidized, incentive-driven agriculture of industrialized market economies generates surpluses that depress

> To successfully advance in solving global problems, we need to develop new methods of thinking, to elaborate new moral and value criteria, and, no doubt, new patterns of behaviour.
>
> Mankind is on the threshold of a new stage in its development. We should not only promote the expansion of its material, scientific, and technical basis, but, what is most important, the formation of new value and humanistic aspirations in human psychology, since wisdom and humaneness are the 'eternal truths' that make the basis of humanity. We need new social, moral, scientific, and ecological concepts, which should be determined by new conditions in the life of mankind today and in the future.
>
> I.T. Frolov
> Editor-in-Chief,
> Communist Magazine
> WCED Public Hearing
> Moscow, 8 Dec 1986

prices and erode the viability of the often neglected agriculture of developing countries. Soils and other environmental resources suffer in both systems. Each country may devise national agricultural policies to secure short-term economic and political gains, but no nation alone can devise policies to deal effectively with the financial, economic, and ecological costs of the agricultural and trade policies of other nations.

46. In the past, responsibility for environmental matters has been placed in environmental ministries and institutions that often have had little or no control over destruction caused by agricultural, industrial, urban development, forestry, and transportation policies and practices. Society has failed to give the responsibility for preventing environmental damage to the 'sectoral' ministries and agencies whose policies cause it. Thus our environmental management practices have focused largely upon after-the-fact repair of damage: reforestation, reclaiming desert lands, rebuilding urban environments, restoring natural habitats, and rehabilitating wild lands. The ability to anticipate and prevent environmental damage will require that the ecological dimensions of policy be considered at the same time as the economic, trade, energy, agricultural, and other dimensions.

47. In most countries, environmental policies are directed at the symptoms of harmful growth; these policies have brought progress and rewards and must be continued and strengthened. But that will not be enough. What is required is a new approach in which all nations aim at a type of development that integrates production with resource conservation and enhancement, and that links both to the provision for all of an adequate livelihood base and equitable access to resources.

48. The concept of sustainable development provides a framework for the integration of environment policies and development strategies - the term 'development' being used here in its broadest sense. The word is often taken to refer to the

> You talk very little about life, you talk too much about survival. It is very important to remember that when the possibilities for life are over, the possibilities for survival start. And there are peoples here in Brazil, especially in the Amazon region, who still live, and these peoples that still live don't want to reach down to the level of survival.
>
> Speaker from the floor
> WCED Public Hearing
> Sao Paulo, 28-29 Oct 1985

processes of economic and social change in the Third World. But the integration of environment and development is required in all countries, rich and poor. The pursuit of sustainable development requires changes in the domestic and international policies of every nation.

49. Sustainable development seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future. Far from requiring the cessation of economic growth, it recognizes that the problems of poverty and underdevelopment cannot be solved unless we have a new era of growth in which developing countries play a large role and reap large benefits.

50. Economic growth always brings risk of environmental damage, as it puts increased pressure on environmental resources. But policy makers guided by the concept of sustainable development will necessarily work to assure that growing economies remain firmly attached to their ecological roots and that these roots are protected and nurtured so that they may support growth over the long term. Environmental protection is thus inherent in the concept of sustainable development, as is a focus on the sources of environmental problems rather than the symptoms.

51. No single blueprint of sustainability will be found, as economic and social systems and ecological conditions differ widely among countries. Each nation will have to work out its own concrete policy implications. Yet irrespective of these differences, sustainable development should be seen as a global objective.

52. No country can develop in isolation from others. Hence the pursuit of sustainable development requires a new orientation in international relations. Long-term sustainable growth will require far-reaching changes to produce trade, capital, and technology flows that are more equitable and better synchronized to environmental imperatives.

53. The mechanics of increased international cooperation required to assure sustainable development will vary from sector to sector and in relation to particular institutions. But it is fundamental that the transition to sustainable development be managed jointly by all nations. The unity of human needs requires a functioning multilateral system that respects the

democratic principle of consent and accepts that not only the Earth but also the world is one.

54. In the chapters that follow we examine these issues in greater detail and make a number of specific proposals for responding to the crises of a threatened future. Overall, our report carries a message of hope. But it is hope conditioned upon the establishment of a new era of international cooperation based on the premise that every human being - those here and those who are to come - has the right to life, and to a decent life. We confidently believe that the international community can rise, as it must, to the challenge of securing sustainable human progress.

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CHAPTER 2

TOWARDS SUSTAINABLE DEVELOPMENT

1. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

* the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
* the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

2. Thus the goals of economic and social development must be defined in terms of sustainability in all countries - developed or developing, market-oriented or centrally planned. Interpretations will vary, but must share certain general features and must flow from a consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it.

3. Development involves a progressive transformation of economy and society. A development path that is sustainable in a physical sense could theoretically be pursued even in a rigid social and political setting. But physical sustainability cannot be secured unless development policies pay attention to such considerations as changes in access to resources and in the distribution of costs and benefits. Even the narrow notion of physical sustainability implies a concern for social equity between generations, a concern that must logically be extended to equity within each generation.

I. THE CONCEPT OF SUSTAINABLE DEVELOPMENT

4 The satisfaction of human needs and aspirations is the major objective of development. The essential needs of vast numbers of people in developing countries for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. A world in which poverty and inequity are endemic will always be prone to ecological and other crises. Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life.

5. Living standards that go beyond the basic minimum are sustainable only if consumption standards everywhere have regard

for long-term sustainability. Yet many of us live beyond the world's ecological means, for instance in our patterns of energy use. Perceived needs are socially and culturally determined, and sustainable development requires the promotion of values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire.

6. Meeting essential needs depends in part on achieving full growth potential, and sustainable development clearly requires economic growth in places where such needs are not being met. Elsewhere, it can be consistent with economic growth, provided the content of growth reflects the broad principles of sustainability and non-exploitation of others. But growth by itself is not enough. High levels of productive activity and widespread poverty can coexist, and can endanger the environment. Hence sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all.

7. An expansion in numbers can increase the pressure on resources and slow the rise in living standards in areas where deprivation is widespread. Though the issue is not merely one of population size but of the distribution of resources, sustainable development can only be pursued if demographic developments are in harmony with the changing productive potential of the ecosystem.

8. A society may in many ways compromise its ability to meet the essential needs of its people in the future - by overexploiting resources, for example. The direction of technological developments may solve some immediate problems but lead to even greater ones. Large sections of the population may be marginalized by ill-considered development.

9. Settled agriculture, the diversion of watercourses, the extraction of minerals, the emission of heat and noxious gases into the atmosphere, commercial forests, and genetic manipulation are all examples of human intervention in natural systems during the course of development. Until recently, such interventions were small in scale and their impact limited. Today's interventions are more drastic in scale and impact, and more threatening to life-support systems both locally and globally. This need not happen. At a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings.

10. Growth has no set limits in terms of population or resource use beyond which lies ecological disaster. Different limits hold for the use of energy, materials, water, and land. Many of these will manifest themselves in the form of rising costs and diminishing returns, rather than in the form of any sudden loss of a resource base. The accumulation of knowledge and the development of technology can enhance the carrying capacity of the resource base. But ultimate limits there are, and sustainability requires that long before these are reached, the world must ensure equitable access to the constrained resource and reorient technological efforts to relieve the pressure.

> A communicati ns gap has kept environmental, population, and development assistance groups apart for too long, preventing us from being aware of our common interest and realizing our combined power. Fortunately, the gap is closing. We now know that what unites us is vastly more important than what divides us.
>
> We recognize that poverty, environmental degradation, and population growth are inextricably related and that none of these fundamental problems can be successfully addressed in isolation. We will succeed or fail together.
>
> Arriving at a commonly accepted definition of 'sustainable development' remains a challenge for all the actors in the development process.
>
> 'Making C mmon Cause' U.S.-Based Development, Environment, Population NGOs
> WCED Public Heating
> Ottawa, 26-27 May 1986

11. Economic growth and development obviously involve changes in the physical ecosystem. Every ecosystem everywhere cannot be preserved intact. A forest may be depleted in one part of a watershed and extended elsewhere, which is not a bad thing if the exploitation has been planned and the effects on soil erosion rates, water regimes, and genetic losses have been taken into account. In general, renewable resources like forests and fish stocks need not be depleted provided the rate of use is within the limits of regeneration and natural growth. But most renewable resources are part of a complex and interlinked ecosysten, and maximum sustainable yield must be defined after taking into account system-wide effects of exploitation.

12. As for non-renewable resources, like fossil fuels and minerals, their use reduces the stock available for future generations. But this does not mean that such resources should not be used. In general the rate of depletion should take into account the criticality of that resource, the availability of technologies for minimizing depletion, and the likelihood of substitutes being available. Thus land should not be degraded beyond reasonable recovery. With minerals and fossil fuels, the rate of depletion and the emphasis on recycling and economy of use should be calibrated to ensure that the resource does not run out before acceptable substitutes are available. Sustainable development requires that the rate of depletion of non renewable resources should foreclose as few future options as possible.

13. Development tends to simplify ecosystems and to reduce their diversity of species. And species, once extinct, are not renewable. The loss of plant and animal species can greatly limit the options of future generations; so sustainable development requires the conservation of plant and animal species.

14. So-called free goods like air and water are also resources. The raw materials and energy of production processes

are only partly converted to useful products. The rest comes out as wastes. Sustainable development requires that the adverse impacts on the quality of air, water, and other natural elements are minimized so as to sustain the ecosystem's overall integrity.

15. In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.

II. EQUITY AND THE COMMON INTEREST

16. Sustainable development has been described here in general terms. How are individuals in the real world to be persuaded or made to act in the common interest? The answer lies partly in education, institutional development, and law enforcement. But many problems of resource depletion and environmental stress arise from disparities in economic and political power. An industry may get away with unacceptable levels of air and water pollution because the people who bear the brunt of it are poor and unable to complain effectively. A forest may be destroyed by excessive felling because the people living there have no alternatives or because timber contractors generally have more influence than forest dwellers.

17. Ecological interactions do not respect the boundaries of individual ownership and political jurisdiction. Thus:

* In a watershed, the ways in which a farmer up the slope uses land directly affect run-off on farms downstream.
* The irrigation practices, pesticides, and fertilizers used on one farm affect the productivity of neighbouring ones, especially among small farms.
* The efficiency of a factory boiler determines its rate of emission of soot and noxious chemicals and affects all who live and work around it.
* The hot water discharged by a thermal power plant into a river or a local sea affects the catch of all who fish locally.

18. Traditional social systems recognized some aspects of this interdependence and enforced community control over agricultural practices and traditional rights relating to water, forests, and land. This enforcement of the 'common interest' did not necessarily impede growth and expansion though it may have limited the acceptance and diffusion of technical innovations.

19. Local interdependence has, if anything, increased because of the technology used in modern agriculture and manufacturing. Yet with this surge of technical progress, the growing 'enclosure' of common lands, the erosion of common rights in forests and other resources, and the spread of commerce and production for the market, the responsibilities for decision making are being taken away from both groups and individuals.

> If the desert is growing, forest disappearing, malnutrition increasing, and people in urban areas living in very bad conditions, it is not because we are lacking resources but the kind of policy implemented by our rulers, by the elite group. Denying people rights and peoples' interests is pushing us to a situation where it is only the poverty that has a very prosperous future in Africa. And it is our hope that your Commission, the World Commission, will not overlook these problems of human rights in Africa and will put emphasis on it. Because it is only free people, people who have rights, who are mature and responsible citizens, who then participate in the development and in the protection of the environment.
>
> Speaker from the floor
> WCED Public Hearing
> Nairobi, 23 Sept 1986

This shift is still under way in many developing countries.

20. It is not that there is one set of villains and another of victims. All would be better off if each person took into account the effect of his or her acts upon others. But each is unwilling to assume that others will behave in this socially desirable fashion, and hence all continue to pursue narrow self-interest. Communities or governments can compensate for this isolation through laws, education, taxes, subsidies, and other methods. Well-enforced laws and strict liability legislation can control harmful side effects. Most important, effective participation in decision-making processes by local communities can help them articulate and effectively enforce their common interest.

21. Interdependence is not simply a local phenomenon. Rapid growth in production has extended it to the international plane, with both physical and economic manifestations. There are growing global and regional pollution effects, such as in the more than 200 international river basins and the large number of shared seas.

22. The enforcement of common interest often suffers because areas of political jurisdictions and areas of impact do not coincide. Energy policies in one jurisdiction cause acid precipitation in another. The fishing policies of one state affect the fish catch of another. No supranational authority exists to resolve such issues, and the common interest can only be articulated through international cooperation.

23. In the same way, the ability of a government to control its national economy is reduced by growing international economic interactions. For example, foreign trade in commodities makes issues of carrying capacities and resource scarcities an international concern. (See Chapter 3.) If economic power and the benefits of trade were more equally distributed, common interests would be generally recognized. But the gains from trade are unequally distributed, and patterns of trade in, say,

sugar affect not merely a local sugar-producing sector, but the economies and ecologies of the many developing countries that depend heavily on this product.

24. The search for common interest would be less difficult if all development and environment problems had solutions that would leave everyone better off. This is seldom the case, and there are usually winners and losers. Many problems arise from inequalities in access to resources. An inequitable landownership structure can lead to overexploitation of resources in the smallest holdings, with harmful effects on both environment and development. Internationally, monopolistic control over resources can drive those who do not share in them to excessive exploitation of marginal resources. The differing capacities of exploiters to commandeer 'free' goods - locally, nationally, and internationally - is another manifestation of unequal access to resources. 'Losers' in environment/development conflicts include those who suffer more than their fair share of the health, property, and ecosystem damage costs of pollution.

25. As a system approaches ecological limits, inequalities sharpen. Thus when a watershed deteriorates, poor farmers suffer more because they cannot afford the same anti-erosion measures as richer farmers. When urban air quality deteriorates, the poor, in their more vulnerable areas, suffer more health damage than the rich, who usually live in more pristine neighbourhoods. When mineral resources become depleted, late-comers to the industrialization process lose the benefits of low-cost supplies. Globally, wealthier nations are better placed financially and technologically to cope with the effects of possible climatic change.

26. Hence, our inability to promote the common interest in sustainable development is often a product of the relative neglect of economic and social justice within and amongst nations.

III. STRATEGIC IMPERATIVES

27. The world must quickly design strategies that will allow nations to move from their present, often destructive, processes of growth and development onto sustainable development paths. This will require policy changes in all countries, with respect both to their own development and to their impacts on other nations' development possibilities. (This chapter concerns itself with national strategies. The required reorientation in international economic relations is dealt with in Chapter 3.)

28. Critical objectives for environment and development policies that follow from the concept of sustainable development include:

* reviving growth;
* changing the quality of growth;
* meeting essential needs for jobs, food, energy, water, and sanitation;

* ensuring a sustainable level of population;
* conserving and enhancing the resource base;
* reorienting technology and managing risk; and
* merging environment and economics in decision making.

1. Reviving Growth

29. As indicated earlier, development that is sustainable has to address the problem of the large number of people who live in absolute poverty - that is, who are unable to satisfy even the most basic of their needs. Poverty reduces people's capacity to use resources in a sustainable manner; it intensifies pressure on the environment. Most such absolute poverty is in developing countries; in many, it has been aggravated by the economic stagnation of the 1980s. A necessary but not a sufficient condition for the elimination of absolute poverty is a relatively rapid rise in per capita incomes in the Third World. It is therefore essential that the stagnant or declining growth trends of this decade be reversed.

30. While attainable growth rates will vary, a certain minimum is needed to have any impact on absolute poverty. It seems unlikely that, taking developing countries as a whole, these objectives can be accomplished with per capita income growth of under 3 per cent. (See Box 2-1.) Given current population growth rates, this would require overall national income growth of around 5 per cent a year in the developing economies of Asia, 5.5 per cent in Latin America, and 6 per cent in Africa and West Asia.

31. Are these orders of magnitude attainable? The record in South and East Asia over the past quarter-century and especially over the last five years suggests that 5 per cent annual growth can be attained in most countries, including the two largest, India and China. In Latin America, average growth rates on the order of 5 per cent were achieved during the 1960s and 1970s, but fell well below that in the first half of this decade, mainly because of the debt crisis.[1/] A revival of Latin American growth depends on the resolution of this crisis. In Africa, growth rates during the 1960s and 1970s were around 4-4.5 per cent, which at current rates of population growth would mean per capita income growth of only a little over 1 per cent.[2/] Moreover, during the 1980s, growth nearly halted and in two-thirds of the countries per capita income declined.[3/] Attaining a minimum level of growth in Africa requires the correction of short-term imbalances, and also the removal of deep-rooted constraints on the growth process.

32. Growth must be revived in developing countries because that is where the links between economic growth, the alleviation of poverty, and environmental conditions operate most directly. Yet developing countries are part of an interdependent world economy; their prospects also depend on the levels and patterns of growth in industrialized nations. The medium-term prospects for industrial countries are for growth of 3-4 per cent, the minimum that international financial institutions consider necessary if these countries are going to play a part in expanding the world

BOX 2-1

Growth, Redistribution, and Poverty

1. The poverty line is that level of income below which an individual or household cannot afford on a regular basis the necessities of life. The percentage of the population below that line will depend on per capita national income and the manner in which it is distributed. How quickly can a developing country expect to eliminate absolute poverty? The answer will vary from country to country, but much can be learned from a typical case.
2. Consider a nation in which half the population lives below the poverty line and where the distribution of household incomes is as follows: the top one-fifth of households have 50 per cent of total income, the next fifth have 20 per cent, the next fifth have 14 per cent, the next fifth have 9 per cent, and the bottom fifth have just 7 per cent. This is a fair representation of the situation in many low-income developing countries.
3. In this case, if the income distribution remains unchanged, per capita national income would have to double before the poverty ratio drops from 50 to 10 per cent. If income is redistributed in favour of the poor, this reduction can occur sooner. Consider the case in which 25 per cent of the incremental income of the richest one-fifth of the population is redistributed equally to the others.
4. The assumptions here about redistribution reflect three judgements. First, in most situations redistributive policies can only operate on increases in income. Second, in low-income developing countries the surplus that can be skimmed off for redistribution is available only from the wealthier groups. Third, redistributive policies cannot be so precisely targeted that they deliver benefits only to those who are below the poverty line, so some of the benefits will accrue to those who are just a little above it.
5. The number of years required to bring the poverty ratio down from 50 to 10 per cent ranges from:
   * 18-24 years if per capita income grows at 3 per cent,
   * 26-36 years if it grows at 2 per cent, and
   * 51-70 years if it grows only at 1 per cent.

   In each case, the shorter time is associated with the redistribution of 25 per cent of the incremental income of the richest fifth of the population and the longer period with no redistribution.
6. So with per capita national income growing only at 1 per cent a year, the time required to eliminate absolute poverty would stretch well into the next century. If, however, the aim is to ensure that the world is well on its way towards sustainable development by the beginning of the next century, it is necessary to aim at a minimum of 3 per cent per capita national income growth and to pursue vigorous redistributive policies.

economy. Such growth rates could be environmentally sustainable if industrialized nations can continue the recent shifts in the content of their growth towards less material- and energy-intensive activities and the improvement of their efficiency in using materials and energy.

33. As industrialized nations use less materials and energy, however, they will provide smaller markets for commodities and minerals from the developing nations. Yet if developing nations focus their efforts upon eliminating poverty and satisfying essential human needs, then domestic demand will increase for both agricultural products and manufactured goods and some services. Hence the very logic of sustainable development implies an internal stimulus to Third World growth.

34. Nonetheless, in large numbers of developing countries markets are very small; and for all developing countries high export growth, especially of non-traditional items, will also be necessary to finance imports, demand for which will be generated by rapid development. Thus a reorientation of international economic relations will be necessary for sustainable development, as discussed in Chapter 3.

2. Changing the Quality of Growth

35. Sustainable development involves more than growth. It requires a change in the content of growth, to make it less material- and energy-intensive and more equitable in its impact. These changes are required in all countries as part of a package of measures to maintain the stock of ecological capital, to improve the distribution of income, and to reduce the degree of vulnerability to economic crises.

36. The process of economic development must be more soundly based upon the realities of the stock of capital that sustains it. This is rarely done in either developed or developing countries. For example, income from forestry operations is conventionally measured in terms of the value of timber and other products extracted, minus the costs of extraction. The costs of regenerating the forest are not taken into account, unless money is actually spent on such work. Thus figuring profits from logging rarely takes full account of the losses in future revenue incurred through degradation of the forest. Similar incomplete accounting occurs in the exploitation of other natural resources, especially in the case of resources that are not capitalized in enterprise or national accounts: air, water, and soil. In all countries, rich or poor, economic development must take full account in its measurements of growth of the improvement or deterioration in the stock of natural resources.

37. Income distribution is one aspect of the quality of growth, as described in the preceding section, and rapid growth combined with deteriorating income distribution may be worse than slower growth combined with redistribution in favour of the poor. For instance, in many developing countries the introduction of large-scale commercial agriculture may produce revenue rapidly, but may also dispossess a large number of small farmers and make

> People have acquired, often for the first time in history, both an idea of their relative poverty and a desire to emerge from it and improve the quality of their lives. As people advance materially, and eat and live better, what were once luxuries tend to be regarded as necessities. The net result is that the demand for food, raw materials, and power increases to an even greater degree than the population. As demand increases, a greater and greater strain is put on the finite area of the world's land to produce the products needed.
>
> Dr. I. P. Garbouchev
> Bulgarian Academy of Sciences
> WCED Public Hearing
> Moscow, 11 Dec 1986

income distribution more inequitable. In the long run, such a path may not be sustainable; it impoverishes many people and can increase pressures on the natural resource base through overcommercialized agriculture and through the marginalization of subsistence farmers. Relying more on smallholder cultivation may be slower at first, but more easily sustained over the long term.

38. Economic development is unsustainable if it increases vulnerability to crises. A drought may force farmers to slaughter animals needed for sustaining production in future years. A drop in prices may cause farmers or other producers to overexploit natural resources to maintain incomes. But vulnerability can be reduced by using technologies that lower production risks, by choosing institutional options that reduce market fluctuations, and by building up reserves, especially of food and foreign exchange. A development path that combines growth with reduced vulnerability is more sustainable than one that does not.

39. Yet it is not enough to broaden the range of economic variables taken into account. Sustainability requires views of human needs and well-being that incorporate such non-economic variables as education and health enjoyed for their own sake, clean air and water, and the protection of natural beauty. It must also work to remove disabilities from disadvantaged groups, many of whom live in ecologically vulnerable areas, such as many tribal groups in forests, desert nomads, groups in remote hill areas, and indigenous peoples of the Americas and Australasia

40. Changing the quality of growth requires changing our approach to development efforts to take account of all of their effects. For instance, a hydropower project should not be seen merely as a way of producing more electricity; its effects upon the local environment and the livelihood of the local community must be included in any balance sheets. Thus the abandonment of a hydro project because it will disturb a rare ecological system could be a measure of progress, not a setback to development.[4/] Nevertheless, in some cases, sustainability considerations will involve a rejection of activities that are financially attractive in the short run.

41. Economic and social development can and should be mutually reinforcing. Money spent on education and health can raise human productivity. Economic development can accelerate social development by providing opportunities for underprivileged groups or by spreading education more rapidly.

3. Meeting Essential Human Needs

42. The satisfaction of human needs and aspirations is so obviously an objective of productive activity that it may appear redundant to assert its central role in the concept of sustainable development. All too often poverty is such that people cannot satisfy their needs for survival and well-being even if goods and services are available. At the same time, the demands of those not in poverty may have major environmental consequences.

43. The principal development challenge is to meet the needs and aspirations of an expanding developing world population. The most basic of all needs is for a livelihood: that is, employment. Between 1985 and 2000 the labour force in developing countries will increase by nearly 900 million, and new livelihood opportunities will have to be generated for 60 million persons every year.[5/] The pace and pattern of economic development have to generate sustainable work opportunities on this scale and at a level of productivity that would enable poor households to meet minimum consumption standards.

44. More food is required not merely to feed more people but to attack undernourishment. For the developing world to eat, person for person, as well as the industrial world by the year 2000, annual increases of 5.0 per cent in calories and 5.8 per cent in proteins are needed in Africa; of 3.4 and 4.0 per cent, respectively, in Latin America; and of 3.5 and 4.5 per cent in Asia.[6/] Foodgrains and starchy roots are the primary sources of calories, while proteins are obtained primarily from products like milk, meat, fish, pulses, and oil-seeds.

45. Though the focus at present is necessarily on staple foods, the projections given above also highlight the need for a high rate of growth of protein availability. In Africa, the task is particularly challenging given the recent declining per capita food production and the current constraints on growth. In Asia and Latin America, the required growth rates in calorie and protein consumption seem to be more readily attainable. But increased food production should not be based on ecologically unsound production policies and compromise long-term prospects for food security.

46. Energy is another essential human need, one that cannot be universally met unless energy consumption patterns change. The most urgent problem is the requirements of poor Third World households, which depend mainly on fuelwood. By the turn of the century, 3 billion people may live in areas where wood is cut faster than it grows or where fuelwood is extremely scarce.[7/] Corrective action would both reduce the drudgery of collecting wood over long distances and preserve the ecological base. The

> In the developing world, mostly in the Third World, we realize that the main problem we have is that we do not have employment opportunities, and most of these people who are unemployed move from rural areas and they migrate into the cities and those who remain behind always indulge in processes - for example charcoal burning - and all this leads to deforestation. So maybe the environmental organizations should step in and look for ways to prevent this kind of destruction.
>
> Kennedy Njiro
> Student, Kenya Polytechnic
> WCED Public Hearing
> Nairobi, 23 Sept 1986

minimum requirements for cooking fuel in most developing countries appear to be on the order of 250 kilogrammes of coal equivalent per capita per year. This is a fraction of the household energy consumption in industrial countries.

47. The linked basic needs of housing, water supply, sanitation, and health care are also environmentally important. Deficiencies in these areas are often visible manifestations of environmental stress. In the Third World, the failure to meet these key needs is one of the major causes of many communicable diseases such as malaria, gastro-intestinal infestations, cholera, and typhoid. Population growth and the drift into cities threaten to make these problems worse. Planners must find ways of relying more on supporting community initiatives and self-help efforts and on effectively using low-cost technologies. See Chapter 9.

4. Ensuring a Sustainable Level of Population

48. The sustainability of development is intimately linked to the dynamics of population growth. The issue, however, is not simply one of global population size. A child born in a country where levels of material and energy use are high places a greater burden on the Earth's resources than a child born in a poorer country. A similar argument applies within countries. Nonetheless, sustainable development can be pursued more easily when population size is stabilized at a level consistent with the productive capacity of the ecosystem.

49. In industrial countries, the overall rate of population growth is under 1 per cent, and several countries have reached or are approaching zero population growth. The total population of the industrialized world could increase from its current 1.2 billion to about 1.4 billion in the year 2025.[8/]

50. The greater part of global population increase will take place in developing countries, where the 1985 population of 3.7 billion may increase to 6.8 billion by 2025.[9/] The Third World does not have the option of migration to 'new' lands, and the time available for adjustment is much less than industrial countries had. Hence the challenge now is to quickly lower

population growth rates, especially in regions such as Africa, where these rates are increasing.

51. Birth rates declined in industrial countries largely because of economic and social development. Rising levels of income and urbanization and the changing role of women all played important roles. Similar processes are now at work in developing countries. These should be recognized and encouraged. Population policies should be integrated with other economic and social development programmes - female education, health care, and the expansion of the livelihood base of the poor. But time is short, and developing countries will also have to promote direct measures to reduce fertility, to avoid going radically beyond the productive potential to support their populations. In fact, increased access to family planning services is itself a form of social development that allows couples, and women in particular, the right to self-determination.

52. Population growth in developing countries will remain unevenly distributed between rural and urban areas. UN projections suggest that by the first decade of the next century, the absolute size of rural populations in most developing countries will start declining. Nearly 90 per cent of the increase in the developing world will take place in urban areas, the population of which is expected to rise from 1.15 billion in 1985 to 3.[illegible] billion in 2025.[10/] The increase will be particularly marked in Africa and, to a lesser extent, in Asia.

53. Developing-country cities are growing much faster than the capacity of authorities to cope. Shortages of housing, water, sanitation, and mass transit are widespread. A growing proportion of city-dwellers live in slums and shanty towns, many of them exposed to air and water pollution and to industrial and natural hazards. Further deterioration is likely, given that most urban growth will take place in the largest cities. Thus more manageable cities may be the principal gain from slower rates of population growth.

54. Urbanization is itself part of the development process. The challenge is to manage the process so as to avoid a severe deterioration in the quality of life. Thus the development of smaller urban centres needs to be encouraged to reduce pressures in large cities. Solving the impending urban crisis will require the promotion of self-help housing and urban services by and for the poor, and a more positive approach to the role of the informal sector, supported by sufficient funds for water supply, sanitation, and other services. See Chapter 9.

5. Conserving and Enhancing the Resource Base

55. If needs are to be met on a sustainable basis the Earth's natural resource base must be conserved and enhanced. Major changes in policies will be needed to cope with the industrial world's current high levels of consumption, the increases in consumption needed to meet minimum standards in developing countries, and expected population growth. However, the case for the conservation of nature should not rest only with development

goals. It is part of our moral obligation to other living beings and future generations.

56. Pressure on resources increases when people lack alternatives. Development policies must widen people's options for earning a sustainable livelihood, particularly for resource-poor households and in areas under ecological stress. In a hilly area, for instance, economic self-interest and ecology can be combined by helping farmers shift from grain to tree crops by providing them with advice, equipment, and marketing assistance. Programmes to protect the incomes of farmers, fishermen, and foresters against short-term price declines may decrease their need to overexploit resources.

57. The conservation of agricultural resources is an urgent task because in many parts of the world cultivation has already been extended to marginal lands, and fishery and forestry resources have been overexploited. These resources must be conserved and enhanced to meet the needs of growing populations. Land use in agriculture and forestry must be based on a scientific assessment of land capacity, and the annual depletion of topsoil, fish stock, or forest resources must not exceed the rate of regeneration.

58. The pressures on agricultural land from crop and livestock production can be partly relieved by increasing productivity. But short-sighted, short-term improvements in productivity can create different forms of ecological stress, such as the loss of genetic diversity in standing crops, salinization and alkalization of irrigated lands, nitrate pollution of ground-water, and pesticide residues in food. Ecologically more benign alternatives are available. Future increases in productivity, in both developed and developing countries, should be based on the better controlled application of water and agrochemicals, as well as on more extensive use of organic manures and non-chemical means of pest control. These alternatives can be promoted only by an agricultural policy based on ecological realities. (See Chapter 5.)

59. In the case of fisheries and tropical forestry, we rely largely on the exploitation of the naturally available stocks. The sustainable yield from these stocks may well fall short of demand. Hence it will be necessary to turn to methods that produce more fish, fuelwood, and forest products under controlled conditions. Substitutes for fuelwood can be promoted.

60. The ultimate limits to global development are perhaps determined by the availability of energy resources and by the biosphere's capacity to absorb the by-products of energy use.[11/] These energy limits may be approached far sooner than the limits imposed by other material resources. First, there are the supply problems: the depletion of oil reserves, the high cost and environmental impact of coal mining, and the hazards of nuclear technology. Second, there are emission problems, most notably acid pollution and carbon dioxide build-up leading to global warming.

I work with rubber trees in the Amazon. I am here to speak about the tropical forest.

We live from this forest they want to destroy. And we want to take this opportunity of having so many people here gathered with the same objective in mind to defend our habitat, the conservation of forest, of tropical forest.

In my area, we have about 14-15 native products that we extract from the forest, besides all the other activities we have. So I think this must be preserved. Because it is not only with cattle, not only with pasture lands, and not only with highways that we will be able to develop the Amazon.

When they think of falling trees, they always think of building roads and the roads bring destruction under a mask called progress. Let us put this progress where the lands have already been deforested, where it is idle of labour and where we have to find people work, and where we have to make the city grow. But let us leave those who want to live in the forest, who want to keep it as it is

We have nothing written. I don't have anything that was created in somebody's office. There is no philosophy. It is just the real truth, because this is what our life is.

Jaime Da Silva Araujo
Rubber Tapper Council
WCED Public Hearing
Sao Paulo, 28-29 Oct 1985

61. Some of these problems can be met by increased use of renewable energy sources. But the exploitation of renewable sources such as fuelwood and hydropower also entails ecological problems. Hence sustainability requires a clear focus on conserving and efficiently using energy.

62. Industrialized countries must recognize that their energy consumption is polluting the biosphere and eating into scarce fossil fuel supplies. Recent improvements in energy efficiency and a shift towards less energy-intensive sectors have helped limit consumption. But the process must be accelerated to reduce per capita consumption and encourage a shift to non-polluting sources and technologies. The simple duplication in the developing world of industrial countries' energy use patterns is neither feasible nor desirable. Changing these patterns for the better will call for new policies in urban development, industry location, housing design, transportation systems, and the choice of agricultural and industrial technologies.

63. Non-fuel mineral resources appear to pose fewer supply problems. Studies done before 1980 that assumed an exponentially growing demand did not envisage a problem until well into the next century.[12/] Since then, world consumption of most metals has remained nearly constant, which suggests that the exhaustion of non-fuel minerals is even more distant. The history of technological developments also suggests that industry can adjust to scarcity through greater efficiency in use, recycling, and substitution. More immediate needs include modifying the pattern

> Indigenous peoples are the base of what I guess could be called the environmental security system. We are the gate-keepers of success or failure to husband our resources. For many of us, however, the last few centuries have meant a major loss of control over our lands and waters. We are still the first to know about changes in the environment, but we are now the last to be asked or consulted.
>
> We are the first to detect when the forests are being threatened, as they are under the slash and grab economics of this country. And we are the last to be asked about the future of our forests. We are the first to feel the pollution of our waters, as the Ojibway peoples of my own homelands in northern Ontario will attest. And, of course, we are the last to be consulted about how, when, and where developments should take place in order to assure continuing harmony for the seventh generation.
>
> The most we have learned to expect is to be compensated, always too late and too little. We are seldom asked to help avoid the need for compensation by lending our expertise and our consent to development.
>
> Louis Bruyere
> President, Native Council of Canada
> WCED Public Hearing
> Ottawa, 26-27 May 1986

of world trade in minerals to allow exporters a higher share in the value added from mineral use, and improving the access of developing countries to mineral supplies, as their demands increase.

64. The prevention and reduction of air and water pollution will remain a critical task of resource conservation. Air and water quality come under pressure from such activities as fertilizer and pesticide use, urban sewage, fossil fuel burning, the use of certain chemicals, and various other industrial activities. Each of these is expected to increase the pollution load on the biosphere substantially, particularly in developing countries. Cleaning up after the event is an expensive solution. Hence all countries need to anticipate and prevent these pollution problems, by, for instance, enforcing emission standards that reflect likely long-term effects, promoting low-waste technologies, and anticipating the impact of new products, technologies, and wastes.

6. Reorienting Technology and Managing Risk

65. The fulfilment of all these tasks will require the reorientation of technology - the key link between humans and nature. First, the capacity for technological innovation needs to be greatly enhanced in developing countries so that they can respond more effectively to the challenges of sustainable development. Second, the orientation of technology development must be changed to pay greater attention to environmental factors.

66. The technologies of industrial countries are not always suited or easily adaptable to the socio-economic and environmental conditions of developing countries. To compound the problem, the bulk of world research and development addresses few of the pressing issues facing these countries, such as arid-land agriculture or the control of tropical diseases. Not enough is being done to adapt recent innovations in materials technology, energy conservation, information technology, and biotechnology to the needs of developing countries. These gaps must be covered by enhancing research, design, development, and extension capabilities in the Third World.

67. In all countries, the processes of generating alternative technologies, upgrading traditional ones, and selecting and adapting imported technologies should be informed by environmental resource concerns. Most technological research by commercial organizations is devoted to product and process innovations that have market value. Technologies are needed that produce 'social goods', such as improved air quality or increased product life, or that resolve problems normally outside the cost calculus of individual enterprises, such as the external costs of pollution or waste disposal.

68. The role of public policy is to ensure, through incentives and disincentives, that commercial organizations find it worthwhile to take fuller account of environmental factors in the technologies they develop. (See Chapter 8.) Publicly funded research institutions also need such direction, and the objectives of sustainable development and environmental protection must be built into the mandates of the institutions that work in environmentally sensitive areas.

69. The development of environmentally appropriate technologies is closely related to questions of risk management. Such systems as nuclear reactors, electric and other utility distribution networks, communication systems, and mass transportation are vulnerable if stressed beyond a certain point. The fact that they are connected through networks tends to make them immune to small disturbances but more vulnerable to unexpected disruptions that exceed a finite threshold. Applying sophisticated analyses of vulnerabilities and past failures to technology design, manufacturing standards, and contingency plans in operations can make the consequences of a failure or accident much less catastrophic.

70. The best vulnerability and risk analysis has not been applied consistently across technologies or systems. A major purpose of large system design should be to make the consequences of failure or sabotage less serious. There is thus a need for new techniques and technologies - as well as legal and institutional mechanisms - for safety design and control, accident prevention, contingency planning, damage mitigation, and provision of relief.

71. Environmental risks arising from technological and developmental decisions impinge on individuals and areas that have little or no influence on those decisions. Their interests must be taken into account. National and international

institutional mechanisms are needed to assess potential impacts of new technologies before they are widely used, in order to ensure that their production, use, and disposal do not overstress environmental resources. Similar arrangements are required for major interventions in natural systems, such as river diversion or forest clearance. In addition, liability for damages from unintended consequences must be strengthened and enforced.

7. Merging Environment and Economics in Decision Making

72. The common theme throughout this strategy for sustainable development is the need to integrate economic and ecological considerations in decision making. They are, after all, integrated in the workings of the real world. This will require a change in attitudes and objectives and in institutional arrangements at every level.

73. Economic and ecological concerns are not necessarily in opposition. For example, policies that conserve the quality of agricultural land and protect forests improve the long-term prospects for agricultural development. An increase in the efficiency of energy and material use serves ecological purposes but can also reduce costs. But the compatibility of environmental and economic objectives is often lost in the pursuit of individual or group gains, with little regard for the impacts on others, with a blind faith in science's ability to find solutions, and in ignorance of the distant consequences of today's decisions. Institutional rigidities add to this myopia.

74. One important rigidity is the tendency to deal with one industry or sector in isolation, failing to recognize the importance of intersectoral linkages. Modern agriculture uses substantial amounts of commercially produced energy and large quantities of industrial products. At the same time, the more traditional connection - in which agriculture is a source of raw materials for industry - is being diluted by the widening use of synthetics. The energy-industry connection is also changing, with a strong tendency towards a decline in the energy intensity of industrial production in industrial countries. In the Third World, however, the gradual shift of the industrial base towards the basic material-producing sectors is leading to an increase in the energy intensity of industrial production.

75. These intersectoral connections create patterns of economic and ecological interdependence rarely reflected in the ways in which policy is made. Sectoral organizations tend to pursue sectoral objectives and to treat their impacts on other sectors as side effects, taken into account only if compelled to do so. Hence impacts on forests rarely worry those involved in guiding public policy or business activities in the fields of energy, industrial development, crop husbandry, or foreign trade. Many of the environment and development problems that confront us have their roots in this sectoral fragmentation of responsibility. Sustainable development requires that such fragmentation be overcome.

> The issues that have been brought forward here, I think, are wide-ranging and maybe you know, maybe you don't know, the answers to all those issues. But at least by hearing all those questions, stories, all these expressions that have been put forward, at least you could have some idea.
>
> You don't know the answers nor the solutions, but you could suggest the way to solve many problems and this is by suggesting either to governments, or the UN, or international agencies, to solve any problem the best way: that is to include those with direct interests in it. The beneficiaries, as well as the victims of any development issue should be included, should be heard.
>
> I think that is the one thing, maybe that all of us are hearing here, or expecting: that in every development planning or development issue as much as possible to listen and to include, to consult the people concerned. If that is taken care of, at least one step of the problem is resolved.
>
> Ismid Hadad
> Chief Editor, Prisma
> WCED Public Hearing
> Jakarta, 26 March 1985

76. Sustainability requires the enforcement of wider responsibilities for the impacts of decisions. This requires changes in the legal and institutional frameworks that will enforce the common interest. Some necessary changes in the legal framework start from the proposition that an environment adequate for health and well-being is essential for all human beings - including future generations. Such a view places the right to use public and private resources in its proper social context and provides a goal for more specific measures.

77. The law alone cannot enforce the common interest. It principally needs community knowledge and support, which entails greater public participation in the decisions that affect the environment. This is best secured by decentralizing the management of resources upon which local communities depend, and giving these communities an effective say over the use of these resources. It will also require promoting citizens' initiatives, empowering people's organizations, and strengthening local democracy.[13/]

78. Some large-scale projects, however, require participation on a different basis. Public inquiries and hearings on the development and environment impacts can help greatly in drawing attention to different points of view. Free access to relevant information and the availability of alternative sources of technical expertise can provide an informed basis for public discussion. When the environmental impact of a proposed project is particularly high, public scrutiny of the case should be mandatory and, wherever feasible, the decision should be subject to prior public approval, perhaps by referendum.

It has not been too difficult to push the environment lobby of the North and the development lobby of the South together. And there is now in fact a blurring of the distinction between the two, so they are coming to have a common consensus around the theme of sustainable development.

The building blocks are there. Environmental concern is common to both sides. Humanitarian concern is common to both sides. The difference lies in the methods of each and the degree to which each side tries to achieve its own economic interest through the development assistance process.

The time is right for bridging this gap for some very pragmatic political reasons. First of all, the people of the North do not want to see their taxes wasted. Secondly, they do not want to see growing poverty, and they obviously care for the environment, be it the environment of the North, where they live, or of the South. And the majority of people in the South do not want short-term overpass solutions.

In effect, there is a political community of interest, North and South, in the concept of sustainable development that you can build upon.

Richard Sandbrook
International Institute for
Environment and Development
WCED Public Hearing
Oslo, 24-25 June 1985

79. Changes are also required in the attitudes and procedures of both public and private-sector enterprises. Moreover, environmental regulation must move beyond the usual menu of safety regulations, zoning laws, and pollution control enactments; environmental objectives must be built into taxation, prior approval procedures for investment and technology choice, foreign trade incentives, and all components of development policy.

80. The integration of economic and ecological factors into the law and into decision making systems within countries has to be matched at the international level. The growth in fuel and material use dictates that direct physical linkages between ecosystems of different countries will increase. Economic interactions through trade, finance, investment, and travel will also grow and heighten economic and ecological interdependence. Hence in the future, even more so than now, sustainable development requires the unification of economics and ecology in international relations, as discussed in the next chapter.

IV. CONCLUSION

81. In its broadest sense, the strategy for sustainable development aims to promote harmony among human beings and between humanity and nature. In the specific context of the development and environment crises of the 1980s, which current

national and international political and economic institutions have not and perhaps cannot overcome, the pursuit of sustainable development requires:

* a political system that secures effective citizen participation in decision making,
* an economic system that is able to generate surpluses and technical knowledge on a self-reliant and sustained basis,
* a social system that provides for solutions for the tensions arising from disharmonious development,
* a production system that respects the obligation to preserve the ecological base for development,
* a technological system that can search continuously for new solutions,
* an international system that fosters sustainable patterns of trade and finance, and
* an administrative system that is flexible and has the capacity for self-correction.

82. These requirements are more in the nature of goals that should underlie national and international action on development. What matters is the sincerity with which these goals are pursued and the effectiveness with which departures from them are corrected.

Footnotes

1/ UNCTAD, Handbook of International Trade and Development Statistics 1985 Supplement (New York: 1985).

2/ Ibid.

3/ Department of International Economic and Social Affairs (DIESA), Doubling Development Finance, Meeting a Global Challenge, Views and Recommendations of the Committee for Development Planning (New York: UN, 1986).

4/ One example of such a decision to forgo a developmental benefit in the interest of conservation is provided by the dropping of the Silent Valley Hydro project in India

5/ Based on data from World Bank, World Development Report 1984 (New York: Oxford University Press, 1984).

6/ Based on per capita consumption data from FAO, Production Yearbook 1984 (Rome: 1985) and population projections from DIESA, World Population Prospects: Estimates and Projections as Assessed in 1984 (New York: UN, 1986).

7/ FAO, Fuelwood Supplies in the Developing Countries, Forestry Paper No. 42 (Rome: 1983).

8/ DIESA, World Population Prospects, op. cit.

9/ Ibid.

10/ Ibid.

11/ W. Häfele and W. Sassin, 'Resources and Endowments, An Outline of Future Energy Systems', in P.W. Hemily and M.N. Ozdas (eds.), Science and Future Choice (Oxford: Clarendon Press, 1979).

12/ See, for example, OECD, Interfutures: Facing the Future (Paris: 1979) and Council on Environmental Quality and U.S. Department of State, The Global 2000 Report to the President: Entering the Twenty-First Century, The Technical Report, Vol. Two (Washington, DC: U. S. Government Printing Office, 1980).

13/ See 'For Municipal Initiative and Citizen Power', in INDERENA, La Campana Verde y los Concejos Verdes (Bogotá, Colombia: 1985).

CHAPTER 3

THE ROLE OF THE INTERNATIONAL ECONOMY

1. Through the ages, people have reached beyond their own borders to obtain essential, valued, or exotic materials. Today's surer communications and larger trade and capital movements have greatly enlarged this process, quickened its pace, and endowed it with far-reaching ecological implications. Thus the pursuit of sustainability requires major changes in international economic relations.

I. THE INTERNATIONAL ECONOMY, THE ENVIRONMENT, AND DEVELOPMENT

2. Two conditions must be satisfied before international economic exchanges can become beneficial for all involved. The sustainability of ecosystems on which the global economy depends must be guaranteed. And the economic partners must be satisfied that the basis of exchange is equitable; relationships that are unequal and based on dominance of one kind or another are not a sound and durable basis for interdependence. For many developing countries, neither condition is met.

3. Economic and ecological links between nations have grown rapidly. This widens the impact of the growing inequalities in the economic development and strength of nations. The asymmetry in international economic relations compounds the imbalance, as developing nations are generally influenced by - but unable to influence - international economic conditions.

4. International economic relationships pose a particular problem for poor countries trying to manage their environments, since the export of natural resources remains a large factor in their economies, especially those of the least developed nations. The instability and adverse price trends faced by most of these countries make it impossible for them to manage their natural resource bases for sustained production. The rising burden of debt servicing and the decline in new capital flows intensify those forces that lead to environmental deterioration and resource depletion occurring at the expense of long-term development.

5. The trade in tropical timber, for example, is one factor underlying tropical deforestation. Needs for foreign exchange encourage many developing countries to cut timber faster than forests can be regenerated. This overcutting not only depletes the resource that underpins the world timber trade, it causes the loss of forest-based livelihoods, increases soil erosion and downstream flooding, and accelerates the loss of species and

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BOX 3-1

Cotton Produced for Export in the Sahel

In 1983-84, as drought and hunger were taking hold in the Sahel region of Africa, five Sahelian nations - Burkina Faso, Chad, Mali, Niger, and Senegal - produced record amounts of cotton. They harvested 154 million tons of cotton fibre, up from 22.7 million tons in 1961-62. The Sahel as a whole set another record in 1984: It imported a record 1.77 million tons of cereals, up from 200,000 tons yearly in the early 1960s. Over the period that Sahelian cotton harvests were steadily rising, world cotton prices were steadily falling in real terms. These figures do not suggest that Sahelian nations should plough up all cotton to plant sorghum and millet. But the fact that farmers who can grow cotton cannot grow enough food to feed themselves suggests that cash crops are getting too much attention and food crops too little.

Source: J. Giri, 'Retrospective de l'Economie Sahelienne', Club du Sahel, Paris, 1984.

genetic resources. International trade patterns can also encourage the unsustainable development policies and practices that have steadily degraded the croplands and rangelands in the drylands of Asia and Africa; an example of that is provided by the growth of cotton production for export in the Sahel region. (See Box 3-1.)

6. Growth in many developing countries also requires external capital inflows. Without reasonable flows, the prospect for any improvements in living standards is bleak. As a result, the poor will be forced to overuse the environment to ensure their own survival. Long-term development thus becomes much harder, and in some cases impossible. Yet trends in the movement of capital are worrying. Net resource flows to developing countries have fallen in real terms; in aggregate, there is now actually an outflow. (See Table 3-1.) The increase of international capital flows to developing countries expected over the rest of the 1980s is only half that thought necessary to restore growth to levels where a reduction in poverty can occur.[1/]

7. A mere increase in flows of capital to developing countries will not necessarily contribute to development. Domestic efforts are of paramount importance. More external funding is also required, but it must come in ways that are sensitive to the environmental impacts. The point is that the reduction of poverty itself is a precondition for environmentally sound development. And resource flows from rich to poor - flows improved both qualitatively and quantitatively - are a precondition for the eradication of poverty.

...

TABLE 3-1
Net Transfer of Resources to Capital-Importing Developing Countries

	1979	1980	1981	1982	1983	1984	1985
	(billion dollars)						
Net Transfer from Loans (all IDCs)*	30.7	30.6	27.7	0.8	-8.6	-22.0	-41.0
Net Transfer from all Resource Flows (all IDCs)**	41.4	39.3	41.5	10.4	-0.3	-12.5	-31.0
Net Transfer from all Resource Flows (to Latin America)	15.6	11.9	11.4	-16.7	-25.9	-23.2	-30.0

* Net transfers on loans are net capital flows minus net interest paid. All loans, official and private, short and long-term, are included together with IMF credit

** Total net resource flows relate to net loan transfers, grants and net direct investment (less net direct investment income)

Source: UN, World Economic Survey 1986 (New York: 1986).

II. DECLINE IN THE 1980s

8. The pressures of poverty and rising populations make it enormously difficult for developing countries to pursue environmentally sound policies even in the best of circumstances. But when international economic conditions are bad, the problems can become unmanageable. During the 1980s, economic growth rates declined sharply or even turned negative in much of the Third World, particularly in Africa and Latin America. Over the five years from 1981 to 1985, population growth outstripped economic growth in most developing countries.[2/]

9. Deteriorating terms of trade, rising debt service obligations, stagnating flows of aid, and growing protectionism in the developed market economies caused severe external payment problems. The increased cost of foreign borrowing, at a time

...

> We know that the world lives through an international finance crisis, which increases the misery and the poverty in the Third World and we sacrifice even more our environment, though we know that this situation can be reversed, if we can use correctly new technology and knowledge. But for this we have to find a new ethic that will include the relationship between man and nature above all.
>
> Sergio Dialetachi
> Speaker from the floor
> WCED Public Hearing
> Sao Paulo, 28-29 Oct 1985

when exports were depressed, also helped to plunge many developing countries into debt crises. Austerity programmes laid down by the IMF as a prerequisite for extending credit to meet short-term balance-of-payments needs became particularly onerous after the debt crisis. Growth was cut back and many social objectives fell by the wayside, including those having to do with employment, health, education, environment, and human settlements.

10. This was a radical change from the 1960s and 1970s. Then it was rapid economic growth that was seen as an ecological threat. Now it is recession, austerity, and falling living standards. The decline of the 1980s has aggravated pressures on the environment in several ways:

* Austerity measures and general recessionary conditions have brought sharp declines in per capita incomes and increased unemployment. This forces more people back into subsistence agriculture, where they draw heavily on the natural resource base and thus degrade it.
* Austerity programmes inevitably include government cutbacks in both the staff and expenditure of fledgling, weak environmental agencies, undermining even the minimal efforts being made to bring ecological considerations into development planning.
* Conservation always takes a back seat in times of economic stress. As economic conditions have worsened in developing countries and debt pressures have mounted, planners have tended to ignore environmental planning and conservation in both industrial and rural development projects.

11. The critical situations in sub-Saharan Africa and the debt-strapped countries of Latin America demonstrate, in an extreme way, the damaging impacts that unreformed international economic arrangements are having on both development and the environment.

1. The African Continent

12. Africa on the whole has been caught up in a series of downward spirals:

* poverty and hunger leading to environmental degradation, deteriorating agriculture, and hence more poverty and hunger;
* falling savings and a neglect of new investment in the wake of growing poverty;
* high infant mortality, poverty, and lack of education;
* high population growth rates; and
* a flight from rural hunger to the cities, leading to explosive levels of urban growth and squalor, compounding the problems of inadequate food supplies.

13. The situation is not everywhere so bleak. Some nations have coped well, and some far-reaching and courageous policy reforms begun in the last few years have begun to bear fruit. Encouragement also comes from South Asia, where a comparable crisis 20 years ago has given way to an upward spiral of rising food production, diminishing (but still vast) poverty, slowing population growth, rising savings and investment, and greater attention to the long-term questions of environmental management and appropriate technology.

14. Among the many causes of the African crisis, the workings of the international economy stand out. Sub-Saharan Africa's economic well-being depends even more than low-income Asia's on developments in the world economy. Within the last decade, many sub-Saharan countries have been hit by adverse trends in commodity terms of trade and external shocks such as higher oil prices, fluctuating exchange rates, and higher interest rates. Over the last 10 years, the prices of major commodities such as copper, iron ore, sugar, ground-nuts, rubber, timber, and cotton have fallen significantly. In 1985, the terms of trade of sub-Saharan countries (except oil-exporting countries) were 10 per cent below 1970 levels. In countries eligible for funds from the International Development Association (IDA), the average fall was well over 20 per cent, with even greater drops in some, including Ethiopia, Liberia, Sierra Leone, Zaire, and Zambia.[3/]

15. The problem has been compounded by growing difficulties in attracting development capital from the industrial world. At the same time, debt repayments and interest charges have risen. Debt service rose in sub-Saharan Africa as a whole from 15 per cent of export earnings in 1980 to 31 per cent in 1986.[4/] This combination of events has led to a situation where net resource transfers to the area fell from an estimated $10 billion a year in 1982 to $1 billion in 1985.[5/] Thus nations have been able to import far less. In countries eligible for IDA loans, the import volume per person in 1984 was only 62 per cent of the volume in 1970.[6/] Imports for agriculture - machinery, fertilizers, and pesticides - and of essential supplies to meet basic needs have all been cut. The combination of adverse international and internal factors cut per capita incomes by 16 per cent in sub-Saharan Africa between 1980 and 1985.[7/]

16. The economic difficulties of sub-Saharan countries have had devastating social impacts. Declining per capita food production has contributed to growing undernourishment. The recent drought

> The seriousness of the African crisis cannot be overemphasized and in its entirety, it should really engage the whole world. The lives of 400 million people living in Africa today are imperilled. And many more people yet to be born will face a very bleak future unless effective solutions are found and found quickly.
>
> It requires of course very little imagination to appreciate the fact that it is not only Africa that is in danger. In the long term the entire world economy could be threatened not only because of the indivisibility of human welfare but because of Africa's crucial position in the global economy as a source of a large number of vital raw materials.
>
> Maxime Ferrari
> Director, UNEP Regional Office
> for Africa
> WCED Public Hearing
> Harare, 18 Sept 1986

placed some 35 million lives at risk in 1984/85, and as the drought receded some 19 million people continued to suffer famine.[8/] Malnutrition and hunger have weakened much of the population, reducing their productivity, and made more of them (especially children and the old) more susceptible to debilitating diseases and premature death. The crisis has reversed progress in supplying safe drinking water and sanitation.

17. It is now more widely recognized that it is necessary to deal with the long-term causes rather than the symptoms. The vast misery brought on by the drought in Africa is now generally acknowledged, and the world community has responded with a substantial emergency programme. But emergency food aid is only a short-term reaction, and, at best, a partial answer. The roots of the problem lie in national and international policies that have so far prevented African economies from realizing their full potential for economic expansion and thus for easing poverty and the environmental pressures that it generates.

18. The resolution lies in large part with African decision makers, but the international community also has a heavy responsibility to support Africa's adjustment efforts with adequate aid and trade arrangements and to see to it that more capital flows into poorer nations than out. These two complementary aspects of the resolution of the problems have been fully recognized by the African countries themselves[9/] and generally acknowledged by the international community.[10/] The World Bank estimates that even if external economic conditions are favourable over the next five years, and even if African governments implement key policy reforms, a substantial gap will still remain between the finance or debt relief available on current donor policies and the amounts needed to prevent a further deterioration in the living standards of low-income Africa.[11/] And there is no money in this grim equation for restoring the damaged environment.

19. The international community must realize that Africa cannot pull itself out of the planet's most serious economic and ecological crisis without much more long-term assistance than is currently envisioned. In addition, greatly increased external financing for development must be accompanied by policy changes that recognize the need to avoid environmental degradation.

2. Latin American Debt

20. Debt is an acute problem for many countries of Africa. But, because of the magnitudes of debt involved, it has had its most visible impact in some middle-income countries - particularly in Latin America. The debt crisis remains a threat to international financial stability, but its main impact so far has been on the process of development, both in its economic and ecological aspects. Of the total world debt of around $950 billion in 1985, roughly 30 per cent was owed by four countries: Argentina, Brazil, Mexico, and Venezuela. Their debts constitute roughly two-thirds of the outstanding loans of banks to developing countries.[12/]

21. In the 1970s, Latin America's economic growth was facilitated by external borrowing. Commercial banks were happy to lend to growing countries rich in natural resources. Then major changes in international conditions made the debt unsustainable. A global recession restricted export markets, and tight monetary policies forced up global interest rates to levels far exceeding any in living memory. Bankers, alarmed by deteriorating creditworthiness, stopped lending. A flight of indigeno s capital from developing countries compounded the problem.

22. The ensuing crisis forced governments into austerity policies to cut back imports. As a result, Latin American imports fell by 40 per cent in real terms over three years.[13/] The consequent economic contraction reduced per capita gross domestic product by an average of 8 per cent in the eight main Latin American countries.[14/] Much of the burden was carried by the poor, as real wages fell and unemployment rose. Growing poverty and deteriorating environmental conditions are clearly visible in every major Latin American country.

23. Further, the lack of new credit and the continuing burden of debt service forced these countries to service their debts by running trade surpluses. The net transfers from seven major Latin American countries to creditors rose to almost $39 billion in 1984, and in that year 35 per cent of export earnings went to pay interest on overseas debt.[15/] This massive drain represents 5 to 6 per cent of the region's GDP, around a third of the internal savings, and nearly 40 per cent of export earnings. It has been achieved by adjustment policies that impose severe and regressively skewed cuts in wages, social services, investment, consumption, and employment, both public and private, further aggravating social inequity and widespread poverty. Pressures on the environment and resources have increased sharply in the search for new and expanded exports and replacements for imports, together with the deterioration and overexploitation of

The impact of the present crisis on Latin America has been compared, in its depth and extension, with the Great Depression of 1929-32. The crisis has made it clear that, although the need to protect the environment against the traditional problems of deterioration and depletion continues to be a valid objective, policymakers responsible for environmental management ought to avoid negative attitudes in the face of the need for economic reactivation and growth.

The expansion, conservation, maintenance, and protection of the environment can make an essential contribution to the improvement of the standard of living, to employment, and to productivity.

Osvaldo Sunkel
Coordinator, Joint ECLA/UNEP
Development and Environment Unit
WCED Public Hearing
Sao Paulo, 28-29 Oct 1985

the environment brought about by the swelling number of the urban and rural poor in desperate struggle for survival. A substantial part of Latin America's rapid growth in exports are raw materials, food, and resource-based manufactures.

24. So Latin American natural resources are being used not for development or to raise living standards, but to meet the financial requirements of industrialized country creditors. This approach to the debt problem raises questions of economic, political, and environmental sustainability. To require relatively poor countries to simultaneously curb their living standards, accept growing poverty, and export growing amounts of scarce resources to maintain external creditworthiness reflects priorities few democratically elected governments are likely to be able to tolerate for long. The present situation is not consistent with sustainable development. This conflict is aggravated by the economic policies of some major industrial countries, which have depressed and destabilized the international economy. In order to bring about socially and environmentally sustainable development it is indispensable, among other elements, for industrial countries to resume internationally expansionary policies of growth, trade, and investment. The Commission noted that, in these circumstances, some debtor countries have felt forced to suspend or limit the net outflow of funds.

25. Growing numbers of creditor banks and official agencies are realizing that many debtors simply will not be able to keep servicing their debts unless the burden is eased. Measures under discussion include additional new lending, forgiveness of part of the debt, longer-term rescheduling, and conversion to softer terms. But a necessary sense of urgency is lacking. Any such measures must incorporate the legitimate interests of creditors and debtors and represent a fairer sharing of the burden of resolving the debt crisis.

...

III. ENABLING SUSTAINABLE DEVELOPMENT

26. Developing countries have sought, for many years, fundamental changes in international economic arrangements so as to make them more equitable, particularly with regard to financial flows, trade, transnational investment, and technology transfer.[16/] Their arguments must now be recast to reflect the ecological dimensions, frequently overlooked in the past.

27. In the short run, for most developing countries except the largest a new era of economic growth hinges on effective and coordinated economic management among major industrial countries - designed to facilitate expansion, to reduce real interest rates, and to halt the slide to protectionism. In the longer term, major changes are also required to make consumption and production patterns sustainable in a context of higher global growth.

28. International cooperation to achieve the former is embryonic, and to achieve the latter, negligible. In practice, and in the absence of global management of the economy or the environment, attention must be focused on the improvement of policies in areas where the scope for cooperation is already defined: aid, trade, transnational corporations, and technology transfer.

1. Enhancing the Flow of Resources to Developing Countries

29. Two interrelated concerns lie at the heart of our recommendations on financial flows: one concerns the quantity, the other the 'quality' of resource flows to developing countries. The need for more resources cannot be evaded. The idea that developing countries would do better to live within their limited means is a cruel illusion. Global poverty cannot be reduced by the governments of poor countries acting alone. At the same time, more aid and other forms of finance, while necessary, are not sufficient. Projects and programmes must be designed for sustainable development.

1.1 Increasing the Flow of Finance

30. As regards the quantity of resources, the stringency of external finance has already contributed to an unacceptable decline in living standards in developing countries. The patterns and the needs of the heavily indebted countries that rely mainly on commercial finance have been described, along with those of low-income countries that depend on aid. But there are other poor countries that have made impressive progress in recent years but still face immense problems, not least in countering environmental degradation. Low-income Asia has a continuing need for large amounts of aid; in general, the main recipients in this region have a good record of aid management. Without such aid it will be much more difficult to sustain the growth that, together with poverty-focused programmes, could improve the lot of

> The universal importance of ecological problems can hardly be denied. Their successful solution will increasingly require coordinated activities not only within every country's economy but also within the scope of international cooperation. Ecological problems are unprecedented in the history of mankind.
>
> Dr. Todor I. Boznhinov
> Committee for Environment
> Protection, Bulgaria
> WCED Public Hearing
> Moscow, 8 Dec 1986

hundreds of millions of the 'absolute poor'.

31. To meet such needs requires that the main donors and lending institutions re-examine their policies. Official development assistance (ODA) levels have stagnated in absolute terms, and most donor countries fall well short of internationally agreed targets. Commercial lending and lending by export credit agencies has fallen sharply. As part of a concerted effort to reverse these trends it is vitally important for development that there should be a substantial increase in resources available to the World Bank and IDA. Increased commercial bank lending is also necessary for major debtors.

1.2 Lending for Sustainable Development

32. In the past, development assistance has not always contributed to sustainable development and in some cases detracted from it. Lending for agriculture, forestry, fishing, and energy has usually been made on narrow economic criteria that take little account of environmental effects For instance, development agencies have sometimes promoted chemical-dependent agriculture, rather than sustainable, regenerative agriculture. It is important therefore that there should be a qualitative as well as a quantitive improvement.

33. A larger portion of total development assistance should go to investments needed to enhance the environment and the productivity of the resource sectors. Such efforts include reforestation and fuelwood development, watershed protection, soil conservation, agroforestry, rehabilitation of irrigation projects, small-scale agriculture, low-cost sanitation measures, and the conversion of crops into fuel. Experience has shown that the most effective efforts of this type are small projects with maximum grass-roots participation. The programmes most directly related to the objective of sustainable development may therefore involve higher local costs, a higher ratio of recurrent to capital costs, and a greater use of local technology and expertise.

34. A shift towards projects of this kind would also require donors to re-examine the content of their aid programmes, particularly with regard to commodity assistance, which has

> The industrialized world's demands for raw materials, higher productivity, and material goods have imposed serious environmental impacts and high economic costs not only in our own countries, but also on the developing world. The existing international patterns of financial, economic trade and investment policies further add to the problems.
>
> We must all be willing to examine our relations in international trade, investments, development assistance, industry, and agriculture in light of the consequences these may have for underdevelopment and environmental destruction in the Third World. We must even be willing to go further and implement the means necessary to alleviate these symptoms.
>
> Rakel Surlien
> Former Minister of Environment,
> Government of Norway
> WCED Opening Ceremony
> Oslo, 24 June 1985

sometimes served to reduce rather than enhance the possibilities for sustainable development. (See Chapter 5.)

35. The major priority is for sustainability considerations to be diffused throughout the work of international financial institutions. The roles of the World Bank and the IMF are particularly crucial because their lending conditions are being used as benchmarks for parallel lending by other institutions - commercial banks and export credit agencies. It is important in this context that sustainability considerations be taken into account by the Bank in the appraisal of structural adjustment lending and other policy-oriented lending directed to resource-based sectors - agriculture, fishing, forestry, and energy in particular - as well as specific projects.

36. A similar shift of emphasis is required in respect of adjustment programmes undertaken by developing countries. To date, 'adjustment' - particularly under IMF auspices - has led more often than not to cutbacks in living standards in the interest of financial stabilization. Implicit in many suggested plans for coping with the debt crisis is the growing recognition that future adjustment should be growth-oriented. Yet it also needs to be environmentally sensitive.

37. The IMF also has a mandate for structural adjustment lending, as in its new Structural Adjustment Facility. There has been a strongly expressed demand from developing-country borrowers for the Fund to take into account wider and longer-term development objectives than financial stabilization: growth, social goals, and environmental impacts.

38. Development agencies, and the World Bank in particular, should develop easily usable methodologies to augment their own appraisal techniques and to assist developing countries to improve their capacity for environmental assessment.

2. Linking Trade, Environment, and Development

39. The importance of foreign trade to national development has greatly increased for most countries in the post-war period. (See Table 3-2.) This is one measure of the extent to which trade has made nations, economically and ecologically, more interdependent. Patterns of world trade also have changed markedly. First, the value of trade in manufactured goods grew at a faster rate than that in primary products other than fuel, and a growing number of developing countries have emerged as major exporters of such goods. Manufactured goods now account for twice the value of developing countries' non-oil exports.[17/] (See Chapter 8.) Second, the industrialized market economies have come to depend more on fuel imports from developing countries, which accounted for 43 per cent of consumption in 1980-81 compared with only 16 per cent in 1959-60 and even less in pre-war years.[18/]

40. The dependence of the developed market economies on other mineral imports from the developing countries has also grown, and the share of these imports in consumption increased from 19 per cent in 1959-60 to 30 per cent in 1980-81.[19/] Non-renewable resources like fuels and minerals, as well as manufactured goods, are now far more important than tropical products and other agricultural materials in the flow of primary products from developing to industrial countries. In fact, the flow of food grains is in the opposite direction.

41. The main link between trade and sustainable development is the use of non-renewable raw materials to earn foreign exchange. Developing countries face the dilemma of having to use commodities as exports, in order to break foreign exchange constraints on growth, while also having to minimize damage to the environmental resource base supporting this growth. There are other links between trade and sustainable development; if protectionism raises barriers against manufactured exports, for example, developing nations have less scope for diversifying away from traditional commodities. And unsustainable development may arise not only from overuse of certain commodities but from manufactured goods that are potentially polluting.

2.1 International Commodity Trade

42. Although a growing number of developing countries have diversified into manufactured exports, primary commodities other than petroleum continue to account for more than one-third of the export earnings of the group as a whole. Dependence on such exports is particularly high in Latin America (52 per cent) and Africa (62 per cent).[20/] The countries recognized as 'least developed' for the purposes of the UN Special Programme use primary commodities for 73 per cent of their export earnings.[21/]

43. Non-oil commodity prices fell during the early 1980s, not only in real but also in nominal terms. By early 1985, the UNCTAD commodity price index was 30 per cent below the 1980

TABLE 3-2

The Growing Importance of Trade

Economic Group	1950	1982
	(exports as a per cent of GDP or NMP)	
Developed Market Economies	7.7	15.3
Developing Market Economies	15.5	23.8
Socialist Countries of Eastern Europe	3.4*	16.6*
Socialist Countries of Asia	2.9*	9.7*

*percentages to net material product (NMP).

Source: Based on UNCTAD, Handbook of International Trade and Development Statistics, 1985 Supplement (New York: United Nations, 1985).

average.[22/] This recent weakness of commodity prices may not be only a temporary phenomenon. Commodity prices have not yet recovered from the depth of the world recession despite increased economic growth in consuming countries. The reasons may be partly technological (an acceleration in raw material substitution); partly monetary, caused by the high cost of holding stocks of commodities; and partly due to increases in supplies by countries desperate to earn foreign exchange.

44. These countries are turning the terms of trade against themselves, earning less while exporting more. The promotion of increased volumes of commodity exports has led to cases of unsustainable overuse of the natural resource base. While individual cases may not exactly fit this generalization, it has been argued that such processes have been at work in ranching for beef, fishing in both coastal and deep sea waters, forestry, and the growing of some cash crops. Moreover, the prices of commodity exports do not fully reflect the environmental costs to the resource base. In a sense, then, poor developing countries are being caused to subsidize the wealthier importers of their products.

45. The experience of oil has of course been different from that of most other commodities. (See Chapter 7.) It does provide one example of producers combining to restrict output and raise prices in ways that greatly increased export earnings while conserving the resource base and promoting energy saving and substitution on a large scale. Recent events suggest that regulation of the market by producers is very difficult in the long term, whether or not it is desirable in the wider, global

...

interest, and in any event the conditions have not existed for other commodity exporters to operate in a like manner. Any arrangement encompassing measures to enhance the export earnings of producers, as well as to ensure the resource basis, would require consumer as well as producer support.

46. In recent years, Third World commodity exporters have sought to earn more by doing the first-stage processing of raw materials themselves. This first stage often involves subsidized energy, other concessions, and substantial pollution costs. But these countries often find that they do not gain much from this capital- and energy-intensive first-stage processing, as the price spread shifts in favour of downstream products, most of which continue to be manufactured mainly in industrial countries. Tariff escalation in the industrial market economies reinforces this tendency.

47. The main international response to commodity problems has been the development of international commodity agreements to stabilize and raise developing countries' earnings from these exports. But real progress has been very limited and in fact there have been reversals. Moreover, environmental resource considerations have not played any part in commodity agreements, with the notable exception of the International Tropical Timber Agreement.[23/]

48. Commodity agreements have not been easy to negotiate, and regulation of commodity trade has been notoriously controversial and difficult. Current arrangements could be improved in two crucial respects:

* Larger sums for compensatory financing to even out economic shocks - as under the IMF's Compensatory Financing Facility - would encourage producers to take a long-term view, and not to overproduce commodities where production is close to the limits of environmental sustainability during periods of market glut.
* Where producers need to diversify from traditional, single-crop production patterns, more assistance could be given for diversification programmes. The second window of the Common Fund could be used for promoting resource regeneration and conservation.[24/]

49. Individual governments can better use renewable resources such as forests and fisheries to ensure that exploitation rates stay within the limits of sustainable yields and that finances are available to regenerate resources and deal with all linked environmental effects. As for non-renewable resources like minerals, governments should ensure that:

* the leaseholder undertakes exploration aimed at adding to proven reserves at least the amount extracted;
* that the ratio of production to proven reserve remains below a pre-specified limit;
* that the funds generated by royalties are used in a way that compensates for the declining income when the resource deposit is exhausted; and

I think it is also of importance for the Commission to note the problem of negotiation of contracts on resource development. We have been trying for 10 years to include provisions on environment. We have been successful only to get from the investors a very broad description of what should be done in environmental protection. If you go into details you get problems with the lawyers and so on. That hampers then the investment.

For us, of course, it is a choice of whether to loosen the grip a little bit or if you maintain that, then of course, there will be no investment in the country. If an appeal could be made to the multinationals, mainly to understand that what has been done in timber should also be applied to other agreements like coffee, tin, and others, I think this would be a great help.

Speaker from the floor,
government agency
WCED Public Hearing
Jakarta, 26 March 1985

* that the leaseholder is responsible for land restoration and other environmental control measures in the area affected by mining.

50. Relevant international organizations such as various UN agencies, the World Bank, and regional groups could develop further their work on model contracts and guidelines incorporating these principles.

2.2 Protectionism and International Trade

51. The increase in protectionism in industrial countries stifles export growth and prevents diversification from traditional exports. The success of some Far Eastern developing countries in increasing exports of labour-intensive manufactured goods shows the development potential of such trade. However, other countries - especially low-income Asian and Latin American nations - seeking to follow the same route have found themselves severely handicapped by growing trade barriers, particularly in textiles and clothing. If developing countries are to reconcile a need for rapid export growth with a need to conserve the resource base, it is imperative that they enjoy access to industrial country markets for non-traditional exports where they enjoy a comparative advantage. In many cases, the problems of protectionism relate to manufactures; but there are cases - sugar is a good example - where industrial countries employ agricultural trade restrictions in ways that are damaging ecologically as well as economically. (See Box 3-2.)

2.3 'Pollution-intensive' Goods

52. The processing of certain raw materials - pulp and paper, oil, and alumina, for example - can have substantial environmental side effects. Industrial countries have generally

BOX 3-2
Sugar and Sustainable Development

Thirty million poor people in the Third World depend on sugar-cane for their survival. Many developing countries have a genuine comparative advantage in production and could earn valuable foreign exchange by expanding output. Some small states - Fiji, Mauritius, and several Caribbean islands - depend for their economic survival on cane sugar exports.

Industrial countries have actively promoted, and protected, beet sugar production, which competes with cane and has had quite damaging effects on developing countries: High-cost, protected beet production encourages artificial sweeteners; quotas have kept out Third World imports (except for some guaranteed imports as under the EEC's Sugar Protocol); and surpluses are dumped on world markets depressing prices.

In the 1986 World Development Report, the World Bank estimated that industrial countries' sugar policies cost developing countries about $7.4 billion in lost revenues during 1983, reduced their real income by about $2.1 billion and increased price instability by about 25 per cent.

Over and above the increased developing country poverty that results from these practices, the promotion of beet production in industrial countries has had adverse ecological side effects. Modern beet growing is highly capital-intensive, it depends heavily on chemical herbicides, and the crop has poorer regenerative properties than others. The same product could be grown in developing countries, as cane, more cheaply, using more labour and fewer chemical additives.

been more successful than developing ones in seeing to it that export product prices reflect the costs of environmental damage and of controlling that damage. Thus in the case of exports from industrial countries, these costs are paid by consumers in importing nations, including those in the Third World But in the case of exports from developing countries, such costs continue to be borne entirely domestically, largely in the form of damage costs to human health, property, and ecosystems.

53. In 1980 the industries of developing countries exporting to OECD members would have incurred direct pollution control costs of $5.5 billion if they had been required to meet the environmental standards then prevailing in the United States, according to a study conducted for this Commission.[25/] If the pollution control expenditures associated with the materials that went into the final product are also counted, the costs would have mounted to $14.2 billion. The evidence also suggests that OECD imports from developing countries involve products that entail higher average environmental and resource damage costs than do overall OECD imports.[26/] These hypothetical pollution control costs probably understate the real costs of environmental and resource damage in the exporting countries. Furthermore, these costs relate only to environmental pollution and not to the economic damage costs associated with resource depletion.

...

54. The fact that these costs remain hidden means that developing countries are able to attract more investment to export manufactured goods than they would under a more rigorous system of global environmental control. Many Third World policymakers see this as beneficial in that it gives developing countries a comparative advantage in 'pollution-intensive' goods that should be exploited. They also see that passing along more of the real costs could reduce the competitive position of their country in some markets, and thus regard any pressure in this direction as a form of disguised protectionism from established producers. Yet it is in developing countries' own long-term interests that more of the environmental and resource costs associated with production be reflected in prices. Such changes must come from the developing countries themselves.

2.4 The Mandates of Multilateral Trade Forums

55. Although a number of UNCTAD research projects have considered the links between trade and environment, these issues have not been taken up systematically by intergovernmental organizations. The mandates of these organizations - principally GATT and UNCTAD - should include sustainable development. Their activities should reflect concern with the impacts of trading patterns on the environment and the need for more effective instruments to integrate environment and development concerns into international trading arrangements.

56. International organizations dealing with trade will find it easier to reorientate their activities if each nation designates a lead agency with a broad mandate to assess the effects of international trade on sustaining the environmental and resource base of economic growth. This agency could be responsible for raising sustainability issues in the work of UNCTAD, GATT, OECD, CMEA, and other relevant organizations.

3. Ensuring Responsibility in Transnational Investment

57. Overseas investment activity by companies in market economies has grown substantially over the past 40 years. (See Box 3-3.) Foreign affiliates now account for 40 per cent of sales, 33 per cent of net assets, and 56 per cent of net earnings for 380 of the largest industrial corporations in the market economies, according to data compiled by the UN Centre for Transnational Corporations.[27] A high proportion of transnational investment is within industrial market economies, another aspect of the growing integration of these economies.

58. Transnationals play an important role as owners, as partners in joint ventures, and as suppliers of technology in the mining and manufacturing sectors in many developing countries, especially in such environmentally sensitive areas as petroleum, chemicals, metals, paper, and automobiles. They also dominate world trade in many primary commodities.

59. In recent years, many developing countries have begun to take a more positive view of the role TNC investment can play in

BOX 3-3

The Role of Transnational Corporations

* In 1983 chemicals accounted for roughly one-fourth of the stock of foreign direct investment in manufacturing in developing countries by companies from four leading countries - Japan (23 per cent), the United States (23 per cent), the United Kingdom (27 per cent), and the Federal Republic of Germany (14 per cent).
* Agriculture, mining, and other extractive industries accounted for 38 per cent of the stock of U.S. investment in developing countries in 1983, 29 per cent of the stock of Japanese investment in 1983, 21 per cent of the total FRG investment in 1981-83, and 9 per cent of the stock of U.K. investment in 1978.
* Eighty to ninety per cent of the trade in tea, coffee, cocoa, cotton, forest products, tobacco, jute, copper, iron ore, and bauxite is controlled in the case of each commodity by the three to six largest transnationals.

Source: UN Centre on Transnational Corporations, Environmental Aspects of the Activities of Transnational Corporations: A Survey (New York: UN, 1985).

their development process. This has been somewhat influenced by these countries' needs for foreign exchange and their awareness of the role that foreign investment might play in providing it. Effective cooperation with TNCs is possible in creating equal conditions for all parties. This can be attained by a strict observance of the principle of sovereignty of the host country For their part, many corporations have recognized the need to share managerial skills and technological know-how with host-country nationals and to pursue profit-seeking objectives within a framework of long-term sustainable development.

60. But mutual suspicions still exist, usually because of an asymmetry in bargaining power between large corporations and small, poor, developing countries. Negotiations are often made one-sided by a developing country's lack of information, technical unpreparedness, and political and institutional weaknesses. Suspicions and disagreements remain, particularly concerning the introduction of new technologies, the development of natural resources, and the use of the environment. If multinationals are to play a larger role in development, these conflicts and suspicions must be reduced.

61. Strengthening the bargaining posture and response of developing countries vis à vis transnationals is therefore critical. Where nations lack indigenous capacity to deal with large TNCs, regional and other international institutions should assist. As indicated earlier, they could expand existing help in the form of model agreements with transnationals for different situations, such as lease agreements for the exploitation of a

mineral resource. They could also field technical assistance and advisory teams when a country negotiates with a transnational.

62. Transnationals can have a substantial impact on the environment and resources of other countries and on the global commons. Both the home and host countries of TNCs share responsibilities and should work together to strengthen policies in this sphere. For example, information on policies and standards applied to and followed by corporations when investing in their own home country, especially concerning hazardous technologies, should be provided to host countries. Moreover, the policies of some industrialized countries that major investments are subject to prior environmental assessment should be considered for application to investments made elsewhere and should be broadened to include sustainability criteria. The information and recommendations thus arrived at should be shared with the host countries, which of course would retain the final responsibility.

63. Despite their importance, international measures regarding transnationals have been generally lacking and have proved extremely difficult to negotiate. The codes of conduct for transnational corporations formulated by the OECD and under discussion in the UN should deal explicitly with environmental matters and the objective of sustainable development. More detailed and specific instruments are needed for other problems. In particular, when introducing a new technology, plant, product, or process, or when setting up a joint venture in a developing country, the parties involved must also recognize and accept certain special responsibilities. (See Chapter 8.)

4. Broadening the Technological Base

64. The promotion of resource productivity is largely the work of domestic economic policy. But the international economy impinges on possibilities for productivity improvement in several ways, particularly in the transfer of technology from one country to another.

4.1 The Diffusion of Environmentally Sound Technologies

65. The promotion of sustainable development will require an organized effort to develop and diffuse new technologies, such as for agricultural production, renewable energy systems, and pollution control. Much of this effort will be based on the international exchange of technology: through trade in improved equipment, technology-transfer agreements, provision of experts, research collaboration, and so on. Hence the procedures and policies that influence these exchanges must stimulate innovation and ensure ready and widespread access to environmentally sound technologies.

66. The real challenge is to ensure that the new technologies reach all those who need them, overcoming such problems as the lack of information and in some cases an inability to pay for commercially developed technologies. The measures required at the national level to deal with these problems are discussed in

> Transfer of technology should be also looked upon as being a social process. Actually, ideally, it is the people themselves who have to make the selection, not us. So, to sum it up I think, talking about technology it is very important to, perhaps, understand that we are dealing here with a process of change. Technologies cannot be directly transferred except by relating this to a social process. So, actually technology is not an independent variable in this case, but it is very much dependant of social change.
>
> M. Nashihin Hasan
> Speaker from the floor
> WCED Public Hearing
> Jakarta, 26 March 1985

Part II of this report. However, both these issues also arise in the international diffusion of technology.

67. Developing countries paid about $2 billion in 1980 by way of royalties and fees, mainly to industrial countries.[28/] The gap in scientific and technological capabilities is particularly wide in areas of direct relevance to the objectives of sustainable development, including biotechnology and genetic engineering, new energy sources, new materials and substitutes, and low-waste and non-polluting technologies.

68. The principal policy issue as regards the impact of payments is the impact of patents and proprietary rights. In 1980, industrialized market economies accounted for 65 per cent of the world total of patents granted, and the socialist countries of Eastern Europe held 29 per cent.[29/] Developing countries held only 6 per cent, and most of these had been granted to non-residents. Proprietary rights are a key element in the commercial development of technology. But their application in certain areas may hamper the diffusion of environmentally sound technologies and may increase inequities.

69. In the past, publicly funded research provided new technology to small producers, particularly farmers, on a full or subsidized basis. The situation is not very different now, and in areas such as new seed varieties there is some reason to believe proprietary rights could act as a major barrier to developing countries' acquisition of new technologies. International cooperation is essential to maintain the flow of genetic material and to ensure an equitable sharing of gains.

4.2 Building Up Technological Capabilities in Developing Countries

70. At present, most of the global research and development effort is devoted to military purposes or the commercial objectives of large corporations. Little of this is of direct relevance to conditions in developing countries. In many areas the gap in technological capabilities is narrowing, but these efforts must be supported by international assistance, especially

in such key areas as biotechnology. Unless action is taken to accumulate biological knowledge, valuable information as well as vital genetic variety will be lost forever, and developing countries will be at a permanent disadvantage in adapting the new biotechnologies to their own needs.

71. Developing countries therefore have to work, individually and together, to build up their technological capabilities. The creation and enhancement of the infrastructure for research and technology is a precondition for such cooperation. The countries concerned could share the burden by establishing cooperative research projects along the lines of the International Agricultural Research Centres.[30/] Mission-oriented cooperative research ventures could be developed in areas such as dryland agriculture, tropical forestry, pollution control in small enterprises, and low-cost housing. Specific responsibilities would be assigned to institutions and corporations in the participating countries, and the agreement could provide for the equitable sharing and widespread diffusion of the technologies developed.

IV. A SUSTAINABLE WORLD ECONOMY

72. If large parts of the developing world are to avert economic, social, and environmental catastrophes, it is essential that global economic growth be revitalized. In practical terms, this means more rapid economic growth in both industrial and developing countries, freer market access for the products of developing countries, lower interest rates, greater technology transfer, and significantly larger capital flows, both concessional and commercial.

73. But many people fear that a more rapidly growing world economy will apply environmental pressures that are no more sustainable than the pressures presented by growing poverty. The increased demand for energy and other non-renewable raw materials could significantly raise the price of these items relative to other goods.

74. The Commission's overall assessment is that the international economy must speed up world growth while respecting the environmental constraints. Some favourable trends have been noted in the pattern of consumption and production in industrial countries, which collectively still consume most of the world's non-renewable resources.

75. Sustaining these trends will make it easier for developing countries to grow by diversifying their own economies. But for them to emerge from dependence a general acceleration of global economic growth is not enough. This would mean a mere perpetuation of existing economic patterns, though perhaps at a higher level of incomes. It must be ensured that the economies of developing countries grow fast enough to outpace their growing internal problems and fast enough for that first leap needed to acquire momentum. A continuation of economic growth and diversification, along with the development of technological and

managerial skills, will help developing countries mitigate the strains on the rural environment, raise productivity and consumption standards, and allow nations to move beyond dependence on one or two primary products for their export earnings.

76. Future patterns of agricultural and forestry development, energy use, industrialization, and human settlements can be made far less material-intensive (see Chapters 5, 7, 8, and 9), and hence both more economically and environmentally efficient. Under these conditions, a new era of growth in the world economy can widen the options available to developing countries.

77. Reforms at an international level are now needed to deal simultaneously with economic and ecological aspects in ways that allow the world economy to stimulate the growth of developing countries while giving greater weight to environmental concerns. Such an agenda requires deep commitment by all countries to the satisfactory working of multilateral institutions, such as the multilateral development banks; to the making and observance of international rules in fields such as trade and investment; and to constructive dialogue on the many issues where national interests do not immediately coincide but where negotiation could help to reconcile them.

78. The Commission therefore regrets but cannot ignore the recent decline in multilateral cooperation in general and a negative attitude to dialogue on development in particular. At first sight, the introduction of an environmental dimension further complicates the search for such cooperation and dialogue. But it also injects an additional element of mutual self-interest, since a failure to address the interaction between resource depletion and rising poverty will accelerate global ecological deterioration.

79. New dimensions of multilateralism are essential to human progress. The Commission feels confident that the mutual interests involved in environment and development issues can help generate the needed momentum and can secure the necessary international economic changes that it will make possible.

Footnotes

1/ Department of International Economic and Social Affairs (DIESA), Doubling Development Finance: Meeting a Global Challenge, Views and Recommendations of the Committee on Development Planning (New York: UN, 1986).

2/ Ibid.

3/ World Bank, Financing Adjustment with Growth in Sub-Saharan Africa (Washington, DC: 1986).

4/ IMF, World Economic Outlook, October 1986.

5/ UN, World Economic Survey 1986 (New York: 1986).

6/ World Bank, op. cit.

7/ Ibid.

8/ UN, General Assembly, 'The Critical Economic Situation in Africa: Report of the Secretary General', A/S-13/2, New York, 20 May 1986.

9/ Organization of African Unity Assembly of Heads of State of Government, Africa's Priority Programme of Action 1986-1991 (Addis Ababa: 1985).

10/ UN General Assembly, United Nations Programme of Action for African Economic Recovery and Development (New York: 1986).

11/ World Bank, op. cit.

12/ Bank of International Settlements, International Banking and Financial Markets Developments, (Basle: 1986).

13/ Inter-American Development Bank, Economic and Social Progress in Latin America (Washington, DC: 1986).

14/ Unpublished data from UN Economic Commission on Latin America.

15/ Ibid.

16/ See, for example, UN, 'Programme of Action on a New International Economic Order', General Assembly Resolution 3202 (S-VI), 1 May 1974.

17/ See GATT, International Trade 1985-86 (Geneva: 1986).

18/ UNCTAD, Handbook of International Trade and Development Statistics, 1977 and 1985 Supplements (New York: UN, 1977 and 1985).

19/ Ibid.

20/ UNCTAD, Statistical Pocketbook (New York: UN, 1984).

21/ Ibid.

22/ UNCTAD, Trade and Development Report (New York: UN, 1986).

23/ Alister MacIntyre, UNCTAD, statement at WCED Public Hearings, Oslo, 1985.

24/ The Common Fund is an international arrangement for the stabilization of prices for a group of commodities of particular interest to developing countries. The Second Window of the fund is meant to provide resources for promotional and research measures.

25/ I. Walter and J.H. Loudon, 'Environmental Costs and the Patterns of North-South Trade', prepared for WCED, 1986.

26/ Ibid.

27/ UN Centre on Transnational Corporations, Transnational Corporations in World Development Third Survey (New York: UN, 1983).

28/ Ibid.

29/ Commonwealth Working Group, Technological Change (London: Commonwealth Secretariat, 1985).

30/ The reference is to the activities of the international institutes that work under the umbrella of the Consultative Group on International Agricultural Research of the World Bank.

CHAPTER 4

POPULATION AND HUMAN RESOURCES

1. In 1985, some 80 million people were added to a world population of 4.8 billion. Each year the number of human beings increases, but the amount of natural resources with which to sustain this population, to improve the quality of human lives, and to eliminate mass poverty remains finite. On the other hand, expanding knowledge increases the productivity of resources.

2. Present rates of population growth cannot continue. They already compromise many governments' abilities to provide education, health care, and food security for people, much less their abilities to raise living standards. This gap between numbers and resources is all the more compelling because so much of the population growth is concentrated in low-income countries, ecologically disadvantaged regions, and poor households.

3. Yet the population issue is not solely about numbers. And poverty and resource degradation can exist on thinly populated lands, such as the drylands and the tropical forests. People are the ultimate resource. Improvements in education, health, and nutrition allow them to better use the resources they command, to stretch them further. In addition, threats to the sustainable use of resources come as much from inequalities in people's access to resources and from the ways in which they use them as from the sheer numbers of people. Thus concern over the 'population problem' also calls forth concern for human progress and human equality.

4. Nor are population growth rates the challenge solely of those nations with high rates of increase. An additional person in an industrial country consumes far more and places far greater pressure on natural resources than an additional person in the Third World. Consumption patterns and preferences are as important as numbers of consumers in the conservation of resources.

5. Thus many governments must work on several fronts to limit population growth; to control the impact of such growth on resources and, with increasing knowledge, enlarge their range and improve their productivity; to realize human potential so that people can better husband and use resources; and to provide people with forms of social security other than large numbers of children. The means of accomplishing these goals will vary from country to country, but all should keep in mind that sustainable economic growth and equitable access to resources are two of the more certain routes towards lower fertility rates.

6. Giving people the means to choose the size of their families is not just a method of keeping population in balance

with resources; it is a way of assuring - especially for women - the basic human right of self-determination. The extent to which facilities for exercising such choices are made available is itself a measure of a nation's development. In the same way, enhancing human potential not only promotes development but helps to ensure the right of all to a full and dignified life.

I. THE LINKS WITH ENVIRONMENT AND DEVELOPMENT

7. Population growth and development are linked in complex ways. Economic development generates resources that can be used to improve education and health. These improvements, along with associated social changes, reduce both fertility and mortality rates. On the other hand, high rates of population growth that eat into surpluses available for economic and social development can hinder improvements in education and health.

8. In the past, the intensification of agriculture and the production of higher yields helped nations cope with the increasing population pressures on available land. Migration and international trade in food and fuels eased the pressure on local resources. They permitted and helped sustain the high population densities of some industrialized countries.

9. The situation is different in most of the developing world. There, improvements in medicine and public health have led to a sharp drop in mortality rates and have accelerated population growth rates to unprecedented levels. But fertility rates remain high; much human potential remains unrealized, and economic development is stalled. Agricultural intensification can go some way towards restoring a balance between food production and population, but there are limits beyond which intensification cannot go. (See Box 4-1.)

10. The very possibility of development can be compromised by high population growth rates. Moreover, most developing countries do not have the resources to wait for a few generations before population stabilizes. The option of migration to new lands is virtually closed. And low levels of economic and social development combined with changing trade-production relationships limit possibilities of using international trade to augment access to resources. Hence, in the absence of deliberate measures, the imbalance between population growth and resource development will worsen.

11. Population pressure is already forcing traditional farmers to work harder, often on shrinking farms on marginal land, just to maintain household income. In Africa and Asia, rural population nearly doubled between 1950 and 1985, with a corresponding decline in land availability.[1/] Rapid population growth also creates urban economic and social problems that threaten to make cities wholly unmanageable. (See Chapter 9.)

12. Larger investments will be needed just to maintain the current inadequate levels of access to education, health care, and other services. In many cases, the resources required are

BOX 4-1
The Food/Population Balance

1. The potential population-supporting capacity of land in developing countries has been assessed in a joint study by FAO and the International Institute for Applied Systems Analysis. Data on soil and land characteristics were combined with climatic data to calculate the potential yields of major crops, to select the optimum crops, and to derive the overall potential for calorie production. Three levels of crop production were calculated: the first at a low level of technology with no fertilizer or chemicals, traditional crop varieties, and no soil conservation; the second at an intermediate level, where the most productive crop mix is used on half the land along with fertilizers, improved varieties, and some soil conservation; and the third at a high level of technology with an ideal crop mix and technology on all lands. The population-supporting capacity was determined by dividing the total calorie production by a minimum per capita intake level. This figure was then compared with the medium-variant UN population projections.

2. The 117 developing countries covered in the study, taken together, can produce enough food to feed one-and-a-half times their projected population in the year 2000, even at a low level of technology. But the picture is less hopeful in the cases of individual countries. At the low level of technology, 64 countries with a population of around 1.1 billion lack the resources to feed themselves. With the most advanced agricultural methods, the number of countries where food production potential would fall short of requirements drops to 19, with a total population of 100 million. Most are high-income West Asian countries and some small island states. Many of these countries have the capacity to earn enough foreign exchange to import their food requirements. In the others, the real issue is the modernization of agriculture on a sustainable basis.

3. Some researchers have assessed the 'theoretical' potential for global food production. One study assumes that the area under food production can be around 1.5 billion hectares (close to the current level) and that average yields could go up to 5 tons of grain equivalent per hectare (as against the present average of 2 tons of grain equivalent). Allowing for production from rangelands and marine sources, the total 'potential' is placed at 8 billion tons of grain equivalent.

4. How many people can this sustain? The present global average consumption of plant energy for food, seed, and animal feed amounts to about 6,000 calories daily, with a range among countries of 3,000-15,000 calories, depending on the level of meat consumption. On this basis, the potential production could sustain a little more than 11 billion people. But if the average consumption rises substantially - say, to 9,000 calories - the population carrying capacity of the Earth comes

(Box 4.1 continued)

'own to 7.5 billion. These figures could be substantially higher if the area under food production and the productivity of 3 billion hectares of permanent pastures can be increased on a sustainable basis. Nevertheless, the data do suggest that meeting the food needs of an ultimate world population of around 10 billion would require some changes in food habits, as well as greatly improving the efficiency of traditional agriculture.

Sources: B. Gilland, 'Considerations on World Population and Food Supply', Population and Development Review, Vol. 9, No. 2, pp. 203-11; G.M. Higgins et al., Potential Population Supporting Capacities of Lands in the Developing World (Rome: FAO, 1982); D.J. Mahar (ed.), Rapid Population Growth and Human Carrying Capacity, Staff Working Papers No. 690 (Washington, D.C.: World Bank, 1985).

just not available. Health, housing conditions, and the quality of education and public services all deteriorate; unemployment, urban drift, and social unrest increase.

13. Industrial countries seriously concerned with high population growth rates in other parts of the world have obligations beyond simply supplying aid packages of family planning hardware. Economic development, through its indirect impact on social and cultural factors, lowers fertility rates. International policies that interfere with economic development thus interfere with a developing nation's ability to manage its population growth. A concern for population growth must therefore be a part of a broader concern for a more rapid rate of economic and social development in the developing countries.

14. In the final analysis, and in both the developed and developing worlds, the population issue is about humans and not about numbers. It is misleading and an injustice to the human condition to see people merely as consumers. Their well being and security — old age security, declining child mortality, health care, and so on — are the goal of development. Almost any activity that increases well being and security lessens people's desires to have more children than they and national ecosystems can support.

II. THE POPULATION PERSPECTIVE

1. Growth in Numbers

15. Population growth accelerated in the middle of the 18th century with the advent of the Industrial Revolution and associated improvements in agriculture, not just in the regions that are more developed but elsewhere as well. The recent phase of acceleration started around 1950 with the sharp reduction in mortality rates in the developing countries.

> Since 1970 it has been fashionable to draw a distinction between population and environment as two crisis areas, but often times we forget that population is in fact a very integral part of the environment and therefore when we are addressing ourselves to population we are looking at not only the physical, biological, and chemical environments, we are also looking at the socio-cultural or socio-economic environment in which these development programmes are being set. And population makes much more sense if you are talking of population within a context.
>
> Dr. J.O. Oucho
> Population Studies and Research Institute
> WCED Public Hearing
> Nairobi, 23 Sept 1986

16. Between 1950 and 1985, world population grew at an annual rate of 1.9 per cent, compared with 0.8 per cent in the half-century preceding 1950.[2/] Population growth is now concentrated in the developing regions of Asia, Africa, and Latin America, which accounted for 85 per cent of the increase of global population since 1950. (See Table 4-1.)

17. The processes of population growth are changing in most developing countries as birth and death rates fall. In the early 1950s, practically all developing countries had birth rates over 40 and death rates over 20, the major exception being the low death rates in Latin America. (These rates refer to the annual number of births and deaths per 1,000 population.) Today the situation is quite different:

* Thirty-two per cent of the people in the Third World live in countries - such as China and the Republic of Korea - with birth rates below 25 and death rates below 10.
* Forty-one per cent are in countries where birth rates have fallen, but not as much as death rates, and their populations are growing at around 2 per cent - doubling, in other words, every 34 years. Such countries include Brazil, India, Indonesia, and Mexico.
* The remaining 27 per cent live in countries, such as Algeria, Bangladesh, Iran, and Nigeria, where death rates have fallen slightly but birth rates remain high. Overall population growth is in the range of 2.5 to 3 per cent (doubling every 28 to 23 years), with even higher growth rates in some countries, such as Kenya.[3/]

18. In the industrial world, fertility rates have declined and the population is not growing rapidly. In fact, it has stabilized in many countries. Still, the population in North America, Europe, the USSR, and Oceania is expected to increase by 230 million by the year 2025, which is as many people as live in the United States today.

TABLE 4-1
World Population 1950-85: Key Facts

Size and Rates	1950	1960	1970	1980	1985
			(billions)		
Total Population:					
World	2.5	3.0	3.7	4.4	4.8
More developed regions	0.83	0.94	1.05	1.14	1.17
Less developed regions	1.68	2.07	2.65	3.31	3.66
			(per cent)		
Annual Growth*:					
World		1.8	2.0	1.9	1.7
More developed regions		1.3	1.0	0.8	0.6
Less developed regions		2.1	2.5	2.3	2.0
			(per cent)		
Urban Population:					
World	29	34	37	40	41
More developed regions	54	67	67	70	72
Less developed regions	17	22	25	29	31

*Data are for growth over previous decade or, for last column, over previous five years.
Source: Department of International Economic and Social Affairs, World Population Prospects: Estimates and Projections as Assessed in 1984 (New York: UN, 1986).

19. The acceleration of population growth in the Third World and the decline in fertility levels in industrial countries are changing age distribution patterns radically. In developing countries, the young predominate. In 1980, 39 per cent of developing-country populations were younger than 15; the figure for industrialized countries was only 23 per cent.[4/] Yet in these countries, the proportion of the elderly is growing. Those 65 or older accounted for 11 per cent of the population in 1980; in developing countries, they represented only 4 per cent.[5/] Thus in the industrial world, relatively fewer people of working age will bear the burden of supporting relatively larger numbers of older people.

20. A changing age structure helps to set patterns of future population growth. The large number of young people in developing countries means large numbers of future parents, so that even if each person produces fewer children, the total number of births will continue to increase. Population growth can continue to grow for some decades after fertility rates decline to the 'replacement level' of slightly over two children on average per couple. Thus in many nations, high population growth rates over the next few generations are assured.

...

21. Population projections indicate an increase in global population from 4.8 billion in 1985 to 6.1 billion by 2000, and to 8.2 billion by 2025. (See Table 4-2.) More than 90 per cent of this increase is expected in developing regions. Large differences exist among countries in these areas, and the momentum of population growth is higher in Africa than in Latin America or Asia. In some developing countries, such as China, population growth rates are already well below 2 per cent and are expected to fall below 1 per cent by the beginning of the next century.6/

22. Reflecting the 'momentum' of population growth, long term UN projections show that at the global level:

* if replacement-level fertility is reached in 2010, global population will stabilize at 7.7 billion by 2060;
* if this rate is reached in 2025, population will stabilize at 10.2 billion by 2095;
* if, however, the rate is reached only in 2065, global population in 2100 would be 14.2 billion.7/

23. These projections show that the world has real choices. Policies to bring down fertility rates could make a difference of billions to the global population next century. The greater part of the differences between the three variants is accounted for by South Asia, Africa, and Latin America. Hence much depends on the effectiveness of population policies in these regions.

2. Changes in Mobility

24. The number of people in Europe, Japan, North America, and the Soviet Union quintupled between 1750 and 1950, and these regions' share in world population increased sharply over this period.8/ By the latter part of the 19th century, there was growing concern about population pressures in Europe. Migration to North America, Australia, and New Zealand helped to some extent. At its peak between 1861 and 1910, permanent emigration absorbed nearly 20 per cent of the increase in population in Europe.9/

25. Today, however, migration is not a major factor in determining population distribution among countries. Between 1970 and 1980 permanent emigration as a percentage of population increase fell to 4 per cent in Europe and was only 2.5 per cent in Latin America. The corresponding percentages in Asia and Africa were very much lower.10/ Thus the option of emigration to new lands has not been and will not be a significant element in relieving demographic pressures in developing countries. In effect, this reduces the time available to bring population into balance with resources.

26. Within countries, populations are more mobile. Improved communications have enabled large movements of people, sometimes as a natural response to the growth of economic opportunities in different places. Some governments have actively encouraged migration from densely to sparsely settled areas.

TABLE 4-2

Current and Projected
Population Size and Growth Rates*

Region	Population			Annual Growth Rate		
	1985	2000	2025	1950 to 1985	1985 to 2000	2000 to 2025
	(billion)			(per cent)		
World	4.8	6.1	8.2	1.9	1.6.	1.2
Africa	0.56	0.87	1.62	2.6	3.1	2.5
Latin America	0.41	0.55	0.78	2.6	2.0	1.4
Asia	2.82	3.55	4.54	2.1	1.6	1.0
North America	0.26	0.30	0.35	1.3	0.8	0.6
Europe	0.49	0.51	0.52	0.7	0.3	0.1
USSR	0.28	0.31	0.37	1.?	0.8	0.6
Oceania	0.02	0.03	0.04	1.9	1.4	0.9

* Medium-variant projections.

Source: Department of International Economic and Social Affairs, World Population Prospects: Estimates and Projections as Assessed in 1984 (New York: UN, 1986).

A more recent phenomenon is the flight of 'ecological refugees' from areas of environmental degradation.

27. Much of the movement is from countryside to city. (See Chapter 9.) In 1985, some 40 per cent of the world's population lived in cities; the magnitude of the urban drift can be seen in the fact that since 1950, the increase in urban population has been larger than the increase in rural population both in percentage and in absolute terms. This shift is most striking in developing countries, where the number of city-dwellers quadrupled during this period.[11/]

3. Improved Health and Education

28. Improvements in the health and education of all, but especially of women and in conjunction with other social changes that raise the status of women, can have a profound effect in bringing down population growth rates. In an initial period, however, better health care means that more babies live to reproduce and that women reproduce over longer time spans.

TABLE 4-3

Health Indicators

Region	Life Expectancy at Birth		Infant Mortality Rates	
	1950-55	1980-85	1960-65	1980-85
	(years)		(deaths per 1,000 live births)	
World	49.9	64.6	117	81
Africa	37.5	49.7	157	114
Asia	41.2	57.9	133	87
South America	52.3	64.0	101	64
North America	64.4	71.1	43	27
Europe	65.3	73.2	37	16
USSR	61.7	70.9	32	25
Oceania	61.0	67.6	55	39

Source: WCED, based on data in World Resources Institute/International Institute for Environment and Development, World Resources 1986 (New York: Basic Books, 1986).

29. The 'health status' of a society is a complex concept that cannot be measured easily. Two widely available indicators that reflect at least some aspects of a given society's health are life expectancy and infant mortality rates. (See Table 4-3.) These statistics suggest that health has improved virtually everywhere; and, at least with regard to these two indicators, the gap between industrial and developing regions has narrowed.

30. Many factors can increase life expectancy and reduce mortality rates; two are worth emphasizing. First, although generally speaking national wealth buys national health, some relatively poor nations and areas, such as China, Sri Lanka, and the Indian state of Kerala, have achieved remarkable success in lowering infant mortality and improving health through increases in education, especially of women; the establishment of primary health clinics; and other health care programmes.[12/] Second, the principal reductions in mortality rates in the industrial world came about before the advent of modern drugs; they were due to improved nutrition, housing, and hygiene. The recent gains in developing countries have also been largely due to public health programmes, particularly for the control of communicable diseases.

31. Education is another key dimension of 'population quality'. The past few decades have seen a great expansion of educational facilities in virtually all countries. In terms of

school enrolment, literacy rates, the growth in technical education, and the development of scientific skills, much progress has been achieved. (See Table 4-4.)

III. A POLICY FRAMEWORK

32. Excessive population growth diffuses the fruits of development over increasing numbers instead of improving living standards in many developing countries; a reduction of current growth rates is an imperative for sustainable development. The critical issues are the balance between population size and available resources and the rate of population growth in relation to the capacity of the economy to provide for the basic needs of the population, not just today but for generations. Such a long-term view is necessary because attitudes to fertility rarely change rapidly and because, even after fertility starts declining, past increases in population impart a momentum of growth as people reach child-bearing age. However a nation proceeds towards the goals of sustainable development and lower fertility levels, the two are intimately linked and mutually reinforcing.

33. Measures to influence population size cannot be effective in isolation from other environment/development issues. The number, density, movement, and growth rate of a population cannot be influenced in the short run if these efforts are being overwhelmed by adverse patterns of development in other areas. Population policies must have a broader focus than controlling numbers: Measures to improve the quality of human resources in terms of health, education, and social development are as important.

34. A first step may be for governments to abandon the false division between 'productive' or 'economic' expenditures and 'social' expenditures. Policymakers must realize that spending on population activities and on other efforts to raise human potential is crucial to a nation's economic and productive activities and to achieving sustainable human progress - the end for which a government exists.

1. Managing Population Growth

35. Progress in population policies is uneven. Some countries with serious population problems have comprehensive policies. Some go no further than the promotion of family planning. Some do not do even that.

36. A population policy should set out and pursue broad national demographic goals in relation to other socio-economic objectives. Social and cultural factors dominate all others in affecting fertility. The most important of these is the roles women play in the family, the economy, and the society at large. Fertility rates fall as women's employment opportunities outside the home and farm, their access to education, and their age at marriage all rise. Hence policies meant to lower fertility rates not only must include economic incentives and disincentives, but

TABLE 4-4

Male and Female Enrolment Ratios, by Region, 1960 and 1982

Region	Male		Female	
	1960	1982	1960	1982
World				
First Level	92.2	101.3	71.1	87.3
Second Level	31.3	53.3	23.1	42.5
Africa				
First Level	56.2	89.2	32.0	72.1
Second Level	7.3	29.6	2.9	19.5
Latin America and Caribbean				
First Level	75.0	106.2	71.2	103.3
Second Level	14.9	46.6	13.6	48.5
North America				
First Level	117.4	119.7	116.4	119.9
Second Level	69.4	85.4	71.4	86.6
Asia				
First Level	94.9	100.1	63.1	79.9
Second Level	29.3	49.3	16.6	32.9
Europe and USSR				
First Level	103.4	105.4	102.7	104.5
Second Level	46.5	76.2	44.6	81.3
Oceania				
First Level	102.2	102.9	100.7	98.9
Second Level	53.8	71.1	58.8	72.0

Note: The figures are percentages of appropriate age groups receiving a given level of education. As many older children are in primary school, percentages can be over 100.
Source: WCED, based on data in UNESCO, 'A Summary Statistical Review of Education in the World, 1960-1982', Paris, July 1984.

must aim to improve the position of women in society. Such policies should essentially promote women's rights.

37. Poverty breeds high rates of population growth: Families poor in income, employment, and social security need children first to work and later to sustain elderly parents. Measures to provide an adequate livelihood for poor households, to establish

> The environment is the business of everybody, development is the business of everybody, life and living is the business of everybody. I think the solution will be found in encouraging mass environmental literacy so that there can be democratic and literate decisions, because if decisions are taken by a few without the incorporation of the opinion of the masses, the NGOs especially included, the likelihood is that the situations will not succeed. They will be imposed from above, the people will not respond positively to them, and the project is lost before it is launched.
>
> Joseph Ouma
> Dean of School of Environmental Studies
> Moi University
> WCED Public Hearing
> Nairobi, 23 Sept 1986

and enforce minimum-age child labour laws, and to provide publicly financed social security will all lower fertility rates. Improved public health and child nutrition programmes that bring down infant mortality rates - so parents do not need 'extra' children as insurance against child death - can also help to reduce fertility levels.

38. All these programmes are effective in bringing down birth rates only when their benefits are shared by the majority. Societies that attempt to spread the benefits of economic growth to a wider segment of the population may do better at lowering birth rates than societies with both faster and higher levels of economic growth but a less even sharing of the benefits of that growth.

39. Thus developing-country population strategies must deal not only with the population variable as such but also with the underlying social and economic conditions of underdevelopment. They must be multifaceted campaigns: to strengthen social, cultural, and economic motivations for couples to have small families and, through family planning programmes, to provide to all who want them the education, technological means, and services required to control family size.

40. Family planning services in many developing countries suffer by being isolated from other programmes that reduce fertility and even from those that increase motivation to use such services. They remain separate both in design and implementation from such fertility-related programmes as nutrition, public health, mother and child care, and preschool education that take place in the same area and that are often funded by the same agency.

41. Such services must therefore be integrated with other efforts to improve access to health care and education. The clinical support needed for most modern contraceptive methods makes family planning services heavily dependent on the health

system. Some governments have successfully combined population programmes with health, education, and rural development projects, and implemented them as part of major socio-economic programmes in villages or regions. This integration increases motivation, improves access, and raises the effectiveness of investments in family planning.

42. Only about 1.5 per cent of official development aid now goes for population assistance.[13/] Regrettably, some donor countries have cut back on their assistance for multilateral population programmes and so weakened them; this must be reversed.

43. Zimbabwe is one nation that has successfully integrated its family planning efforts not only with its rural health services but also with efforts to improve women's abilities to organize group activities and earn money through their own labour. The government's initial efforts were aimed less at limiting population growth than at assisting women to space births in the interests of mother and child health and at helping infertile women to bear children. But gradually families have begun to use the contraceptives made available for child spacing as a way to limit fertility. Zimbabwe now leads sub-Saharan Africa in the use of modern contraceptive methods.[14/]

2. Managing Distribution and Mobility

44. Population distribution across a country's different regions is influenced by the geographical spread of economic activity and opportunity. Most countries are committed in theory to balancing regional development, but are rarely able to do this in practice. Governments able to spread employment opportunities throughout their nations and especially through their countrysides will thus limit the rapid and often uncontrolled growth of one or two cities. China's effort to support village-level industries in the countryside is perhaps the most ambitious of this sort of national programme.

45. Migration from countryside to city is not in itself a bad thing; it is part of the process of economic development and diversification. The issue is not so much the overall rural-urban shift but the distribution of urban growth between large metropolitan cities and smaller urban settlements. (See Chapter 9.)

46. A commitment to rural development implies more attention to realizing the development potential of all regions, particularly those that are ecologically disadvantaged (See Chapter 5.) This would help reduce migration from these areas due to lack of opportunities. But governments should avoid going too far in the opposite direction, encouraging people to move into sparsely populated areas such as tropical moist forests, where the land may not be able to provide sustainable livelihoods.

Demographic phenomena constitute the heart of the African Development problematique. They are the data that lead most analysts to project a continuing and deepening crisis in Africa. There is no doubt of the imperative and urgent need for a far reaching population policy to be adopted and vigorously implemented by African governments.

One issue of relevance that requires further research is the use of the tax system as a means for controlling population growth and discouraging rural-urban migration.

To slow down population growth, should families without children be given a tax incentive or tax break? Should a tax penalty be imposed for each child after a fixed number of children, considering that the tax system has not solved the population migration problem?

Adebayo Adedeji
Executive Director, Economic
Commission for Africa
WCED Public Hearing
Harare, 18 Sept 1986

3. From Liability to Asset

47. When a population exceeds the carrying capacity of the available resources, it can become a liability in efforts to improve people's welfare. But talking of population just as numbers glosses over an important point: People are also a creative resource, and this creativity is an asset societies must tap. To nurture and enhance that asset, people's physical well-being must be improved through better nutrition, health care, and so on. And education must be provided to help them become more capable and creative, skilful, productive, and better able to deal with day-to-day problems. All this has to be achieved through access to and participation in the processes of sustainable development.

3.1 Improving Health

48. Good health is the foundation of human welfare and productivity. Hence a broad-based health policy is essential for sustainable development. In the developing world, the critical problems of ill health are closely related to environmental conditions and development problems.

49. Malaria is the most important parasitic disease in the tropics, and its prevalence is closely related to wastewater disposal and drainage. Large dams and irrigation systems have led to sharp increases in the incidence of schistosomiasis (snail fever) in many areas. Inadequacies in water supply and sanitation are direct causes of other widespread and debilitating diseases such as diarrhoeas and various worm infestations.

50. Though much has been achieved in recent years, 1.7 billion people lack access to clean water, and 1.2 billion to adequate sanitation.[15/] Many diseases can be controlled not just

> We in Asia, I feel, want to have an equilibrium between the spiritual and material life. I noticed that you have tried to separate religion from the technological side of life. Is that not exactly the mistake in the West in developing technology, without ethics, without religion? If that is the case, and we have the chance to develop a new direction, should we not advise the group on technology to pursue a different kind of technology which has as its base not only the rationality, but also the spiritual aspect? Is this a dream or is this something we cannot avoid?
>
> Speaker from the floor
> WCED Public Hearing
> Jakarta, 26 March 1985

through therapeutic interventions but also through improvements in rural water supply, sanitation, and health education. In this sense, they really require a developmental solution. In the developing world, the number of water taps nearby is a better indication of the health of a community than is the number of hospital beds.

51. Other examples of links between development, environmental conditions, and health include air pollution and the respiratory illnesses it brings, the impact of housing conditions on the spread of tuberculosis, the effects of carcinogens and toxic substances, and the exposure to hazards in the workplace and elsewhere.

52. Many health problems arise from the nutritional deficiencies that occur in virtually all developing countries, but most acutely in low-income areas. Most malnutrition is related to a shortage of calories or protein or both, but some diets also lack specific elements and compounds, such as iron and iodine. Health will be greatly improved in low-income areas by policies that lead to the production of more of the cheap foods the poor traditionally eat - coarse grains and root crops.

53. These health, nutrition, environment, and development links imply that health policy cannot be conceived of purely in terms of curative or preventive medicine, or even in terms of greater attention to public health. Integrated approaches are needed that reflect key health objectives in areas such as food production; water supply and sanitation; industrial policy, particularly with regard to safety and pollution; and the planning of human settlements. Beyond this, it is necessary to identify vulnerable groups and their health risks and to ensure that the socio-economic factors that underlie these risks are taken into account in other areas of development policy.

54. Hence, WHO's 'Health for All' strategy should be broadened far beyond the provision of medical workers and clinics, to cover health-related interventions in all development activities.[16/] Moreover, this broader approach must be reflected in

institutional arrangements to coordinate all such activities effectively.

55. Within the narrower area of health care, providing primary health care facilities and making sure that everyone has the opportunity to use them are appropriate starting points. Maternal and child health care are also particularly important. The critical elements here are relatively inexpensive and can have a profound impact on health and well-being. An organized system of trained birth attendants, protection against tetanus and other childbirth infections, and supplemental feeding can dramatically reduce maternal mortality. Similarly, low-cost programmes to assure immunization, teach and supply oral dehydration therapy against diarrhoeas, and encourage breast-feeding (which in turn can reduce fertility) can increase child survival rates dramatically.

56. Health care must be supplemented by effective health education. Some parts of the Third World may soon face growing numbers of the illnesses associated with life-styles in industrial nations - cancer and heart disease especially. Few developing nations can afford the expensive treatment required for the latter diseases, and should begin efforts now to educate their citizens on the dangers of smoking and of high-fat diets.

57. A rapid spread of acquired immune deficiency syndrome (AIDS) in both developed and developing nations could drastically alter all countries' health priorities. AIDS is threatening to kill millions of people and disrupt the economies of many countries. Governments should overcome any lingering shyness and rapidly educate their people about this syndrome and about the ways in which it is spread. International cooperation on research and the handling of the disease is essential.

58. Another major health problem with international ramifications is the increase in drug addiction. It is a problem closely linked to organized crime in the production of drugs, in large-scale international traffic in these drugs, and in the networks for distribution. It distorts the economy in many poor producing areas and destroys people the world over. International cooperation is essential in tackling this scourge. Some countries have to deploy considerable financial resources to halt the production and traffic in narcotics and to promote crop diversification and rehabilitation schemes in the producing areas, which are generally impoverished. To sustain their efforts, greater international assistance is essential

59. Most medical research focuses on pharmaceuticals, vaccines, and other technological interventions for disease management. Much of this research is directed at the diseases of industrialized countries, as their treatment accounts for a substantial part of the sales of pharmaceutical companies. More research is urgently needed on the environmentally related tropical diseases that are the major health problem in the Third World. This research should focus not merely on new medicines, but also on public health measures to control these diseases. Existing arrangements for international collaboration on tropical disease research should be greatly strengthened.

3.2 Broadening Education

60. Human resource development demands knowledge and skills to help people improve their economic performance. Sustainable development requires changes in values and attitudes towards environment and development - indeed, towards society and work at home, on farms, and in factories. The world's religions could help provide direction and motivation in forming new values that would stress individual and joint responsibility towards the environment and towards nurturing harmony between humanity and environment.

61. Education should also be geared towards making people more capable of dealing with problems of overcrowding and excessive population densities, and better able to improve what could be called 'social carrying capacities'. This is essential to prevent ruptures in the social fabric, and schooling should enhance the levels of tolerance and empathy required for living in a crowded world. Improved health, lower fertility, and better nutrition will depend on greater literacy and social and civic responsibility. Education can induce all these, and can enhance a society's ability to overcome poverty, increase incomes, improve health and nutrition, and reduce family size.

62. The investment in education and the growth in school enrolment during the past few decades are signs of progress. Access to education is increasing and will continue to do so. Today almost all the world's boys are getting some form of primary education. In Asia and Africa, however, enrolment rates for girls are much lower than for boys at all levels. A large gap also exists between developed and developing countries in enrolment rates beyond primary schools, as Table 4-4 indicated.

63. UN projections of enrolment rates for the year 2000 suggest a continuation of these trends. Thus despite the growth in primary education, illiteracy will continue to rise in terms of sheer numbers: there will be more than 900 million people unable to read and write at the end of the century. By then, girls' enrolment rates are still expected to be below the current rates for boys in Asia. As for secondary education, developing countries are not expected to attain even the 1960 industrial country levels by the year 2000.[17/]

64. Sustainable development requires that these trends be corrected. The main task of education policy must be to make literacy universal and to close the gaps between male and female enrolment rates. Realizing these goals would improve individual productivity and earnings, as well as personal attitudes to health, nutrition, and child-bearing. It can also instill a greater awareness of everyday environmental factors. Facilities for education beyond primary school must be expanded to improve skills necessary for pursuing sustainable development.

65. A major problem confronting many countries is the widespread unemployment and the unrest that it leads to. Education has often been unable to provide the skills needed for appropriate employment. This is evident in the large numbers of

> Education and communication are vitally important in order to impress each individual of his or her responsibility regarding the healthy future of the earth. The best way for students to recognize that their action can make a difference is to have projects organized by the school or community on which the students can work. Once convinced that they can help, people tend to change both their attitude and their behaviour. New attitudes towards the environment will be reflected in decisions at home and in corporate boardrooms around the world.
>
> Bernice Goldsmith
> Student, North Toronto Collegiate
> WCED Public Hearing
> Ottawa, 26-27 May 1986

unemployed people who have been trained for white-collar employment in swelling urban populations. Education and training should also be directed towards the acquisition of practical and vocational skills, and particularly towards making people more self-reliant. All this should be supported by efforts to nurture the informal sector and the participation of community organizations.

66. Providing facilities is only the beginning. Education must be improved in quality and in relevance to local conditions. In many areas, it should be integrated with children's participation in farm work, a process requiring flexibility in the school system. It should impart knowledge relevant for the proper management of local resources. Rural schools must teach about local soils, water, and the conservation of both, about deforestation and how the community and the individual can reverse it. Teachers must be trained and the curriculum developed so that students learn about the agricultural balance sheet of an area.

67. Most people base their understanding of environmental processes and development on traditional beliefs or on information provided by a conventional education. Many thus remain ignorant about ways in which they could improve traditional production practices and better protect the natural resource base. Education should therefore provide comprehensive knowledge, encompassing and cutting across the social and natural sciences and the humanities, thus providing insights on the interaction between natural and human resources, between development and environment.

68. Environmental education should be included in and should run throughout the other disciplines of the formal education curriculum at all levels - to foster a sense of responsibility for the state of the environment and to teach students how to monitor, protect, and improve it. These objectives cannot be achieved without the involvement of students in the movement for a better environment, through such things as nature clubs and

I am here as the son of a small nation, the Krenak Indian Nation. We live in the valley of the Rio Doce, which is the frontier of Espirito Santo with the State of Minas Gerais. We are a micro-country - a micro-nation.

When the government took our land in the valley of Rio Doce, they wanted to give us another place somewhere else. But the State, the government will never understand that we do not have another place to go.

The only possible place for the Krenak people to live and to re-establish our existence, to speak to our Gods, to speak to our nature, to weave our lives is where our God created us. It is useless for the government to put us in a very beautiful place, in a very good place with a lot of hunting and a lot of fish. The Krenak people, we continue dying and we die insisting that there is only one place for us to live.

My heart does not become happy to see humanity's incapacity. I have no pleasure at all to come here and make these statements. We can no longer see the planet that we live upon as if it were a chess-board where people just move things around. We cannot consider the planet as something isolated from the cosmic.

We are not idiots to believe that there is possibility of life for us outside of where the origin of our life is. Respect our place of living, do not degrade our living condition, respect this life. We have no arms to cause pressure, the only thing we have is the right to cry for our dignity and the need to live in our land.

Ailton Krenak
Coordinator of Indian Nations Union
WCED Public Hearing
Sao Paulo, 28-29 Oct 1985

special interest groups. Adult education, on-the-job training, television, and other less formal methods must be used to reach out to as wide a group of individuals as possible, as environmental issues and knowledge systems now change radically in the space of a lifetime.

69. A critical point of intervention is during teacher training. The attitudes of teachers will be key in increasing understanding of the environment and its links with development. To enhance the awareness and capabilities of teachers in this area, multilateral and bilateral agencies must provide support for the relevant curriculum development in teacher training institutions, for the preparation of teaching aids, and for other similar activities. Global awareness could be fostered by encouraging contacts among teachers from different countries, for instance in specialized centres set up for this purpose.

3.3 Empowering Vulnerable Groups

70. The processes of development generally lead to the gradual integration of local communities into a larger social and

economic framework. But some communities - so-called indigenous or tribal peoples - remain isolated because of such factors as physical barriers to communication or marked differences in social and cultural practices. Such groups are found in North America, in Australia, in the Amazon Basin, in Central America, in the forests and hills of Asia, in the deserts of North Africa, and elsewhere.

71. The isolation of many such people has meant the preservation of a traditional way of life in close harmony with the natural environment. Their very survival has depended on their ecological awareness and adaptation. But their isolation has also meant that few of them have shared in national economic and social development; this may be reflected in their poor health, nutrition, and education.

72. With the gradual advance of organized development into remote regions, these groups are becoming less isolated. Many live in areas rich in valuable natural resources that planners and 'developers' want to exploit, and this exploitation disrupts the local environment so as to endanger traditional ways of life. The legal and institutional changes that accompany organized development add to such pressures.

73. Growing interaction with the larger world is increasing the vulnerability of these groups, since they are often left out of the processes of economic development. Social discrimination, cultural barriers, and the exclusion of these people from national political processes makes these groups vulnerable and subject to exploitation. Many groups become dispossessed and marginalized, and their traditional practices disappear. They become the victims of what could be described as cultural extinction.

74. These communities are the repositories of vast accumulations of traditional knowledge and experience that links humanity with its ancient origins. Their disappearance is a loss for the larger society, which could learn a great deal from their traditional skills in sustainably managing very complex ecological systems. It is a terrible irony that as formal development reaches more deeply into rain forests, deserts, and other isolated environments, it tends to destroy the only cultures that have proved able to thrive in these environments.

75. The starting point for a just and humane policy for such groups is the recognition and protection of their traditional rights to land and the other resources that sustain their way of life - rights they may define in terms that do not fit into standard legal systems. These groups' own institutions to regulate rights and obligations are crucial for maintaining the harmony with nature and the environmental awareness characteristic of the traditional way of life. Hence the recognition of traditional rights must go hand in hand with measures to protect the local institutions that enforce responsibility in resource use. And this recognition must also give local communities a decisive voice in the decisions about resource use in their area.

76. Protection of traditional rights should be accompanied by positive measures to enhance the well-being of the community in ways appropriate to the group's life-style. For example, earnings from traditional activities can be increased through the introduction of marketing arrangements that ensure a fair price for produce, but also through steps to conserve and enhance the resource base and increase resource productivity.

77. Those promoting policies that have an impact on the lives of an isolated, traditional people must tread a fine line between keeping them in artificial, perhaps unwanted isolation and wantonly destroying their life-styles. Hence broader measures of human resource development are essential. Health facilities must be provided to supplement and improve traditional practices; nutritional deficiencies have to be corrected, and educational institutions established. These steps should precede new projects that open up an area to economic development. Special efforts should also be made to ensure that the local community can derive the full benefit of such projects, particularly through jobs.

78. In terms of sheer numbers, these isolated, vulnerable groups are small. But their marginalization is a symptom of a style of development that tends to neglect both human and environmental considerations. Hence a more careful and sensitive consideration of their interests is a touchstone of a sustainable development policy.

Footnotes

1/ Department of International Economic and Social Affairs (DIESA), World Population Prospects: Estimates and Projections as Assessed in 1984 (New York: United Nations, 1986).

2/ Ibid.

3/ Based on data from UNCTAD, Handbook of International Trade and Development Statistics 1985 Supplement (New York: 1985).

4/ World Bank, World Development Report 1984 (New York: Oxford University Press, 1984).

5/ Ibid.

6/ DIESA, op. cit.

7/ UN, Population Bulletin of the United Nations, No. 14, 1982 (New York: 1983).

8/ C. Clark, Population Growth and Land Use (New York: St. Martin's Press, 1957).

9/ World Bank, op. cit.

10/ Ibid.

11/ DIESA, op. cit.

12/ WHO, Intersectoral Linkages and Health Development, Case Studies in India (Kerala State), Jamica, Norway, Sri Lanka and Thailand (Geneva: 1984).

13/ World Bank, op. cit.

14/ L. Timberlake, Only One Earth: Living for the Future (London: BBC/Earthscan, 1987).

15/ UNEP, The State of the Environment: Environment and Health (Nairobi: 1986).

16/ WHO, Global Strategy for Health for All by the Year 2000 (Geneva: 1981).

17/ UNESCO, A Summary Statistical Review of Education in the World, 1960-82 (Paris: 1984).

CHAPTER 5

FOOD SECURITY: SUSTAINING THE POTENTIAL

1. The world produces more food per head of population today than ever before in human history. In 1985, it produced nearly 500 kilogrammes per head of cereals and root crops, the primary sources of food.[1/] Yet amid this abundance, more than 730 million people did not eat enough to lead fully productive working lives.[2/] There are places where too little is grown; there are places where large numbers cannot afford to buy food. And there are broad areas of the Earth, in both industrial and developing nations, where increases in food production are undermining the base for future production.

2. The agricultural resources and the technology needed to feed growing populations are available. Much has been achieved over the past few decades. Agriculture does not lack resources; it lacks policies to ensure that the food is produced where it is needed and in a manner that sustains the livelihoods of the rural poor. We can meet this challenge by building on our achievements and devising new strategies for sustaining food and livelihood security.

I. ACHIEVEMENTS

3. Between 1950 and 1985, cereal production outstripped population growth, increasing from around 700 million tons to over 1,800 million tons, an annual growth rate of around 2.7 per cent.[3/] This increase helped to meet escalating demands for cereals caused by population growth and rising incomes in developing countries and by growing needs for animal feed in developed countries. Yet regional differences in performance have been large. (See Table 5-1.)

4. As production has increased sharply in some regions and demand in others, the pattern of world trade in foods, especially cereals, has changed radically. North America exported barely 5 million tons of foodgrains yearly before the Second World War; it exported nearly 120 million tons during the 1980s. Europe's grain deficit is very much lower now, and the bulk of North American exports are to the USSR, Asia, and Africa. Three countries - China, Japan, and the USSR - took half the world exports in the early 1980s; much of the rest went to relatively wealthy developing countries, such as Middle Eastern oil exporters. Several poor agricultural countries, especially in sub-Saharan Africa, have become net importers of foodgrains. Still, although one-fourth of sub-Saharan Africa's population relied on imported grains in 1984, that region's imports have

TABLE 5-1

Two Decades of Agricultural Development

	Per Capita Food Production (Index 1961-64 = 100)		Per Capita Gross Cropped Area (Hectares)		Per Hectare Fertilizer use (kg.)	
	1961-64	1981-84	1964	1984	1964	1984
World	100	112	0.44	0.31	29.3	85.3
North America	100	121	1.05	0.90	47.3	93.2
Western Europe	100	131	0.31	0.25	124.4	224.3
Eastern Europe and USSR	100	128	0.84	0.71	30.4	122.1
Africa	100	88	0.74	0.35	1.8	9.7
Near East*	100	107	0.53	0.35	6.9	53.6
Far East**	100	116	0.30	0.20	6.4	45.8
Latin America	100	108	0.49	0.45	11.6	32.4
CPE's of Asia***	100	135	0.17	0.10	15.8	170.3

* An FAO grouping that includes West Asia plus Egypt, Libya and Sudan

** An FAO grouping that covers South and South-East Asia excluding the centrally planned economies of Asia.

***An FAO grouping of Centrally Planned Economies of Asia which covers China, Kampuchea, North Korea, Mongolia and Vietnam.

accounted for less than 10 per cent of world grain trade thus far in the 1980s.[4/]

5. Other foods besides grains are changing the patterns of world food demand and production. Demand for milk and meat is growing as incomes rise in societies that prefer animal protein, and much agricultural development in the industrialized nations has been devoted to meeting these demands. In Europe, meat production more than tripled between 1950 and 1984, and milk production nearly doubled.[5/] Meat production for exports increased sharply, particularly in the rangelands of Latin America and Africa. World meat exports have risen from around 2 million tons in 1950-52 to over 11 million tons in 1984.[6/]

6. To produce this milk and meat required in 1984 about 1.4 billion cattle and buffaloes, 1.6 billion sheep and goats, 800 million pigs, and a great deal of poultry - all of which weigh more than the people on the planet.[7/] Most of these animals graze or browse or are fed local plants collected for them. However, rising demands for livestock feedgrains led to sharp increases in the production of cereals such as corn, which accounted for nearly two-thirds of the total increase in grain production in North America and Europe between 1950 and 1985.

7. This unprecedented growth in food production has been achieved partly by an extension of the production base: larger cropped areas, more livestock, more fishing vessels, and so on. But most of it is due to a phenomenal rise in productivity. Population increases have meant a decline in the area of cropped land in most of the world in per capita terms. And as the availability of arable land has declined, planners and farmers have focused on increasing productivity. In the past 35 years this has been achieved by:

* using new seed varieties designed to maximize yields, facilitate multiple cropping, and resist disease;
* applying more chemical fertilizers, the consumption of which rose more than ninefold[8/];
* using more pesticides and similar chemicals, the use of which increased thirty-two-fold[9/]; and
* increasing irrigated area, which more than doubled.[10/]

8. Global statistics mask substantial regional differences. (See Box 5-1.) The impacts of new technology have been uneven, and in some respects the agricultural technology gap has widened. For instance, average African foodgrain productivity declined in relation to European productivity from roughly one-half to about one-fifth over the past 35 years. Even in Asia, where new technology has spread rapidly, productivity in relation to European levels dropped.[11/] Similar 'technology gaps' have emerged between regions within countries.

9. The past few decades have seen the emergence of three broad types of food production systems. 'Industrial agriculture', capital- and input-intensive and usually large-scale, is dominant in North America, Western and Eastern Europe, Australia and New Zealand, and in some small areas in developing countries. 'Green Revolution agriculture' is found in uniform, resource-rich, often flat and irrigated areas in the agricultural heartlands of some developing countries. It is more widespread in Asia but is also found in parts of Latin America and North Africa. Though initially the new technologies may have favoured large farmers, they are today accessible to a growing number of small producers. 'Resource-poor agriculture' relies on uncertain rain rather than irrigation and is usually found in developing regions difficult to farm - drylands, highlands, and forests - with fragile soils. This includes most of sub-Saharan Africa and the remoter areas of Asia and Latin America. Here, per capita production has been declining and hunger is a critical problem. But today, all three systems of food production display signs of crises that endanger their growth.

II. SIGNS OF CRISIS

10. Agricultural policies in practically all countries have focused on output growth. Despite this, it has proved far more difficult to raise world agricultural output by a consistent 3 per cent a year in the mid-1980s than it was in the mid-1950s. Moreover, production records have been offset by the appearance

BOX 5-1

Regional Perspectives on Agricultural Development

Africa

* a drop in per capita food output of about 1 per cent a year since the beginning of the 1970s
* a focus on cash crops and a growing dependence on imported food, fostered by pricing policies and foreign exchange compulsions
* major gaps in infrastructure for research, extension, input supply, and marketing
* degradation of the agricultural resource base due to desertification, droughts, and other processes
* large untapped potential of arable land, irrigation, and fertilizer use

West Asia and North Africa

* improvements in productivity due to better irrigation, the cultivation of high-yielding varieties, and higher fertilizer use
* limited arable land and considerable amounts of desert, making food self-sufficiency a challenge
* a need for controlled irrigation to cope with dry conditions

South and East Asia

* increased production and productivity, with some countries registering grain surpluses
* rapid growth in fertilizer use in some countries and extensive development of irrigation
* government commitments to be self-reliant in food, leading to national research centres, development of high-yielding seeds, and the fostering of location-specific technologies
* little unused land, and extensive, unabated deforestation
* growing numbers of rural landless

Latin America

* declining food imports since 1980, as food production kept pace with population growth over the last decade
* government support in the form of research centres to develop high-yielding seeds and other technologies
* inequitable distribution of land
* deforestation and degradation of the agricultural resource base, fueled partly by foreign trade and debt crisis
* a huge land resource and high productivity potential, though most of the potentially arable land is in the remote, lightly populated Amazon Basin, where perhaps only 20 per cent of the land is suitable for sustainable agriculture

(Box 5-1 continued)

North America and Western Europe

* North America the world's leading source of surplus foodgrain, though the rate of increase in output per hectare and in total productivity slowed in the 1970s
* subsidies for production that are ecologically and economically expensive
* depressing effect of surpluses on world markets and consequent impact on developing countries
* a resource base increasingly degraded through erosion, acidification, and water contamination
* in North America, some scope for future agricultural expansion in frontier areas that can be intensively farmed only at high cost

Eastern Europe and the Soviet Union

* food deficits met through imports, with the Soviet Union being the world's largest grain importer
* increased government investment in agriculture accompanied by eased farm distribution and organization to meet desires for food self-reliance, leading to production increases in meat and root crops
* pressures on agricultural resources through soil erosion, acidification, salinization, alkalization, and water contamination

of linked economic and ecological crises: Industrialized countries are finding it increasingly difficult to manage their surplus food production, the livelihood base of millions of poor producers in developing countries is deteriorating, and the resource base for agriculture is under pressure virtually everywhere.

1. Impact of Subsidies

11. The food surpluses in North America and Europe result mainly from subsidies and other incentives that stimulate production even in the absence of demand. Direct or indirect subsidies, which now cover virtually the entire food cycle, have become extremely expensive. In the United States, the cost of farm support has grown from $2.7 billion in 1980 to $25.8 billion in 1986. In the EEC, such costs have risen from $6.2 billion in 1976 to $21.5 billion in 1986.[12/]

12. It has become politically more attractive, and usually cheaper, to export surpluses - often as food aid - rather than to store them. These heavily subsidized surpluses depress the international market prices of commodities such as sugar and have created severe problems for several developing countries whose economies are based on agriculture. Non-emergency food aid and low-priced imports also keep down prices received by Third World farmers and reduce the incentive to improve domestic food production.

13. The environmental consequences of a heavily subsidized production system are becoming evident within industrialized nations[13/]:

* lower productivity as soil quality declines due to intensive soil cultivation and overuse of chemical fertilizers and pesticides[14/];
* the destruction of the countryside, through clearing of hedgerows, park belts, and other protective cover and the levelling, occupation, and cultivation of marginal land and watershed protection areas; and
* nitrate pollution of ground-water aquifers due to the often subsidized overuse of nitrate fertilizers.

14. The financial, economic, and environmental effects of the current incentive systems are beginning to be questioned by many governments and groups, including farm organizations. A particular area of concern is the impact of these policies on developing countries. They depress international prices of products, such as rice and sugar, that are important exports for many developing countries and so reduce exchange earnings of developing countries. They increase the instability of world prices. And they discourage the processing of agricultural commodities in the producing countries.[15/]

15. It is in the interests of all, including the farmers, that the policies be changed. Indeed, in recent years some conservation-oriented changes have taken place and some subsidy systems have increasingly stressed the need to retire land from production. The financial and economic burden of subsidies must be reduced. The harm that these policies do to the agriculture of developing countries by disrupting world markets must be eliminated.

2. Neglect of the Small Producer

16. The new technology behind increases in agricultural productivity requires scientific and technological skills, a system for technology extension and other services for farmers, and commercial orientation in farm management. In many parts of Asia, in particular, small farmers have shown a remarkable capacity to use new technology once they are given incentives and adequate financial and infrastructural support. Small cash-crop farmers in Africa have demonstrated the potential of the smallholder on that continent, and in the last few years successes have been recorded in food crops also. But ecologically disadvantaged areas and land-poor rural masses have not benefited from advances in technology and will not until governments are willing and able to redistribute land and resources, and give them the necessary support and incentives.

17. Agricultural support systems seldom take into account the special circumstances of subsistence farmers and herders. Subsistence farmers cannot afford the high cash outlay of modern inputs. Many are shifting cultivators who do not have a clear title to the land they use. They may plant a variety of crops on one plot to meet their own needs, and are thus unable to use

> I think that at a forum like this there always tends to be someone standing up and saying you forgot my issue. I think my issue, as an NGO, is rather important; it is the issue of women. And I am sure that most of the people here have a serious sensitivity to women's role vis-à-vis the environment.
>
> Especially in Africa, I think it has been clearly stated over and again that women are responsible for between 60 to 90 per cent of the food production, processing, and marketing. No one can really address the food crisis in Africa or many of the other crises that seem to exist here without addressing the question of women, and really seeing that women are participants in decision-making processes at the very basic all the way through up the highest level.
>
> Mrs. King
> The Greenbelt Movement
> WCED Public Hearing
> Nairobi, 23 Sept 1986

methods developed for large stands of a single crop.

18. Many herders are nomadic and difficult to reach with education, advice, and equipment. They, like subsistence farmers, depend on certain traditional rights, which are threatened by commercial developments. They herd traditional breeds, which are hardy but rarely highly productive.

19. Women farmers, though they play a critical role in food production, are often ignored by programmes meant to improve production. In Latin America, the Caribbean, and Asia they form a large agricultural labour force, while most of sub-Saharan Africa's food is grown by women. Yet almost all agricultural programmes tend to neglect the special needs of women farmers.

3. Degradation of the Resource Base

20. Short-sighted policies are leading to degradation of the agricultural resource base on almost every continent: soil erosion in North America; soil acidification in Europe; deforestation and desertification in Asia, Africa, and Latin America; and waste and pollution of water almost everywhere. Within 40-70 years, global warming may cause the flooding of important coastal production areas. Some of these effects arise from trends in energy use and industrial production. Some arise from the pressure of population on limited resources. But agricultural policies emphasizing increased production at the expense of environmental considerations have also contributed greatly to this deterioration.

3.1 Loss of Soil Resources

21. Increases in cropped areas in recent decades have often extended cultivation onto marginal lands prone to erosion. By the late 1970s, soil erosion exceeded soil formation on about a third of U.S. cropland, much of it in the midwestern agricultural

heartland.[16/] In Canada, soil degradation has been costing farmers $1 billion a year.[17/] In the USSR, the extension of cultivation to the so-called Virgin Lands was a major plank of agricultural policy, but now it is believed that much of this land is marginal.[18/] In India, soil erosion affects 25-30 per cent of the total land under cultivation.[19/] Without conservation measures, the total area of rainfed cropland in developing countries in Asia, Africa, and Latin America would shrink by 544 million hectares over the long term because of soil erosion and degradation, according to an FAO study.[20/]

22. Erosion makes soil less able to retain water, depletes it of nutrients, and reduces the depth available for the roots to take hold. Land productivity declines. Eroded topsoil is carried to rivers, lakes, and reservoirs, silts up ports and waterways, reduces reservoir storage capacity, and increases the incidence and severity of floods.

23. Poorly designed and implemented irrigation systems have caused waterlogging, salinization, and alkalization of soils. FAO and UNESCO estimate that as much as half the world's irrigation schemes suffer in some degree from these problems.[21/] These estimates indicate that some 10 million hectares of irrigated land are being abandoned each year.

24. Soil degradation erodes the overall resource base for agriculture. The loss of croplands encourages farmers to overuse the remaining land and to move into forests and onto rangelands. Sustainable agriculture cannot be based on methods that mine and deplete the soil.

3.2 Impact of Chemicals

25. Chemical fertilizers and pesticides have played a large role in production increases since the Second World War, but clear warnings have been raised against over-reliance on them. The run-off of nitrogen and phosphates from excess use of fertilizers damages water resources, and such damage is spreading.

26. Using chemicals to control insects, pests, weeds, and fungi enhances productivity, but overuse threatens the health of humans and the lives of other species. Continuing, long-term exposure to pesticide and chemical residues in food, water, and even in the air is hazardous, particularly to children. A 1983 study estimated that approximately 10,000 people died each year in developing countries from pesticide poisoning and about 400,000 suffered acutely.[22/] The effects are not limited to the area where pesticides are used but travel through the food chain.

27. Commercial fisheries have been depleted, bird species endangered, and insects that prey on pests wiped out. The number of pesticide-resistant insect pest species worldwide has increased and many resist even the newest chemicals. The variety and severity of pest infestations multiply, threatening the productivity of agriculture in the areas concerned.

28. The use of agricultural chemicals is not in itself harmful. In fact, the level of use is still quite low in many

regions. In these areas, response rates are high and the environmental consequences of residues are not yet a problem. Hence these regions would benefit by using more agrochemicals. However, the growth in the use of chemicals tends to be concentrated precisely where they may be doing more overall harm than good.

3.3 Pressure on Forests

29. Forests are crucial for maintaining and improving the productivity of agricultural land. Yet agricultural expansion, a growing world timber trade, and woodfuel demand have destroyed much forest cover. Although this destruction has occurred worldwide, today the greatest challenge is in developing countries, particularly in tropical forests. (See Chapter 6.)

30. Growing populations and the decreasing availability of arable land lead poor farmers in these countries to seek new land in forests to grow more food. Some government policies encourage the conversion of forests to pastures and others encourage large resettlement schemes in forests. There is nothing inherently wrong with clearing forests for farming, provided that the land is the best there is for new farming, can support the numbers encouraged to settle upon it, and is not already serving a more useful function, such as watershed protection. But often forests are cleared without forethought or planning.

31. Deforestation most severely disrupts mountainous areas and upland watersheds and the ecosystems that depend on them. The uplands influence precipitation, and the state of their soil and vegetation systems influence how this precipitation is released into the streams and rivers and onto the croplands of the plains below. The growing numbers and growing severity of both floods and droughts in many parts of the world have been linked to the deforestation of upland watersheds.[23/]

3.4 Advancing Deserts

32. Some 29 per cent of the earth's land area suffers slight, moderate, or severe desertification; an additional 6 per cent is classified as extremely severely desertified.[24/] In 1984, the world's drylands supported some 850 million people, of whom 230 million were on lands affected by severe desertification.[25/]

33. The process of desertification affects almost every region of the globe, but it is most destructive in the drylands of South America, Asia, and Africa; for these three areas combined, 18.5 per cent (870 million hectares) of productive lands are severely desertified. Of the drylands in developing countries, Africa's Sudano-Sahelian zones and, to a lesser extent, some countries south of this zone suffer the most. In their arid and semi-arid lands are to be found 80 per cent of the moderately affected and 85 per cent of the severely affected people.[26/]

34. Land permanently degraded to desert-like conditions continues to grow at an annual rate of 6 million hectares.[27/] Each year, 21 million additional hectares provide no economic

> Small farmers are held responsible for environmental destruction as if they had a choice of resources to depend on for their livelihood, when they really don't. In the context of basic survival, today's needs tend to overshadow consideration for the environmental future. It is poverty that is responsible for the destruction of natural resources, not the poor.
>
> Geoffrey Bruce
> Canadian International
> Development Agency
> WCED Public Hearing
> Ottawa, 26/27 May 1986

return because of the spread of desertification.[28/] These trends are expected to continue despite some local improvements.

35. Desertification is caused by a complex mix of climatic and human effects. The human effects, over which we have more control, include the rapid growth of both human and animal populations, detrimental land use practices (especially deforestation), adverse terms of trade, and civil strife. The cultivation of cash crops on unsuitable rangelands has forced herders and their cattle onto marginal lands. The unfavourable international terms of trade for primary products and the policies of aid donors have reinforced pressures to encourage increasing cash-crop production at any cost.

36. A Plan of Action conceived by UNEP and drawn up at the 1977 UN Conference on Desertification has led to some slight, mainly local gains.[29/] Progress on the plan has been hampered by lack of financial support from the international community, by inadequacies of the regional organizations established to respond to the regional nature of the problem, and by the lack of involvement of grass-roots communities.

III. THE CHALLENGE

37. Food demand will increase as populations increase and their consumption patterns change. In the remaining years of this century, about 1.3 billion people will be added to the human family (see Chapter 4); rising incomes, however, may account for 30 to 40 per cent of the increased demand for food in developing countries and about 10 per cent in industrial nations.[30/] Thus over the next few decades, the global food system must be managed to increase food production by 3 to 4 per cent yearly.

38. Global food security depends not only on raising global production, but on reducing distortions in the structure of the world food market and on shifting the focus of food production to food-deficit countries, regions, and households. Many of the countries not growing enough food to feed themselves possess the largest remaining reservoirs of untapped agricultural resources.

> There are many contradictions in agricultural development. The blind imitation of models developed under different circumstances will have to give way to the realities and conditions existing in Africa. Large areas of virgin land have been opened up for export crops whose prices keeps declining. This is not in the interest of developing countries.
>
> There are so many problems to be overcome that we forget that every problem is an opportunity to do something positive. This is an opportunity for us to think of conservation and environment in a broad educational context. In doing so, we will be able to capture the next generation and demonstrate the wonder and the benefits of the world around them.
>
> Adolfo Mascarenhas
> IUCN Harare Office
> WCED Public Hearing
> Harare, 18 Sept 1986

Latin America and sub-Saharan Africa have much unused land, although its quality and quantity vary greatly from nation to nation and much of it is ecologically vulnerable.[31/] The Soviet Union and parts of North America have significant amounts of frontier land suitable for agriculture; only Asia and Europe are truly land-starved.

39. Global food security also depends on ensuring that all people, even the poorest of the poor, can get food. While on the world scale this challenge requires a reappraisal of global food distribution, the task weighs more immediately and heavily on national governments. Inequitable distribution of production assets, unemployment, and underemployment are at the heart of the problem of hunger in many countries.

40. Rapid, sound agricultural development will mean not only more food but more opportunities for people to earn money to purchase food. Thus when countries with untapped agricultural resources provide food by importing more, they are effectively importing unemployment. By the same token, countries that are subsidizing food exports are increasing unemployment in food-importing countries. This marginalizes people, and marginalized people are forced to destroy the resource base to survive. Shifting production to food-deficit countries and to the resource-poor farmers within those countries is a way of securing sustainable livelihoods.

41. Conserving the agricultural resource base and livelihood security of the poor can be mutually supportive in three ways. First, secure resources and adequate livelihoods lead to good husbandry and sustainable management. Second, they ease rural-to-urban migration, stimulate agricultural production from resources that otherwise would be underused, and reduce the need for food to be produced elsewhere. Third, by combating poverty, they help to slow population growth.

42. Shifting the focus of production to food-deficit countries will also reduce pressures on agricultural resources in the industrialized market economies, enabling them to move towards more sustainable agricultural practices. Incentive structures can be changed so that instead of encouraging overproduction, they encourage farm practices that improve soil and water quality. Government budgets will be relieved of the burdens of storing and exporting surplus products.

43. This shift in agricultural production will be sustainable only if the resource base is secure. As indicated, this is far from the case today. Thus to achieve global food security, the resource base for food production must be sustained, enhanced, and, where it has been diminished or destroyed, restored.

IV. STRATEGIES FOR SUSTAINABLE FOOD SECURITY

44. Food security requires more than good conservation programmes, which can be - and usually are - overridden and undermined by inappropriate agricultural, economic, and trade policies. Nor is it just a matter of adding an environmental component to programmes. Food strategies must take into account all the policies that bear upon the threefold challenge of shifting production to where it is most needed, of securing the livelihoods of the rural poor, and of conserving resources.

1. Government Intervention

45. Government intervention in agriculture is the rule in both industrial and developing countries, and it is here to stay. Public investment in agricultural research and extension services, assisted farm credit and marketing services, and a range of other support systems have all played parts in the successes of the last half-century. In fact, the real problem in many developing countries is the weakness of these systems.

46. Intervention has taken other forms as well. Many governments regulate virtually the entire food cycle - inputs and outputs, domestic sales, exports, public procurement, storage and distribution, price controls and subsidies - as well as imposing various land use regulations: acreage, crop variety, and so on.

47. In general, patterns of government intervention suffer three basic defects. First, the criteria that underlie the planning of these interventions lack an ecological orientation and are often dominated by short-term considerations. These criteria should discourage environmentally unsound farm practices and encourage farmers to maintain and improve their soils, forests, and waters.

48. The second defect is that agricultural policy tends to operate within a national framework with uniform prices and subsidies, standardized criteria for the provision of support services, indiscriminate financing of infrastructure investments,

> The problem in agriculture is not faceless. I as a farmer am a potential victim of the system that we now operate under. Why are approximately a quarter of Canadian farmers facing the immediate prospects of farm bankruptcy? It is directly related to the general concept of a cheap food policy that has constituted a cornerstone of federal agricultural policy since the beginning of settlement.
>
> We regard the current cheap food policy as a form of economic violence that is contributing towards soil exploitation and the growing impersonal relationship between farmers and the soil for economic survival. It is a policy of industrialization that can lead only towards disaster economically--for us as farmers, and environmentally for us all as Canadians and as world citizens.
>
> Wayne Easter
> President, National Farmers' Union
> WCED Public Hearing
> Ottawa, 26/27 May 1986

and so forth. Policies that vary from region to region are needed to reflect different regional needs, encouraging farmers to adopt practices that are ecologically sustainable in their own areas.

49. The importance of regional policy differentiation can be easily illustrated:

* Hill areas may require incentive prices for fruits and subsidized supplies of foodgrains to induce farmers to shift towards horticulture, which may be ecologically more sustainable.
* In areas prone to wind and water erosion, public intervention through subsidies and other measures should encourage farmers to conserve soil and water.
* Farmers on land over recharge areas for underground aquifers subject to nitrate pollution might be given incentives to maintain soil fertility and increase productivity by means other than nitrate fertilizers.

50. The third defect in government intervention lies in incentive structures. In industrialized countries, overprotection of farmers and overproduction represent the accumulated result of tax reliefs, direct subsidies, and price controls. Such policies are now studded with contradictions that encourage the degradation of the agricultural resource base and, in the long run, do more harm than good to the agricultural industry. Some governments now recognize this and are making efforts to change the focus of the subsidies from production growth to conservation.

51. On the other hand, in most developing countries the incentive structure is weak. Market interventions are often ineffective for lack of an organizational structure for

procurement and distribution. Farmers are exposed to a high degree of uncertainty, and price support systems have often favoured the urban dweller or are limited to a few commercial crops, leading to distortions of cropping patterns that add to destructive pressures on the resource base. In some cases, price controls reduce the incentive to produce. What is required, in many cases, is nothing less than a radical attempt to turn the 'terms of trade' in favour of farmers through pricing policy and government expenditure reallocation.

52. Strengthening food security from a global point of view requires reducing incentives that force overproduction and non-competitive production in the developed market economies and enhancing those that encourage food production in developing countries. At the same time, these incentive structures must be redesigned to promote farming practices that conserve and enhance the agricultural resource base.

2. A Global Perspective

53. Trade in agricultural products tripled between 1950 and 1970; it has doubled since then. Yet, when it comes to farming, countries are at their most conservative, continuing to think mainly in local or national terms and concerned, above all, to protect their own farmers at the expense of competitors.

54. Shifting food production towards food-deficit countries will require a major shift in trading patterns. Countries must recognize that all parties lose through protectionist barriers, which reduce trade in food products in which some nations may have genuine advantage. They must begin by redesigning their trade, tax, and incentive systems using criteria that include ecological and economic sustainability and international comparative advantage.

55. The incentive-driven surpluses in developed market economies increase pressures to export these surpluses at subsidized prices or as non-emergency food aid. Donor and receiving countries should be responsible for the impacts of aid and use it for long-term objectives. It can be beneficially used in projects to restore degraded lands, build up rural infrastructure, and raise the nutrition level of vulnerable groups.

3. The Resource Base

56. Agricultural production can only be sustained on a long-term basis if the land, water, and forests on which it is based are not degraded. As suggested, a reorientation of public intervention will provide a framework for this. But more specific policies that protect the resource base are needed to maintain and even enhance agricultural productivity and the livelihoods of all rural dwellers.

3.1 Land Use

57. The initial task in enhancing the resource base will be to delineate broad land categories:

* enhancement areas, which are capable of sustaining intensive cropping and higher population and consumption levels;
* prevention areas, which by common consent should not be developed for intensive agriculture or, where developed, should be converted to other uses; and
* restoration areas, where land stripped of vegetative cover has either totally lost its productivity or had it drastically reduced.

58. Identifying land according to 'best use' criteria requires information that is not always available. Most industrial nations possess inventories and descriptions of their lands, forests, and waters that are detailed enough to provide a basis for delineating land categories. Few developing countries have such inventories, but they can and should develop them quickly using satellite monitoring and other rapidly changing techniques.[32/]

59. Selection of land for each category could be made the responsibility of a board or commission representing the interests involved, especially the poor and more marginalized segments of the population. The process must be public in character, with publicly agreed criteria that combine the best use approach with the level of development required to sustain livelihood. Classifying land according to best use will determine variations in infrastructure provision, support services, promotional measures, regulatory restrictions, fiscal subsidies, and other incentives and disincentives.

60. Lands identified as prevention areas should be denied supports and subsidies that would encourage their development for intensive agriculture. But such areas might well support certain ecologically and economically sustainable uses such as grazing, fuelwood plantations, fruit farming, and forestry. Those redesigning support systems and incentives should focus on a broader range of crops, including those that enhance grazing, soil and water conservation, and so on.

61. In vast areas today natural factors and land use practices have reduced productivity to a point too low to sustain even subsistence farming. Treatment of these areas must vary from site to site. Governments should give priority to establishing a national policy and multidisciplinary programmes and to creating or strengthening institutions to restore such areas. Where these already exist, they should be better coordinated and designed. The UN Plan of Action to Combat Desertification, which is already in place, requires more support, particularly financial.

62. Restoration may require limits on human activities so as to permit the regeneration of vegetation. This can be difficult where there are large herds of animals or large numbers of people, for the agreement and participation of the local people are of the highest importance. The state, with the cooperation of those living locally, could protect these areas by declaring them national reserves. Where these areas are privately held, the state might wish either to purchase the land from the owners or to provide incentives for its restoration.

> Intensive agriculture may quickly exhaust the soil cover, causing its degradation, unless some special soil protection measures aimed at constant restoration and expanded reproduction of fertility are taken. The task of agriculture is thus not confined to obtaining the biological product but extends to constant maintenance and augmentation of soil fertility. Otherwise we will very quickly consume what by right belongs to our children, grandchildren, and great-grandchildren, to say nothing of more distant descendants.
>
> It is this misgiving - that our generation lives to a certain extent at the expense of the coming generations, thoughtlessly drawing on the basic reserves of soil fertility accumulated in the millennia of the biospheric development, instead of living off the current annual increment - that causes the increasing concern of scientists dealing with the state of the planetary soil cover.
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> B. G. Rozanov
> Moscow State University
> WCED Public Hearing
> Moscow, 11 Dec 1986

3.2 Water Management

63. Improvements in water management are essential to raise agricultural productivity and to reduce land degradation and water pollution. Critical issues concern the design of irrigation projects and the efficiency of water use.

64. Where water is scarce, an irrigation project should maximize productivity per unit of water; where water is plentiful, it must maximize productivity per unit of land. But local conditions will dictate how much water can be used without damaging the soil. Salinization, alkalization, and waterlogging can be avoided by a more careful approach to drainage, maintenance, cropping patterns, the regulation of water quantities, and more rational water charges. Many of these objectives will be easier to realize in small-scale irrigation projects. But whether small or large, the projects must be designed with the abilities and aims of the participating farmers in mind, and then involve them in the management.

65. In some areas excessive use of ground-water is rapidly lowering the water table - usually a case where private benefits are being realized at society's expense. Where ground-water use exceeds the recharge capacity of local aquifers, regulatory or fiscal controls become essential. The combined use of ground and surface water can improve the timing of water availability and stretch limited supplies.

3.3 Alternatives to Chemicals

66. Many countries can and should increase yields by greater use of chemical fertilizers and pesticides, particularly in the developing world. But countries can also improve yields by

helping farmers to use organic nutrients more efficiently. Hence governments must encourage the use of more organic plant nutrients to complement chemicals. Pest control must also be based increasingly on the use of natural methods. (See Box 5-2.) These strategies require changes in public policies, which now encourage the increased use of chemical pesticides and fertilizers. The legislative, policy, and research capacity for advancing non-chemical and less-chemical strategies must be established and sustained.

67. Chemical fertilizers and pesticides are heavily subsidized in many countries. These subsidies promote chemical use precisely in the more commercially oriented agricultural areas where their environmental damage may already outweigh any increases in productivity they bring. Hence different regions will require different policies to regulate and promote chemical use.

68. Legislative and institutional frameworks for controlling agrochemicals must be greatly strengthened everywhere. Industrialized countries must tighten controls on pesticide exports. (See Chapter 8.) Developing countries must possess the basic legislative and institutional instruments to manage the use of agricultural chemicals within their countries. And they will need technical and financial assistance to do so.

3.4 Forestry and Agriculture

69. Undisturbed forests protect watersheds, reduce erosion, offer habitats for wild species, and play key roles in climatic systems. They are also an economic resource providing timber, fuelwood, and other products. The crucial task is to balance the need to exploit forests against the need to preserve them.

70. Sound forest policies can be based only on an analysis of the capacity of the forests and the land under them to perform various functions. Such an analysis might lead to some forests being cleared for intensive cultivation, others for livestock; some forestland might be managed for increased timber production or agroforestry use and some left intact for watershed protection, recreation, or species conservation. The extension of agriculture into forest areas must be based on scientific classification of land capacities.

71. Programmes to preserve forest resources must start with the local people who are both victims and agents of destruction, and who will bear the burden of any new management scheme.[33/] They should be at the centre of integrated forest management, which is the basis of sustainable agriculture.

72. Such an approach would entail changes in the way governments set development priorities, as well as the evolution of greater responsibility to local governments and communities. Contracts covering forest use will have to be negotiated, or renegotiated, to ensure sustainability of forest exploitation and overall environmental and ecosystem conservation. Prices for