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Human development and the environment

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*The UN and Human Development in the New Millennium*

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# Human development and the environment: Challenges for the United Nations in the new millennium

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Edited by Hans van Ginkel, Brendan Barrett, Julius Court,  
and Jerry Velasquez

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# Contents

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Tables and figures .....	vii
1 Reflections on human development and the environment .....	1
<i>Hans van Ginkel, Brendan Barrett, Julius Court, and Jerry Velasquez</i>	
<b>Human development</b>	
2 Conceptual challenges of a globalizing economy .....	33
<i>Karel van Wolferen</i>	
3 Into the twenty-first century: Assessing social and political concerns .....	45
<i>Rolph van der Hoeven</i>	
4 Policy priorities for human development.....	63
<i>Ruth Kagia</i>	
5 Poverty and inequality in the era of liberalization and globalization .....	76
<i>Giovanni Andrea Cornia</i>	
6 The future of technology and the implications for society and the UN system .....	110
<i>Jerome Glenn and Theodore Gordon</i>	

7 Population – A global challenge for the twenty-first century ...	126
<i>Wolfgang Lutz</i>	
8 Institutions, corruption, and development, and their ramifications for international cooperation .....	149
<i>Beatrice Weder</i>	
9 Future of global economic governance .....	161
<i>Walden Bello</i>	
<b>Environment</b>	
10 Urbanization, industrialization, and sustainable development ..	185
<i>Fred Langeweg, Henk Hilderink, and Rob Maas</i>	
11 Water in our future .....	197
<i>Motoyuki Suzuki</i>	
12 The importance of tropical atmospheric chemistry in global change research .....	213
<i>Paul Crutzen</i>	
13 Energy requirements for the new millennium .....	220
<i>Ingvar B. Fridleifsson</i>	
14 Global food security for tomorrow .....	234
<i>Monkombu Sambasivam Swaminathan</i>	
15 Land degradation: A global and regional problem .....	245
<i>Adel El-Beltagy</i>	
16 Global governance of biological diversity .....	265
<i>A. Hamid Zakri</i>	
17 International environmental governance and its impact on social and human development .....	284
<i>Akiko Domoto</i>	
Acronyms .....	302
Contributors .....	305
Index .....	307

---

## Tables and figures

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### Tables

Table 3.1	Sub-Saharan Africa: Evolution of employment in the formal sector during the adjustment phase (as percentage of the active population) .....	49
Table 3.2	Informal employment as percentage of labour force (non-agricultural), selected countries in Latin America .....	50
Table 3.3	Gini ratios and per capita growth for selected countries, 1970s–1990s .....	51
Table 3.4	Composition of social sector expenditures (percentage of GDP) .....	54
Table 3.5	Trends in selected social indicators.....	55
Table 3.6	Temporary employment as a share of total salaried employment.....	57
Table 3.7	Indicators for “unprotected” salaried employment (percentage shares).....	58
Table 4.1	Progress in social indicators, 1970–1998.....	66
Table 5.1	Decomposition of the increase in the Gini coefficient of the distribution of household incomes between the pre-transition period (1989) and the years 1993–1996.....	80
Table 5.2	Evolution of the Gini coefficients and the income gap in China, 1978–1995 .....	82

Table 5.3	Trends in the Gini coefficients of the distribution of income from the 1950s to the 1990s for 77 developed, developing, and transitional economies .....	86
Table 5.4	Analysis of differences between the results of LSZ and the estimates presented in Table 5.3.....	87
Table 5.5	Estimated poverty rates for 1985–1998, and 1990 projection for 2000.....	101
Table 5.6	Decomposition of changes in poverty over time into changes in mean income and changes in the distribution of income .....	102
Table 7.1	Demographic trends in the world since 1950.....	129
Table 7.2	Population (in millions) by region for probabilistic projections assuming uncorrelated fertility and mortality.....	140
Table 8.1	The economic effects of corruption.....	152
Table 8.2	The effects of aid .....	156
Table 11.1	Water resources and potential availability per capita by continent.....	200
Table 12.1	Estimated rates of biomass burning in the tropics and subtropics .....	215
Table 13.1	Key energy data from 1990 for the 11 regions of the world .....	223
Table 13.2	Characteristics of the three cases for the world in 2050 compared with 1990 .....	226
Table 13.3	Assumed primary energy production from renewables in 2020.....	230
Table 14.1	Plant medicine and human health .....	239

**Figures**

Figure 4.1	A global view of HIV/AIDS: 33.4 million infected adults and children, 1998 .....	67
Figure 5.1	Trends over time in the Gini coefficient for the UK and the USA .....	79
Figure 5.2	Trends over time of the Gini coefficient of India .....	83
Figure 5.3	Non-linear relation between inequality and growth ...	98
Figure 5.4	Relation between changes in Gini coefficients over time (during rising, stable, and falling periods for which data are available) and changes in growth performance over the same period .....	100
Figure 6.1	Regional demographics of Millennium Project participants.....	111
Figure 6.2	Sectoral demographics of Millennium Project participants.....	112

Figure 7.1	Age pyramids of sub-Saharan Africa and Western Europe in 2000.....	131
Figure 7.2	Birth and death rates in Mauritius, 1871–1991.....	133
Figure 7.3	Uncertainty distribution of the size of the world's population, 1995–2100.....	138
Figure 7.4	Uncertainty distribution of the population of the world in the 60+ age group.....	139
Figure 8.1	Relationship between ODA per capita and economic growth .....	155
Figure 10.1	The share of urban population from 1950 to 2030 ....	186
Figure 10.2	Efficiency improvement and diffusion time of three kinds of environment-oriented system innovations ....	189
Figure 11.1	Water withdrawal as a percentage of water availability, 1995 .....	201
Figure 11.2	Predicted water withdrawal as a percentage of water availability in 2025 .....	203
Figure 11.3	Water use and availability per capita in Asian countries in 2025 .....	204
Figure 12.1	Calculated annual average OH concentrations as a function of latitude and season in units of 100,000 molecules per cubic centimetre .....	216
Figure 13.1	Electricity consumption and GNP per capita in selected countries .....	222
Figure 13.2	Life expectancy and energy use.....	222
Figure 13.3	World population showing historical development from 1850 to 1990 and World Bank projections to 2100.....	224
Figure 13.4	Evolution of primary energy shares – Historical development from 1850 to 1990 and in scenarios to 2100.....	228

# Reflections on human development and the environment

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*Hans van Ginkel, Brendan Barrett, Julius Court, and  
Jerry Velasquez*

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## Introduction

Every significant historic juncture provides a rationale to review and reassess the values, systems, and institutions that form the basis of contemporary societal organization. The beginning of the third millennium is no different, and presents an extraordinary opportunity to consider innovative solutions to many of the pressing problems confronting our modern world and global institutions. In this context, there is currently broad consensus around the view that the future success of the UN system, as it faces an ever more complex and demanding milieu, will depend upon its ability to embrace new thinking and realistic reforms. This theme was explored in considerable depth at a United Nations University conference entitled “On the Threshold of the New Millennium” held in Tokyo on 19–21 January 2000 which brought together leading thinkers to generate new insights and policy-oriented recommendations on the challenges faced by humanity and on the role of the United Nations in helping to address them. The conference provided a bridge between theory and practice through the engagement of governments, research think-tanks, and non-governmental organizations. Most of the position papers (including those presented in this volume) and a summary of the discussions were forwarded to New York in time for the preparation of the Secretary-General’s Millennium Report, subsequently submitted to the Millennium Assembly in September 2000.<sup>1</sup>

The UNU conference examined key issues related to the themes of human development, environmental conservation, peace, governance, and security at the global level. Four parallel working groups (on governance, security, human development, and the environment) took stock of key international trends and considered their implications for the global community in the future. The group discussions were a focused and interdisciplinary exercise with expert presentations outlining major trends, policy implications, and recommendations arising from the following issues:

- globalization and its impacts;
- short- and medium-term challenges for human development and environmental conservation;
- element of “surprise” or unpredictability and potentially critical developments;
- the manner in which national governments and the international community might more broadly address these challenges;
- the comparative advantage of the United Nations in working with the international community to address these challenges;
- the potential for partnerships among states, international organizations, commercial organizations, and civil society actors in collectively working to solve pressing global problems.

This volume reflects upon and begins to reconceptualize the relationship between human development and the environment. It is composed of two main parts drawn from the outcomes of the deliberations in the human development and environment working groups. However, it is obvious that many of the topics discussed are interlinked. For example, both working groups found that population issues were a particular source of concern. Hence, this introductory chapter highlights some key interconnections through an exploration of the political, institutional, economic, social, and cultural impacts of present development trends and their implications for global ecosystems.

## The human development challenge

Human development is fundamentally about freedom, enhancing people’s choices, and raising their level of well-being.<sup>2</sup> From this perspective, substantive freedom includes the basic facility to avoid deprivations such as starvation, undernourishment, or premature mortality. It also encompasses the acquisition of certain basic skills (such as numeracy and literacy) as well as the capacity to enjoy participation in political and economic systems. Development, therefore, can be understood as the process of challenging contemporary tendencies that reinforce social ex-

clusion in order to expand these freedoms to an ever-greater number of people. Sadly, for many such talk seems naïve. The peoples of many countries are unlikely to benefit from the expansion of freedoms in the globalizing world under current strategies. Nevertheless, it is very much hoped that the chapters presented in this volume provide new directions or at least helpful suggestions for improving performance in delivering on past promises at the national and international levels.

“We the peoples . . .” is an apposite choice of words for the opening of the UN Charter. Since the signing of the Charter at the end of the Second World War, there have been greater advances in human livelihoods across the globe than in any other period of history. In this period, for instance, life expectancy in developing countries increased from 46 to 62 years, infant mortality rates have halved, and adult literacy rates have risen from 48 per cent to 70 per cent.

Nevertheless, many unresolved challenges from the past have evolved or been exacerbated, while many new challenges have emerged. Even more surprises are yet to come, and the global community needs to be prepared to deal with the associated risks and opportunities. Fifteen years ago, few commentators predicted the end of the Cold War, the incredible power of the Internet, or the rapid spread and devastating impact of HIV/AIDS. Likewise, in the future we can anticipate that many current assumptions will be turned upside down. The nation-state, for example, is under increased pressure to cope with the implications of globalization, the increased power of transnational corporations, and the necessity for decentralization.<sup>3</sup> At the same time, the individual now has to accept ever-greater responsibility in society for things that were once dealt with by the community and the state.<sup>4</sup>

Beginning the discussion in Chapter 2, Karel van Wolferen distinguishes between two aspects of globalization – increasing economic integration, and a political mission aimed at altering the relationship between states and large business organizations. These divergent perspectives in part explain the existing widespread confusion, contention, and controversy surrounding this notion. Van Wolferen argues that UN organizations are ideally positioned to improve the conceptual apparatus so as to enhance our collective understanding of globalization and its ramifications. Taking this forward, in Chapter 3 Rolph van der Hoeven argues that globalization is posing a serious dilemma for those committed to human development by raising new obstacles against and, at the same time, new opportunities for economic and social progress. He highlights seven social and political challenges that, unless properly addressed, are likely to create more widespread antagonism against globalization from those people around the world excluded from the perceived benefits of this phenomenon.

We cannot escape the fact that today's reality is one of a world where minorities and the poor still face discrimination and considerable hardship. Not less than 1.2 billion people (one-fifth of the world population) still live in severe poverty – this means they must survive on less than \$1 a day. It is a world where, according to the United Nations Development Programme, about 790 million people are living in hunger; a place where in the past 15 years income from work rose by only 2 per cent compared with the dramatic 59 per cent increase in income from capital – sharpening the division between the rich and poor. More and more groups are affected by unemployment and poverty – long and short term – and poverty and unemployment no longer respond to class stereotypes, making the jobless ever more difficult to identify.

In Chapter 4, Ruth Kagia argues that human development has arrived at a major crossroads. Globalization presents tantalizing prospects for shared global prosperity, but it could also lead to a widening of the economic and social divides. Kagia argues that the development choices we make today will create the enabling conditions either for eradicating poverty or, more alarmingly, for deepening it. In the future, it will be crucial that new measures be designed, and old measures redesigned, to ensure that all economies are capable of competing fairly in the global capitalist system. For instance, barriers to fair trade should be tackled flexibly, especially in the agricultural and labour-intensive sectors. This could have the advantage of attracting private capital to a greater number of developing countries and could perhaps be supported by a resurgence of official development assistance (ODA) contributions back to the levels a decade ago. It is also important to promote the establishment of strategic partnerships with all stakeholders and support national governments in the implementation of human-centred, equitable, and participatory programmes. Though the creation of greater opportunities for full and fair participation in the capitalist system will be extremely difficult for all countries to achieve, and has eluded us in the past, new measures like the ones described by Kagia will be essential. The world's leaders must at some point rise to the challenge, sooner rather than later, in order to avoid greater entrenchment of North-South inequities and the potential that existing problems will grow to become insurmountable.

Reducing poverty remains the greatest challenge. Moreover, the number of people living in severe poverty is estimated to increase to 1.8 billion by 2025. Poverty, however, has many attributes. In the 1970s, most international agencies approached the issue of poverty in terms of basic needs provision. More recently, partly inspired by the work of Amartya Sen, the UNDP has been championing a human development approach.<sup>5</sup> In contrast, the World Bank in the past viewed poverty very narrowly in terms of income.<sup>6</sup> It is clear that economic growth which really benefits

the poor is a requirement for reducing poverty around the globe. However, to achieve and sustain the levels of growth required to make a substantial reduction in poverty for people in the least developed countries (LDCs), the *global* rate of growth needs to improve. It has also become increasingly clear that economic growth *per se* is not the simple answer. As Beck<sup>7</sup> states:

In the last two decades, world output has risen by 4,000 billion dollars to reach a total of 23,000 billion dollars – yet over the same period the numbers of the poor have risen by more than 20%. The share of the poorest fifth of humanity in the world income fell from 4 to 1 per cent between 1960 and 1990. By contrast, 358 dollar billionaires possess more than half of humanity put together currently earns.

In Chapter 5, Giovanni Andrea Cornia provides a comprehensive discussion of inequality issues. Cornia presents an excellent exposition of the so-called “contemporary tendencies” and provides data to show that income inequality is rising in most countries, making it more difficult to achieve poverty reduction through growth promotion alone. He places the blame firmly on the doorstep of the Washington Consensus and argues that pro-poor growth will require alternative structural, macro-economic, and redistributive policies.

A related concern is increased marginalization of many developing countries, particularly the poorest. For example, in the mid-1950s sub-Saharan Africa accounted for 3.1 per cent of global exports; by 1995 this share had fallen to 1.4 per cent.<sup>8</sup> In particular, there is increasing anxiety about the widening technology gap between the developed and developing world. In this context, Jerome Glenn and Theodore Gordon discuss the future of technology, potential societal impacts, and the implications for the UN system in Chapter 6. They focus on the globalization of science and technology, as well as the influences of key technological areas such as space, information, education, nanotechnology, and biotechnology, noting both risks and benefits in coming decades.

As mentioned above, population growth is an issue that links both human development and the environment. Over the past 50 years, the world’s population has doubled to reach 6 billion, while at the same time it is estimated that life expectancy has risen more than in the previous 4,000 years.<sup>9</sup> In Chapter 7, Wolfgang Lutz deals with the dramatic changes in demographic patterns that have taken place over the past several decades, particularly in developing countries. Although population growth is slowing down and the total population is likely to stabilize between the middle and end of the twenty-first century (most likely around 2070), the world’s population is still set to increase to 7.5 billion

by 2025. It is clear that population will continue to be a crucial factor influencing our ability to pursue sustainable development effectively. Much of the population increase will take place in developing countries, altering the distribution of the world's population. With falling fertility rates, the world as a whole, and industrialized countries in particular, will continue to shift towards ageing societies.

At the same time, the global economic system is characterized by increasing instability and insecurity. Consequently, improving overall growth and reducing instability will require reform in the rich countries as well as coordinated international action. Amongst a complex array of factors, it can be argued that the development of a relatively coherent and stable system of global governance, including the UN system, the International Monetary Fund, the World Bank, and GATT/WTO, has contributed to the move forward in the search for a qualitatively different form of human development. At the international level we can note that in recent years there has been increasing emphasis on a human rights approach to development.<sup>10</sup> Participation is increasingly highlighted as a critical element of development. Evidence from around the world in the *Voices of the Poor* study highlights the issues of powerlessness and voicelessness.<sup>11</sup> Beatrice Weder, in Chapter 8, identifies seven lessons from international experience with development cooperation, particularly focusing on the role of institutions and the impact of corruption. She explains how the international community can become more effective in fostering development provided that overseas aid (bilateral or multilateral) can support the process of institution building and target those countries that are willing to implement good policies within an effective institutional framework. It follows that multilateral organizations, according to Weder, may be better positioned to direct a future development agenda that has been reoriented in the direction described above.

In the context of the current dramatic transformation of the global society, the importance of, and rationale for, the United Nations could hardly be more compelling. We are witnessing global interactions on a scale and intensity unparalleled in history – within and between governments, corporations, and communities. The technological revolution in transport and communications is diminishing the impact of distance and time.<sup>12</sup> National economies have increasingly opened up to cross-border flows of trade, investment, and finance. Many new countries have entered the global system with the end of colonialism since the 1950s and the breakdown of the former Soviet Union since the late 1980s. The last decade has been particularly eventful – a period of accelerated globalization.

As global interactions and integration continue to multiply, issues of global governance become increasingly critical. Like never before, economic prosperity, social equity, and environmental problems are in-

tricately intertwined and increasingly traverse national boundaries. Likewise, policy decisions by individual national governments have global implications, and the decisions taken by regional and global institutions are altering the fabric of states. It is clear therefore that while globalization offers great potential to improve human livelihoods around the world, there are growing concerns from many quarters that the entire process is out of control – a runaway world.<sup>13</sup> In particular, there is considerable anxiety about the growing power of transnational corporations, which may not always act for the benefit of the majority of the world's people.

While appreciating that the United Nations can function as a powerful force for positive change, it is also essential to recognize that there is no *carte blanche*. Not many would agree with the idea of running the world through international institutions linked to the executive arms of national government promoting some form of technocratic executive arrangements for global management. This is an outdated view of the UN system. Meanwhile, others point to the gap between UN rhetoric and the reality of the UN's limited resource base. We must ask ourselves whether the United Nations, in its current form, can be best understood as a dinosaur or as a dynamo in terms of its ability to tackle contemporary global problems.<sup>14</sup>

In Chapter 9, Walden Bello looks at the role of international institutions and the management of the global economy, particularly focusing on the International Monetary Fund (IMF), the World Trade Organization (WTO), and the UN Conference on Trade and Development (UNCTAD). According to Bello, it is no surprise that the WTO and IMF are currently mired in a severe crisis of legitimacy. The dynamics of such institutions clash with the needs of an increasingly sophisticated world and with the burgeoning aspirations of peoples, countries, and communities in both the North and the South. He calls for reforms to deconcentrate institutional power and for the creation of a more pluralistic system of international institutions and organizations. What is under consideration here is the creation of a transnational system of social and environmental protection linked to the spread of civil society and participatory/representative democracy. The UN's role is to provide vision and guidance while working collectively and inclusively with civil society, government, business, and all other stakeholders to reduce obstacles to the creation of a sustainable world free from want and fear.

## Environment under threat

Human-induced environmental change has intensified dramatically over the past 50 years, with a doubling of global population and expansion of

economic activity. Although recent studies suggest that certain developed countries (the Netherlands, Japan, Germany, etc.) have made dramatic improvements in environmental performance (reducing water and air pollution and increasing energy efficiency), the overall picture across the globe is one of nature under siege and humanity the aggressor. Problems such as climate change, loss of biodiversity, and desertification, as explored in second part of this volume, can be understood as parts of the mosaic that constitutes the planetary environmental dilemma we now face.

Of the many powerful forces affecting environmental concerns, urbanization has emerged as one of the most controversial. In Chapter 10, Fred Langeweg, Henk Hilderink, and Rob Maas discuss the role of urbanization and industrial development in relation to sustainable development. The authors explore the changing role of urbanization and industrialization in a globalizing world economy, concluding that the only feasible solution to the upcoming urban crunch would entail widespread application of the multi-stakeholder approach to environmental policy formulation and implementation, with more effective engagement of the private sector in urban environmental problem solving. However, the inevitable urban crunch, if managed properly, may be one of the only ways to absorb future predicted global population growth in a sustainable manner, as long as the associated issues of suburbanization and urban sprawl are carefully controlled. This could be a classic example of where current thinking on urbanization as the manifestation of environmental problems is turned around to become a component of the solution.

It is widely recognized that global environmental problems are exacerbated by the increasing scarcity of non-renewable and renewable resources, and also by the uneven and inequitable geographical distribution of these resources and the rates and patterns of development, effectively excluding about one-third of the world's population. While acknowledging that the logic of economizing on the scarcest resources, because it limits progress, remains correct, the concern is that the pattern of scarcity is changing.<sup>15</sup> As Lutz clearly shows in Chapter 7, people are no longer scarce, but nature is. This is most apparent in the industrial sectors relying on a healthy ecological system, where production is increasingly constrained by lack of fish rather than boats or by loss of forests rather than the shortage of chainsaws. The scarcity of fresh water provides possibly the most disturbing manifestation of this phenomenon. Motoyuki Suzuki, in Chapter 11, focuses on water governance for the next century, highlighting the problems of fresh water availability and its inequitable geographic distribution. These two issues, coupled with the fact that water utilization has increased by three times with a mere doubling of the earth's population in the past 50 years, have created a situation of in-

creased “water stress”. Other important aspects for water governance and human development are health-related issues due to contamination and pollution. The author also emphasizes the need to maximize water productivity and the need for demand management in order to utilize fully the socio-economic benefits of water. More specifically, a completely new paradigm for integrated water management needs to be developed – one that will look closely at water utilization patterns, water costing, and water reuse.

In Chapter 12, Paul Crutzen examines the importance of tropical atmospheric chemistry and notes that the sudden appearance of the ozone hole caught the scientific community completely by surprise. He argues that the complexity of interactions between atmosphere and biosphere are not fully understood. Yet, at the same time, the research findings from scientific studies often form the basis for the negotiation of multi-lateral environmental agreements (MEAs) which do not fully appreciate the uncertainties and knowledge gaps.<sup>16</sup> In addition to the problems of scientific uncertainty it is also important to point out that the overlapping effect of these environmental stresses may actually be greater than the sum of the parts. This supports the need to take a holistic and integrated view of human development, environmental problems, and policy solutions. One collective aspiration, therefore, must be to reintegrate ecological and economic goals at the global level. Yet, nearly 10 years after the Rio Earth Summit, we are faced with a wider spectrum of complex and interlinked environmental problems than ever before. For example, in the UN review conducted during Rio+5, it was found that all unsustainable trends were worsening at a rate faster than at the time of the first Earth Summit in 1992. This does not necessarily mean that Rio has not contributed positively to the environmental agenda. On the contrary, the summit was *the* catalyst for many of the initiatives that have brought nature back from the brink.

In the post-Rio world, energy scarcity remains top of the agenda for many national governments and the energy sector demands the attention of the international community in terms of development of innovative renewable resources and also its relationship to the climate change debate. Ingvar B. Fridleifsson, in Chapter 13, discusses the world’s energy requirements for the next millennium. Several energy utilization scenarios to the end of this century are presented that show fossil fuels remaining as the major portion of our resource base throughout the century. The challenge for the United Nations and the international community in general would be to look at policies and technologies that can considerably reduce fossil fuel usage by the end of this century. Issues touched upon include land use and energy policy, fossil fuels, and nuclear energy and related problems. On fossil fuel utilization, the author also discusses

some related environmental aspects such as global climate change, which links to alternative fuel sources including solar energy and fission-based nuclear power plants.

Similarly, stresses on food production highlight the need for rapid development of technologies whereby maximum benefits can be obtained from shrinking per capita land and water resources. In Chapter 14, Monkombu Sambasivan Swaminathan discusses the urgent problem of global food security for the future in terms of availability, access, and absorption. In discussing these issues, the author looks at the history of genetics and food production, where initially the discovery of genetic laws facilitated the improvement of food availability and security. This was evident in hybrid and advanced varieties of rice, wheat, and maize. However, recent public concerns related to bioethics, biosafety, biosurveillance (terminator gene production), food safety (toxic or allergenic effects), and consumer choice are overshadowing the positive aspects of biotechnology. The author calls for a shift towards an ever-green revolution centred on farming systems incorporating improved management practices and utilizing new concepts, such as the virtual educational technologies, which the author noted would play an important role in the creation of a new management paradigm.

Part of this management paradigm must include measures to reduce land degradation. Adel El-Beltagy examines land degradation in the context of globalization and food security in Chapter 15. Land degradation is now widespread, particularly in arid zones. Moreover, many fragile land areas are being cultivated due to population pressures while at the same time deforestation has serious implications for land degradation and water resource management. One possible solution to this problem would be to increase land values artificially so as to limit urban and agricultural overexploitation. Also, tapping local entrepreneurial skills and increased involvement of people and farmers are important in order to ensure the success of efforts designed to reverse or halt land degradation.

The relationship between entrepreneurial capacities and biodiversity is also crucial. In Chapter 16, A. Hamid Zakri explores the global governance of biodiversity, particularly the impact of globalization on three related aspects, namely biotechnology, biosafety, and bioprospecting. Biotechnology processes in the agricultural, pharmaceutical, and chemical sectors rely on biodiversity to provide raw materials. Zakri argues that developing countries need to enhance their capabilities further so that the benefits can be shared equitably. The ability of these countries to benefit from their biological resources will depend largely on their entrepreneurial capacities and the extent to which they integrate biotechnology into their development strategies. Bioprospecting – the exploration of biodiversity for commercially valuable genetic and biochemical

resources – is another issue that is gaining importance in the context of the equitable sharing of benefits arising out of the use of components of biodiversity. Moreover, with the proliferation of biotechnology activities, in particular the potential risks brought about by living modified organisms (LMOs), biosafety needs to be given serious attention. Negotiations are already being concluded to provide for a biosafety protocol to regulate the safe transboundary movement, handling, and use of LMOs that may have an adverse impact on biodiversity and its components.

The nature of these global environmental challenges highlights the need for urgent action. There are other glaring examples of environmental problems: in the earth's mid-latitudes, ozone has decreased by as much as 6 per cent, causing increased skin cancer and eye cataracts; toxic chemicals, most notably persistent organic pollutants (POPs), are increasingly being found in most components of the global ecosystem, causing damage to the endocrine system and adversely impacting fertility rates; and increasing greenhouse gas emissions are worsening global warming and climate change trends.

This explosion of environmental issues combined with token increases in financial and human capacities for environmental protection have led to extensive discussions, such as those under the UN Millennium Assessment on the need to review the governance structures and systems created to deal with pressing environmental problems. Addressing these realities has proved to be a challenge for global governance under the UN system. Within this context, Akiko Domoto, in Chapter 17, brings the discussions to a close by exploring the need for holistic forms of environmental governance implanted within social and human development. She highlights the need for greater integration across different scales of governance (local, national, regional, and global) in order to ensure effective implementation of environmental instruments with more extensive participation from different interest groups (such as parliamentarians and business people). The discussion goes beyond traditional environmental regime theory by promoting synergies between hitherto conflicting systems such as trade and the environment. The author also highlights the need for an interlinkage approach, where natural interconnections within ecosystems are applied to guide policy in a coherent and synergistic manner.

Distilling the views of the various authors, it does seem, however, that the overall outlook for the twenty-first century is more positive and hopeful than suggested by a variety of doomsday predictions contained in other publications. Recent accounting of the natural environment in terms of goods and services indicates that the environment has a high economic value (US\$16–54 trillion per year).<sup>17</sup> Unfortunately, however, these same accounting efforts have indicated that these potentialities

remain, at present, largely untapped. As an example, opportunities for boosting food production through an ever-green revolution, and improving access to better drugs and other pharmaceuticals through the use of biotechnologies, remain largely underutilized. This is mainly due to public concerns on the perceived risks of using these technologies. Nevertheless, human ingenuity and technological advances are bound to come up with solutions to complex environment and sustainable development issues. Already, we can see beyond the horizon a number of renewable energy resources, technologies for ensuring food security and reversing land degradation, and management practices for sustainable and efficient use of water resources. The general public, mass media, and civil society at large, however, need to be fully conversant with the extent of potential threats to our natural resources and the long-term consequences of their depletion from both environmental and human development perspectives. Further, they need to be convinced that we are not powerless in the face of the forces for change, and that globalization does not mean abandoning everything to the market.

The authors do not concur with the gloom-ridden predictions of the end of the global life-support system that have permeated environmental thinking since the early 1970s. Nor do they endorse Beck's vision of a future of decline *à la carte*, where the wealthy live in gated communities, where nature reserves are occupied by militant Greens and defended by force of arms, and where in place of the United Nations, "an organization has appeared which calls itself United Coca-Cola".<sup>18</sup> Rather they see that there is an increasing push for globalization with a human face, and thus increasing pressure for further regulating the excesses of the global capitalist system.<sup>19</sup> Some form of action needs to be taken to counter current trends and predictions identified in the chapters that follow. There is no excuse any more. The problems and the solutions are known. The bottom line is the political will to act. International coordination of nation-states, the strengthening of international agencies, and greater supervision of existing elements of the global system are essential, now more than ever, to ensure effective management and control of the negative side-effects of globalization. In essence, the authors foresee states closing ranks to work with the UN system in order to promote a renewed form of human development that reaches those most in need and ensures that the environment does not suffer as a consequence.

### Integrating human development and the environment

There is a well-established tradition within the international system of governance of linking human development to the environment, and vice

versa. The origins of contemporary efforts to integrate the environment and the economy can be traced to three discourses within the supranational arena.<sup>20</sup> The first is the World Conservation Strategy, published in 1980,<sup>21</sup> which brought together the United Nations and NGOs such as the World Conservation Union (IUCN) to promote efforts to conserve endangered ecosystems through efficient resource utilization. The second track relates to the debates in UN circles on the links between environment, development, and security, from the 1972 Stockholm Conference to the 1987 Bruntland Report. Indeed, the Bruntland Commission argued that “inequality is the earth’s most important environmental problem”.<sup>22</sup> The third track relates to the work of the OECD’s environment committee, which culminated in the 1984 International Conference on Environment and Economics. The mesmeric vision that emerges from these discourses is a win-win scenario whereby it is possible to have higher living standards and other associated benefits from economic growth together with enhanced environmental protection. This would represent the substantive completion of the process of modernization that began with the industrial revolution.<sup>23</sup>

Conceptually, the definition of development as “freedom” provided by Amartya Sen<sup>24</sup> provides a useful framework to think further about integrating the development and environment debates. Sen highlights seven basic freedoms that form the pillars for the realization of basic human development and human rights: freedom from discrimination, freedom from want, freedom to develop and realize one’s human potential, freedom from fear, freedom from injustice, freedom of thought and speech, and the freedom to get decent work. In a similar sense, environmental issues are constitutive of development. The freedom to enjoy clean air and water is part of human development.

At a more practical level, the approach of integrating societal goals with regard to development and the environment is, clearly, already under way and widely recognized in academic, governmental, and business circles. In some spheres, these goals have already become mutually embedded. In others, they are treated very separately. Some argue that this compartmentalization prevents us from bringing about the full potential for problem amelioration or a broader transformation of general perceptions of the environment-development interconnections.<sup>25</sup>

In this section the authors try to strengthen the links between the individual insights contained in many chapters in the book and better bridge the various deliberations on development and environment in a manner that is challenging for policy-makers. This is no simple task since the entire volume weaves a long, diverse, and complex web of arguments. There are, however, distinct commonalities that link the differing discourses and interests presented by the authors and associated with the

contemporary global *realpolitik* of population, institutions, technology, economics, and the environment. Issues such as globalization, economic growth, population, urbanization, technological change, and resource use closely link human development and the environment. It is through a process of linkage or synergy building between these common interests that glimpses of the way forward in terms of how best to promote a new form of human development that is environmentally sustainable begin to emerge. How well the pieces of the puzzle fit together and can be manipulated to create a complete picture lies in the realms of political feasibility and expediency. A few examples are provided below regarding themes that emerged most clearly.

An issue that stands out very distinctly as linking discussions of human development and the environment is that of population growth. In Chapter 7, Lutz gives an excellent assessment of the relationship between population and climate change – an important and mostly ignored issue in recent years. He also provides a useful framework for linking the issue of population to the chapters on the environment in the second part of this volume. Lutz would like to see greater integration of the international population and environment debates, with the United Nations taking a key role in promoting interdependence of these issues. This is supported by Suzuki in Chapter 11, exploring the relationship between population and water stress/scarcity. It is also highlighted by Fridleifsson in Chapter 12, looking at population growth and energy consumption, and to a lesser extent by Langeweg, Hilderink, and Maas in the context of urbanization and population. While in the former chapter, population growth and associated development exacerbate the water crisis, urbanization represents one possible means to accommodate a growing population with a lower environmental load than their rural counterparts. This is something of a controversial argument and the evidence is inconclusive, yet the model of the sustainable city is attractive for many contemporary commentators.

Globalization is another force that bridges issues of human development and the environment. Although it emerged as an economic concept, globalization has now become understood in a much broader sense as a forceful, overarching process penetrating all aspects of life and society. It offers great opportunities for sustained welfare and well-being but, as the chapters presented in this volume illustrate, also poses numerous challenges. Internationalization is also an important but less frequently discussed force whereby we can note the increasing number and scope of international agreements in both the development and the environment arenas. Moreover, the spread of democracy offers considerable potential to increase the role of civil society in shaping the environment and development agendas. The work of Inglehart and others on the

World Values Survey and the transition under way in many parts of the world from materialist to post-materialist values systems reinforce the important contribution that stable democracy can make to subjective well-being.<sup>26</sup>

A defining aspect of globalization that has important implications for both human development and the environment is the increasing number, scope, and power of multinational corporations (MNCs). There exists an extensive literature on the development impacts, particularly regarding foreign direct investment, and the environmental impacts of MNCs. Understandably, issues addressing the challenge of corporate power are echoed in this volume by a number of authors. In Chapter 2, van Wolferen notes that a “significant number of transnational companies have become empires with a financial wherewithal that is greater than medium-sized members of the United Nations”. The economic opportunities and social and political challenges are highlighted in the chapters by van der Hoeven and Cornia. Zakri, in Chapter 16, describes corporate-driven biotechnology and the need for equitable benefit sharing with developing, resource-providing, states. The authors point to the reality of new emerging relationships that favour developing nations and note that there remains potential to shift the balance even further in the future.

The need for developing countries to attain a better growth rate so as to reduce poverty rapidly is a widely shared goal. But it is also clear that growth provides a major source of tension between developmental and environmental concerns. Domoto indicates in Chapter 17, for instance, that economic growth is linked to the precipitous decline in environmental quality across the globe. Related sets of issues reappear constantly through the chapters, and the debate has yet to be resolved adequately. For example, van Wolferen’s recommendation for a larger, economically strong, and politically significant middle class, while completely correct in terms of its potential impact on reducing poverty, needs to be treated cautiously from an environmental perspective. Thus, many would argue that policies to promote the growth of the middle class should be tempered by environmental policies designed to guard against overly excessive consumption of goods and services. Put bluntly, we want fewer poor people and consequently a larger politically significant middle class, yet without all the consumer trappings found in most modern industrialized countries today.

Many of the authors in both parts of this volume place considerable emphasis on the potential for technology to alter development and environment outcomes radically. The chapter by Glenn and Gordon provides the most extensive discussion, covering a range of emerging technologies (biotechnology, nanotechnology, space technology, etc.) and their poten-

tial contribution to the solution of many modern-day problems, as well as the challenges related to their development and application. On one hand, Glenn and Gordon argue that e-commerce “is helping to destroy the theory that economic growth is inextricably linked to high energy consumption”. On the other hand, they highlight the frightening human and environmental risks associated with genetic modification and cloning. Crutzen, in Chapter 12, adds yet another factor – the quality of our scientific knowledge and the need for focused research efforts. In Chapter 13, Fridleifsson talks about the role of clean energy technologies and their contribution to solving the problems of climate change and energy shortages. In Chapter 14, Swaminathan discusses three emerging scientific revolutions – the gene revolution, the ecotechnology revolution, and the IT revolution – and argues that in principle these could greatly increase the opportunities for the sustainable management of global ecosystems. Kagia, in Chapter 4, and Zakri, in Chapter 16, emphasize issues of equity in their respective discussions of information and communication technologies (ICTs) and biotechnology.

### The need for capacity development and commitment

Two further cross-cutting issues at the national level emerged most clearly from the different contributions: the lack of capacity to address the key issues of the twenty-first century, and the lack of commitment to both human development and environmental issues. Given the lack of financial and human resources, in many developing countries in particular, it may well be that these two issues are interlinked.

With regard to the need for further capacity development, Kagia notes that countries “will need simultaneously to address and deal with the agenda of the twenty-first century in order to become competitive participants in a global economy”. In a similar tone, van der Hoeven argues that in order to develop “a solid basis for economic and social development, institutional capacity for economic and social policy should be improved. This would call for [...] building up of capacity for people to take decisions. This would imply support for research at universities and investing in future leaders in developing countries, as well as support for civic organizations such as those for the self-employed, trade unions, etc.” Glenn and Gordon call for greater effort from international organizations in training to deal with new technologies. More specifically, Zakri notes that “many countries at present have not sufficiently developed their capabilities for taking advantage of the new opportunities in biotechnology applications”.

Langeweg, Hilderink, and Maas argue there could be new initiatives

from the United Nations to help with capacity building and stimulate local initiatives in the area of urbanization. El-Beltagy discusses the existing capacity related to the natural resource environment of rural people in developing countries, and the increasingly important role played by centres of excellence and thematic networks such as the CGIAR. Interestingly, both Glenn and Gordon and Zakri advocate the need to find ways for the private sector to provide education and training. In Chapter 16, Zakri provides the example of the collaboration between Merck Pharmaceuticals and Costa Rica's National Biodiversity Institute (INBio) – a private, non-profit organization. Merck would provide technical assistance and training to help establish drug research capacity in Costa Rica and INBio would provide Merck with chemical extracts from wild plants, insects, and micro-organisms from Costa Rica's conserved wildlands.

With regard to lack of commitment, it is Kagia who calls most strongly for “much greater commitment to international development goals”. The international development goals (IDGs) have been agreed upon at global conferences and endorsed most recently at the UN Millennium Summit – including the reduction of poverty by 50 per cent by 2015. Kagia argues that “the overall responsibility and accountability for poverty reduction and human development rests with the impoverished countries themselves”. Yet it is clear that progress towards achieving most goals has been very limited. Arguably, the most important goal – to enrol all children in primary school by 2015 – has seen the least progress.

So, too, the lack of commitment in the environment area was widely noted. It is not that there has not been much progress. Quite clearly, since the 1992 Rio Conference there have been significant institutional changes at all levels and in nearly every country. We have witnessed the emergence of new international agreements driving the formulation of new visions and strategies in government and business. Indeed, there have been many success stories. But the concern is that we are still not doing enough. Indeed, there was so little discussion concerning sustainable development during the UN Millennium Summit preparatory sessions that Kofi Annan noted in his report that it was surprising that so “little priority is accorded to these extraordinarily serious challenges for all humankind”.<sup>27</sup> In this volume, Domoto refers to the implementation deficit that was identified at Rio+5 and that will probably be reiterated at Rio+10. She does not propose the reinvention of the wheel but simply to attach a power source needed to ensure greater motion in the right direction.

Many would argue that the lack of efforts to address the environmental aspects of sustainable development is due to more pressing social and economic issues which are the main priorities for a majority of decision-makers around the world. While this is understandable for developing countries that have much greater levels of poverty and smaller econo-

mies, it is much less acceptable for the richer countries that are the major contributors to environmental damage.

It is not that the issues have altered or the dangers diminished. It is simply that the context of these concerns and the way we view them have changed. Although most people still consider development and environment as separate and distinct problems, in actuality, as mentioned above, the problems encountered and the solutions proposed now tend to be complex and interlinked. In many parts of the world, particularly where poverty prevails, too often development and the environmental goals are seen as trade-offs rather than win-win. Low-quality development all too frequently limits opportunities, restricts freedoms, and widens inequality while at the same time negatively impacting on the environment. Likewise, rigid promotion of environmental conservation principles can shift priorities for development away from the local people and negatively impact on welfare. The issue that has plagued modern society for the past 50 years, during the entire lifespan of the UN system, is how to create the conditions effectively whereby we can have our proverbial cake and eat it.

As we move forward to Rio+10, there is an overall impression that we are trapped in the first phase of what can be understood as a two-phase process.<sup>28</sup> In this first phase, our efforts have been focused on trying to gain some form of control over our growth-oriented economies. This state of affairs could best be described as “weak global sustainability”. It is a transitional phase in governmental and industrial history wherein all stakeholders still seem to be relatively inexperienced in handling environmental issues creatively, despite all the rhetoric. Phase two, which is hopefully somewhere on the near horizon, would involve a vital shift toward what Robyn Eckersley refers to as the “green market economy”.<sup>29</sup> You may not agree with her vision but she argues that in the future “all market activity (whether carried out by the state or private sector) should be more heavily regulated, scaled down in terms of material-energy throughput and made more responsive to ecological considerations and informed consumer preferences”. The pioneering initiatives and good practice schemes reported at Rio+5 are indicative of phase one. But they are isolated and relatively insignificant within the globalized economy. It is hoped that Rio+10 will provide the impetus for the widespread duplication of these initiatives in order to create a critical mass that will push the economies across the world into the second phase.

### Towards a globally sustainable green economic system

The starting point for the new millennium, say the next 10 to 20 years, may well be conspicuous by the emergence of a globally sustainable

green economic system with a human face. To create this we need to focus our efforts on eliminating the most important reasons for the slow and often lacking implementation of the already well-developed visions incorporated in such documents as Agenda 21. We must also look at the kind of instruments that could be designed to ensure that the process of implementation is more effectively energized. The challenge of how to promote a sustainable future is intimately linked to the need to improve the processes of generating, sharing, and utilizing science for sustainable development. Success in achieving this goal will be determined by our capacity to generate more action-oriented programmes and policies with greater focus on prevention and early identification of emerging problems and opportunities, as well as the necessity carefully to redesign effective processes of knowledge sharing. The changes in nearly all areas will be dramatic indeed. We have only glimpses of what global sustainability could look like. These glimpses, which manifest themselves through pilot projects, innovations in industry, new governance systems, and so on, are enough to convince many that we can make the transformation to a more environmentally sustainable way of living. We can prepare ourselves and future generations to deal more effectively with the risks and uncertainties of the modern world which are explored by the authors in the remaining chapters of this volume.

From the starting point that we face a complex set of interdependent and serious problems, the authors then take divergent views. Some consider, very optimistically, that crises will trigger innovations and change. Others feel that the best way to respond to the current ineffectiveness in many of our institutions, international agreements, and strategic approaches to problem solving is through greater integration and the promotion of holistic approaches. A number of authors argue that through some combination of innovation and integration we will move towards a condition whereby reform will become politically acceptable to a wider range of political leaders. Others see radical reform as the prerequisite.

All authors, however, seem to agree that the blame for the challenges we face is clearly shared by both the developed and developing world. Some certainly place a greater proportion of blame on the doorstep of the market fundamentalism of recent years. Thus, the way forward appears to be some combination of innovation, integration, and reform that creates the appropriate conditions for a value shift to accommodate the necessary actions designed to alleviate poverty and protect the environment. This would require people in the North to compromise on having everything and people in the South to give up on wanting everything those in the North already have. This is a gross oversimplification, but does provide a skeleton understanding of the more complex arguments presented.

Changing the values and motives underlying our contemporary behavioural patterns will be extremely difficult and should not rely on coercion. Rather, our approach should be based on technological optimism and the assumption that innovation can occur at a sufficiently rapid rate to ensure reduced resource consumption and the avoidance of further environmental decline. This does raise the very difficult question as to whether there is an acceptable level of consumption. This is a topic that is not addressed in this volume.

Nevertheless, three key measures would be essential for any regime promoting the integration of human development and environmental concerns. The first is the recognition of existing economic/market failures whereby natural resources (such as the climate) have zero price. International agreements such as the Kyoto Protocol are in effect trying to allocate property rights for our natural resources, albeit in the face of massive opposition from the prime beneficiaries of the *status quo*. Second, there is a need to address the problem of externalities within the economic system whereby the users of goods and services do not pay the full costs associated with the supply: for instance, with respect to petrol prices at the pump. Related to this is the third point, which is the need to tackle the thorny problem of inappropriate subsidies in many sectors of our modern economy that promote environmentally unfriendly activities.<sup>30</sup>

### A synergistic UN response

Progress is an awkward phenomenon to gauge. It is neither inevitable, nor infinitely sustainable, nor universal, leaving massive challenges for the international community to overcome. As mentioned earlier, for many people on the planet today, peace and prosperity are more elusive than ever. There is increasing concern over the scarcity of even the most essential resources: clean water, fertile soils, energy, and fresh air. Local wars and complex humanitarian emergencies have become more prominent in world affairs. Moreover, inequality is increasing at all levels – local, national, and global. Our contemporary form of economic growth alone is not enough to achieve large-scale poverty reduction; the nature and distribution of growth are also imperative. In the new millennium, the international community is facing these and many other major impediments to broader, encompassing progress.

The Millennium Report published by the UN Secretary-General represented a significant step in the process of linking three key international agendas – security, development, and environment.<sup>31</sup> These were expressed in terms of basic freedoms from fear and want, and a sustainable future that may be delivered through a renewed UN system sup-

porting the existing safety nets in the form of the state as a catch-all for modern social problems. The main issue of agreement was on the need to put people first. Putting people first quite clearly must mean putting *all* the people of the world first. The Charter requires that the United Nations promotes social progress and better standards of living in larger freedom. In order to meet this objective, the United Nations has to employ international machinery for the promotion of economic and social advancement for all peoples. As the Secretary-General has already indicated, it is time to make sure that we will have globalization with a human face contributing to a better life in a safer world for all.

This entire volume explores, from a variety of perspectives, the political, cultural, social, environmental, and economic consequences of contemporary trends. As the chapters in the first part clearly show, the authors deliberately avoid the doom-and-gloom viewpoint found in many similar studies and present a rather optimistic outlook on the global future, following on the basic supposition that we can make the necessary changes in order to put our collective house in order. Wherever possible the authors of each chapter have been encouraged to present solutions that would require a major commitment for change at all levels, from international to local, and which may include strengthening of the machinery of global governance in some contexts and weakening in others. In today's political climate not all of these proposals seem realistic, and some may even seem overly simplistic. When, as at present, avoiding a global economic recession appears to be the primary goal of most developed country leaders and obtaining equitable access to the benefits of globalization the goal of developing country leaders, ambitious proposals designed to alter the *status quo* may find little resonance with the global political élites. Nevertheless, the absence of an alternative, or perhaps complementary, agenda may well be what prevents the attainment of development with a human face in the first place. Hence, there is a very real need for a range of potential solutions (some old and some new) to be proposed, evaluated, and implemented when appropriate.

## Recommendations

Accordingly, in this volume the authors have presented an extensive range of specific and practicable recommendations to promote a more humane form of globalization for three target groups, namely national and international policy-makers, including those within the United Nations, the academic and research community, and civil society. Participants at the UNU Millennium Conference and the authors of chapters in this volume were specifically asked to focus on recommendations for the

UN system. This section touches briefly upon five key recommendations, as examples of the types and key characteristics of global measures that may be appropriate.

First, the international community should adopt an integrated approach to regime building. This should be through multilateral agreements that cut across environmental and human development issues as well as link them. There is certainly a need for greater exploration of the links (scientific, political, financial, and technical) and for the development of a more coherent rules structure in both economic and environmental regimes as well as between them. The complexity of the problems often demands a holistic approach in research and investigation so as to arrive at coherent and effective outcomes. However, to achieve greater cohesiveness there is a need, at the same time, to streamline and enhance the capacity of the UN system substantially to handle sustainable development issues.

Within the human development sphere, van der Hoeven believes that these issues can only be tackled through a more extensive global discourse, facilitated by the United Nations acting in an inclusive manner with increased emphasis on standard setting in terms of economic and social policy. Kagia echoes this view and notes: "it is increasingly clear that development policies are interdependent. Countries need integrated policy packages and institutional environments." Within the environment sphere, the importance of a holistic approach is also strongly endorsed by Domoto in Chapter 17 on international environmental governance. A related example of this is the UNU Inter-Linkages Initiative, which promotes holism as an approach to environmental governance at all levels, and has explored the interconnection between issues such as climate change, biodiversity, desertification, and energy.<sup>32</sup>

The increasing discussion of environmental issues in the World Trade Organization highlights the need for greater cohesiveness between the development and environmental spheres most pertinently. As El-Beltagy notes in Chapter 15, only "holistic approaches which address the entirety of the landscape and the land-use system will have a chance of success". We must now ponder deeply as to whether global environmental agreements alone are sufficient to tackle the unsustainable side-effects of the current economic growth model, or whether some more fundamental changes are required. This is the heart of the tensions underlying the contemporary pattern of global development.

Second, perhaps the most significant recommendation that came out of the UNU Millennium Conference was that of holding a UN Conference on Globalization. The many and varied challenges globalization poses to human development and the environment come out repeatedly in the chapters. One of the intrinsic weaknesses of our current approach

to the implementation of governance at the global level is the tendency to split concerns into manageable packages – environment, development, trade, gender, population, and so on. The UN Millennium Assembly represented one of the first cross-cutting reviews initiated by the UN system, and it could be taken much further with a conference on the theme of globalization. Under the umbrella of a UN Conference on Globalization it might prove possible to explore in greater depth the potential to embed further the evolutionary processes of environmental change and human development – a worthy goal set in train by the United Nations at the 1972 Stockholm Conference on the Human Environment. A UN Conference on Globalization would need to follow on from the 2002 World Summit on Sustainable Development, and could explore the potential “implementation deficit” associated with Agenda 21 and the impact that globalization has had on this and other UN processes.

Third, there is the innovative recommendation for the United Nations to be given a leading role in the provision of official development assistance. Weder, in Chapter 8, provides an insightful analysis of why international cooperation so often fails to meet the desired goals and thus why we increasingly hear of the contemporary situation of aid fatigue affecting many donor countries. If we are serious about reducing poverty, we will need to allocate development assistance in forms and to countries where it will have the most impact. Weder convincingly argues that aid would be more effective in fostering development if it was targeted to those countries that are willing to implement good policies within an effective institutional framework. The reason that multilateral aid would be more effective is because multilateral institutions are not subject to the same pressures as bilateral donors to allocate aid for reasons other than developmental ones. Again, this proposal runs counter to current tendencies and may not be viewed positively by many of the major donor countries. Nevertheless, the analysis in Chapter 8 is very compelling.

Fourth, information dissemination and capacity building for decision-makers and the general public are critical to human development, while at the same time being essential for environmental protection. The issue of capacity building is repeatedly mentioned in the volume chapters. For this purpose, the notion of a Virtual School on Human Development and the Environment to achieve this objective, where the latest advances in communication and the Internet can be exploited, may be one important direction forward. With decreasing costs and widespread use, this medium can be used to prepare and disseminate more localized information to end users. An important step could also be to develop a web portal to provide ready access to the best existing knowledge and expertise as well as ongoing projects with regard to human development and the environment.

Fifth, it is essential that we reconsider the current structure and function of the system of international environmental governance (such as the UN Commission on Sustainable Development (CSD), UNEP, the Global Environment Facility (GEF), and a host of international NGOs) in terms of how to increase their flexibility and efficiency while at the same time ensuring streamlining. One example would be the formation of an Environment Security Forum as a means to monitor pressing environmental issues and handle dispute settlement. This forum could represent an important contribution to the attainment of greater UN systemwide integration in order to tackle some of the pressing global problems discussed previously. Such a forum would facilitate rapid UN action on environmental issues and complement the existing CSD that brings together a broad range of international stakeholders, again paving the way for holism. It would also be important for such a forum to have some authority to evaluate the actions taken within the United Nations and its specialized agencies as well as by those beyond. There are, of course, many other models for reform of the international system of environmental governance, and serious consideration needs to be given to this area in the run-up to Rio+10. A similar example has also been advocated in the economic arena – the creation of an Economic Security Council as a means of governing globalization. It would ensure that the United Nations provides an institutional mechanism for consultations on global economic policies and also, wherever necessary, the international regulatory authority.

### Basic principles for effectiveness

These proposals, and others contained in this volume, all share a number of characteristics that are important for their effective implementation. Actions, programmes, and conventions over the past few decades have taught us that most effective and successful approaches to meeting international challenges include five basic principles – participation, subsidiarity, a holistic approach, the precautionary principle, and information sharing and transparency.

Regarding the first issue, projects that are participatory in nature and include partnerships with civil society, business, and the general public tend to be more successful. For example, it has been shown that international regime-building activities which involve grassroot-level participation have made remarkable progress. Conversely, activities where civil society felt that it has been excluded had a tendency to failure.<sup>33</sup>

Subsidiarity entails taking action at the most appropriate level. This becomes most important because environmental problems do not follow

national boundaries, but rather permeate all levels from global to local. Some of the most pressing human and environmental problems today, like climate change, can only be tackled effectively through coordinated global action through the UN system. Due to their cross-cutting nature, these issues affect a number of environmental and other regimes, such as international trade, investment, labour, development, human health, peace, and security. The UN system has a comparative advantage in terms of institutional capacity for dealing with this wide range of issues and its capacity to work in partnership with scientists and academics, business, and civil society. Likewise, these same problems have mostly regional impacts on agriculture or coastal flooding, and are most effectively dealt with through implementation by groups of countries with the United Nations playing a facilitating role, thus reinforcing the need for greater cooperation between the United Nations and national/sub-national government.

The need for a holistic approach has already been extensively highlighted. Holistic approaches encompass not only the link between human development and environmental constraints but also effectively engage the complete set of stakeholders in discussion and action. There is also a need to link national policy development to international concerns and policies. These approaches should be such that the pace of action can be further expedited beyond the relatively slow progress so far. It is also equally important to focus efforts to reverse detrimental trends in well-defined geographical regions that are worst impacted.

Next, it is useful to pursue a precautionary path in order to ensure that environmental and health concerns are not subordinated to meeting other human needs. The precautionary principle implies that in circumstances of scientific uncertainty, when an activity raises potential threats of harm to human health or the environment, precautionary measures should be taken. It calls for scientists and policy-makers, wherever possible, to highlight the existing and projected risks to human and environmental security, as exemplified by the work of the Intergovernmental Panel on Climate Change (IPCC). This information can be very effective in galvanizing national governments, the media, business, and the general public into action. However, policy-makers should be cognizant of the uncertainties in scientific prediction and knowledge gaps when considering longer-term policies. Risk assessment and scenario development can play an important role in reducing the impacts of existing uncertainty.

Finally, it is essential to promote greater information sharing and transparency among policy-makers and the general public on the linkages between human development and environmental issues. An effective way of achieving this is through increased interaction between these sectors and greater sharing of information with civil society. The scientific com-

munity in particular needs to gear its output as a product targeted at, and understandable to, the general public. Scientific knowledge behind popular environmental concepts, such as the precautionary principle, should be better explained to a general audience. On the whole, greater transparency in scientific research and its results is essential to building the trust of the general public.

### A contribution from the United Nations University

In this time of great change and as we shift towards a digital biotech global economy, knowledge is a critical component of progress.<sup>34</sup> Knowledge is vital to resolve the many and serious global challenges – from poverty to bad governance to humanitarian emergencies. Quite clearly, one of the main constraints to solving problems is our imperfect understanding of social, economic, political, and physical environments and their interconnections. Knowledge is also essential for the UN system. Without the results of research, many development and peacekeeping interventions cannot be successfully evaluated. The UN Secretary-General has highlighted the important contribution academic work can make towards the attainment of UN objectives. He has noted, for instance, that “the acquisition and advancement of knowledge is a more powerful weapon in a nation’s arsenal than any missile or mine”.<sup>35</sup> The president of the World Bank, James Wolfensohn, stated in a similar vein that “economies are built not merely through the accumulation of physical capital and human skills, but on a foundation of information, learning, and adaptation”.<sup>36</sup> Sharing knowledge can have significant multiplier effects. For example, solutions to the causes of poverty in one part of the developing world can also be relevant in others.

The mission of the UNU is to generate and share knowledge for human security and development and help build capacities in developing countries. As an international community of scholars, the UNU aims to fill an important niche as a global university in an increasingly globalizing world. In particular, a primary role of the UNU is to be a think-tank for the UN system. As such, it must challenge orthodox thinking on the basis of research findings and also assess the policy implications of the emerging trends in a timely manner. To be successful, close cooperation with universities, research institutions, and think-tanks is essential; in particular with their organizations on the global level. One example of such an organization is the recently established Inter-Academy Council of the Academies of Science participating in the Inter-Academy Panel on International Issues.

In the UNU Millennium Conference, participants were specifically

requested to suggest key issues for the United Nations University to concentrate on. It was suggested that the UNU, through its academic independence and position within the UN system, can promote discussion on hot issues which cannot be discussed via other platforms. The UNU is also ideally suited to support the development of measures designed to enhance human and institutional capacities in developing countries – a prerequisite for the successful implementation of international policies and multilateral environmental agreements as well as sustainable use of energy and natural resources. Equally vital is the process of educating policy-makers on environmental issues. It has become increasingly obvious that developing countries often lack sufficiently trained professionals who can develop coherent and consistent national environmental policies. It was proposed that the UNU undertake the task of multidisciplinary training in partnership with the scientific and academic community.

The Millennium Report<sup>37</sup> issued by the UN Secretary-General made a number of concrete proposals that deal directly with some of the long-term hitherto intractable global problems – issues that were also discussed at the UNU Millennium Conference. It was suggested that one of the primary research objectives of the UNU should be to explore and evaluate the potential for successful implementation of these recommendations, as well as others presented in this volume. Some of the other proposals made at the UNU Millennium Conference included, for example, the establishment of an international technology bank or an international agency responsible for technology forecasting – perhaps as equally significant as the Health InterNetwork. The dynamics behind why one set of ideas can be endorsed within the UN system and others not is fascinating as a future research topic. Moreover, the UNU should be concerned with identifying those issues that have not been covered in the recent reviews and where considerably more knowledge is required in order to guide action. Finally, the UNU can play a key role in analysing the interconnections between various problems highlighted by the UN Millennium Assembly and the implications of these interactions for their potential resolution.

The extensive range of thematic areas covered in this volume is indicative of the lively and constructive debates that took place during the UNU Millennium Conference. The chapters contained in this volume comprise a comprehensive contribution to the discussions directed at issue identification and agenda setting for stakeholders across the globe in the twenty-first century. All of the participants at the conference, however, recognized the need for more synergistic analysis of the problems and prescriptions that proved difficult to achieve in the conference hall and working groups. Therefore, the editors felt that it was their role to

begin the process of making connections between issues and their resolution. Hence, this introductory chapter has highlighted a few perspectives related to creation of a comprehensive and integrated framework connecting human development and the environment. A much more sophisticated assessment of key issues surrounding this topic can be found in the chapters that follow.

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## Human development

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## Conceptual challenges of a globalizing economy

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*Karel van Wolferen*

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The term “globalization” is widely used to describe an observable reality as well as to justify a political programme. It refers on the one hand to the vanishing of many limits on international commercial and investment practices, because of a vastly increased human reach achieved by advanced communication and data-processing technologies, and to the resulting process of partial but rapid global economic integration. On the other hand, “globalization” stands for a political mission aimed at altering the relationships between states and large business organizations. Before the eyes of governments and communities of commentators, globalization is thus presented both as an ongoing, unstoppable process, leaving them without policy options, as well as something they must help bring about through programmes of deregulation, financial liberalization, and privatization. Because the two sets of notions are inappropriately connected in numerous analyses that inform policy discourse, the true nature of the political programme tends to be obscured by assumptions of economic necessity or inevitability. The sponsors of this programme have been a collective consisting of Western financial corporations, the US Treasury, European finance ministries, Wall Street, the City of London, sundry economic publications and editors, and international organizations such as the IMF and the OECD. They have shared a conviction that deregulation and liberalization of financial systems and markets will lead to economic benefit and prosperity for every participant. The political nature of this programme has remained unclear to many of its advo-

cates because it appears to be following less from conscious design than from the logic of a confluence of global developments, such as the end of the Cold War, and neoliberal policies of accommodation with corporate empires.

As a result of the mix-up of the two meanings of globalization, reactions to it have so far characterized by widespread confusion, contention, and controversy. Interacting with this, and causing further confusion, is the widespread application of familiar economic conceptual categories to unfamiliar phenomena, unexamined political circumstances, and unanticipated cause-and-effect chains. Events of recent years, especially in Russia and East Asia, have demonstrated that the widely applied conventional frame of reference for understanding worldwide economic developments does not lead to adequate understanding of these developments. Hence, there exists today no satisfactory intellectual basis for a policy discourse concerning economic development and forms of economic harmonization not detrimental to the well-being of local populations among a diversity of political economies. Various UN organizations are ideally positioned to make major contributions to the construction of an improved conceptual apparatus with which the phenomena attending globalization can be understood.

There are five main reasons for this. First, the United Nations is unique in being the world's sole body that is not under the control of any particular country, and in which all countries have the opportunity to lend their voices to ongoing discussions concerning common human endeavours. The attainment of long-term equitable global economic development ranks with security and the preservation of the environment at the top of the list of such endeavours. Second, unlike other international organizations (such as the OECD, WTO, or IMF), UN organizations charged with development or education have not come under suspicion that they represent or are tainted by partisan economic interests. Third, many UN organizations are fundamentally committed to promote learning in their areas of competence, which is a necessary disposition for a project of conceptual improvement. Fourth, various UN institutions are well placed to contribute to such a project because of their hands-on experience in a multitude of different social and political settings, and their vast institutional memories. Finally, through existing channels of communication with all corners of the world, the United Nations can be a powerful disseminator of knowledge.

Economic crises and other developments in the late 1990s have already prompted at least two gradually evolving general agreements about the fallacy of earlier suppositions concerning globalization. The belief that advanced deregulation will eventually benefit everyone in every country has been severely undermined. Using the words of UN Secretary-

General Kofi Annan, the rising tide, in the metaphor often invoked for vastly expanded markets, does not necessarily lift all boats; it has tended to lift the yachts. James Wolfensohn of the World Bank has commented that “at the level of people” the system of the global economy is not working. Numerous others, as discussed by Cornia in Chapter 5, have conceded that globalization is enriching the few at the expense of the many, and that its promises of equitable economic development have not been fulfilled anywhere. Another very important evolving agreement is that the one-size-fits-all approach to economic analysis, and to solutions for economic problems, is intellectually primitive at best, and at worst causes disaster for countries with disturbed economies.

The primary conceptual challenge for UN agencies lies in the fact that no generally accepted conceptual remedy for either fallacy has been forthcoming. Two areas of attention appear to be obvious: understanding different types of liberalization, and understanding institutions.

### Types of liberalization

Investigation, deliberation, and thought ought to be directed at the question of where a line must be drawn between a type (and degree) of market liberalization that will stimulate, and a type that will harm desirable domestic socio-economic development. There is, for example, good reason to conclude that the large influx of foreign capital in some countries has not only expanded wealth among the propertied classes, but also stimulated wide-ranging if not all-round economic development. There is also no question that deregulation of local financial systems created new and unforeseen vulnerability to which certain countries fell victim when unforeseen and uncontrollable developments caused capital flight. Probably helpful in this context would be the introduction into general discourse of a solid distinction between traditional foreign investors who wish to participate in the development of a certain industries, and speculators who, like herds of antelope, stampede out of emerging markets at the slight provocation.

Several UN agencies are well placed to help introduce realistic caveats into what has been, until now, a relatively sterile and simplistic international discussion on the benefits of unfettered markets. The main arguments levelled at the protesters against the ill-fated WTO meeting in Seattle in late 1999 reflected the manner in which arguments used to justify the relatively well-understood and relatively beneficial international economic arrangement of free trade have been used to plead for liberalizations that unleash entirely different and ill-understood economic forces.

The advocates of the political mission of globalization made a mental jump from the evidence that a relatively free flow of goods across borders has brought great benefit to countries participating in the international free-trade system to the conclusion that an equally free global flow of capital would enlarge those benefits, and that countries participating in a system of globalized industry are obliged to extend blanket rights to foreign investors. The strong dissimilarities in the two types of trade, listed below, have been largely ignored.

- The amount of money involved in capital trade is thousands of times greater than the total value of trade in goods and services.
- Capital moves almost instantaneously to everywhere it can go, once a trade decision is made; under a liberalized regime it is unencumbered by physical and social limitations.
- The interactive effects of currency trade and trade in many financial instruments and their relatively new derivatives are but haphazardly understood, if they are understood at all.
- Speculation as distinct from conventional investment in promising ventures tends to direct most capital trade decisions, especially when the so-called emerging markets of the non-Western world are targeted.

## Understanding institutions

If the claim to universal validity of certain basic tenets of current mainstream economic theory has led to the impoverishment of economic thought, what will enrich it? The answer is relatively simple: a return to the examination of institutions in the widest meaning of the term. Economic dogmatism has recently undermined the prospects for prosperity for millions of the world's poorest people, and it ought to be replaced without fail by more subtle understandings of how institutions interact with each other, and the limits of what populations can absorb and endure in the way of economic shocks caused by market forces under varying conditions.

Economies cannot be adequately understood if they are studied as if they were not shaped by political circumstances, and as if they had no historical dimension. This is nevertheless the way in which they are more frequently than not treated by the specialists of international organizations guiding and monitoring economic development, as well as by the sponsors of the political programme of globalization. A neoliberal agenda of liberalization, deregulation, and privatization has been presented as if their supporting ahistorical tenets are self-evident and unchallengeable, and was drawn up with much intellectual encouragement from economic science as it is taught at most economics courses at universities in the

West today. This mainstream economics, heavily influenced by neoclassical axioms, has become dominant because it appears capable of explaining much economic activity in ways that have earned academic economics the reputation of being an empirical science. While this economics has undeniably produced noteworthy contributions to knowledge, its success rests largely on successful explanations of economic activity in the USA and the UK, and to a lesser extent that in continental Europe. The above-mentioned political agenda based on it tends to benefit large Western financial corporations and Western economic interests generally. Its regionally limited explanatory success and its justification of corporate power have blinded many to the fact that, for meeting putative standards of scientific rigour, it has had to exclude from its perspective the study of institutions that are relevant to the economy also as politically or socially informed institutions (van der Hoeven takes this forward in Chapter 3). Unlike economists of an earlier generation, influenced among others by Keynes, Schumpeter, and a now almost defunct American school of institutional economics, most practitioners of current mainstream economics do not consider institutions as part of an economist's area of concern. Even such a central subject as the phenomenon of the market is normally treated as an abstraction rather than studied as an institution, or rather a collection of institutions, interacting with non-economic institutions and driven by variable incentive structures. Current mainstream economics is thus purposely ahistorical and apolitical.

The application of methods for solving economic problems dictated by theory based on situations in Western economies, which were erroneously believed to be universally applicable (because "scientific"), has led to stagnation or severe setbacks in economic development programmes, and even to economically deteriorating situations in Africa, Latin America, and Russia. Many errors could have been avoided, and a much more careful approach by governments of countries with emerging markets in Asia would have protected them against emergency situations if economic reality had been viewed in the perspective of local institutions, including markets, interacting with other economic and political institutions.

In Russia, monetary and fiscal policies (which emphasized reducing inflation and budget deficits) ignored the particular social and monetary circumstances in which businesses were operating in the transition from the Soviet period, and led to the collapse of the tax base, massive capital flight, the criminalization of a segment of the economy, and an overvaluation of the rouble that had dire consequences for Russian industry. Limiting government expenditure has gone so far that wages and pension obligations have not been met. Privatization and deregulation in Russia have accomplished anything but efficient and competitive markets.

In many parts of Latin America, the state sector has been allowed to sink into poverty and is ill-equipped to deal with urbanization and other problems attending industrial development. Belief in the primacy of the market has helped preclude appropriate policy responses. Adherence to so-called structural adjustment policies insisted on by the World Bank and the IMF (explored in depth by Bello in Chapter 9) and dictated by neoclassical economic theory has tended to be a condition for receiving donor cash in African countries, with the result, again, that native potential for economic development beneficial to local populations has been smothered under ineffective programmes. One important failure of this approach is its blindness to the fact that the normal Western separation of private and public sectors does not obtain in most parts of the world outside the traditional capitalist regions. Legal systems capable of enforcing property rights tend to be underdeveloped. The belief that a “shock treatment” administered through “market forces” will hasten the development of the necessary institutional underpinnings for the proper functioning of a desired capitalist political economy has proven to be tragically misconceived. The Asian financial crisis has done most to awaken the world to the inadequacy of conventional mainstream explanations for economic phenomena, as the one-size-fits-all approach to economic decision-making was disastrously demonstrated in its wake.

Government profligacy had not been a problem among the crisis countries, their savings rates were good or even relatively high, and IMF enforcement of government austerity measures was thus not only inappropriate but counterproductive, rendering the effects of the crisis considerably more grave than they need have been. The measures intended to stabilize exchange rates (in other words, to lift the value of the currencies) mainly benefit foreign investors. A widespread conclusion holds that the IMF applied its standard recipes unthinkingly. Following the Asian crisis, the World Bank, which frequently operates in tandem with the IMF, was a conspicuous critic.

Some other salient points can be singled out from the financial crisis and its aftermath to illustrate the desirability of a conceptual revolution and the necessity of taking institutions seriously. Mainstream opinion has pointed at “irresponsible” banking, “unacceptable” informal relations between the private sector and government, and the lack of transparency as having caused structural weaknesses in the financial sector. Formulae for preventing further crises centred in large part on the elimination of what became popularly known as “crony capitalism”, which entailed establishing improved supervisory/prudential standards. The stricken countries have been portrayed as having brought disaster upon themselves through their delinquency with regard to banking practices.

It would be intellectually more profitable to consider, in the context of

what we know about the history of East Asia's industrialization, that the much-decried informal relations between government and business have been part and parcel of a formula for success. In this light the crisis countries appear significantly less blameable for their own plight. It is not that they left serious supervision and sound rules for prudential banking too late in their economic development, rather that they have practised structural favouritism and cultivated a disdain for short- to medium-term market signals for the sake of gaining industrial strength in the shortest time possible.

While the crisis countries are by no means copies of Japan, they were sufficiently inspired by its example to adopt a radically different incentive structure from that which is believed to determine relations and transactions in the American and European economies. Summing it up succinctly, we can say that in the Western capitalist market economies profit-making is the main purpose of investments by the business community. In East Asia – where business communities and government technocracies enjoy numerous informal, extralegal, and close cooperative relations – many major investments are decided on for the purpose of building strong industries. The public and private sectors could be viewed as being amalgamated for the purpose of economic development. One could also conclude that in the absence of historical developments giving birth to a bourgeoisie – a politically significant middle class – public and private sectors never became truly differentiated in many of the countries in question. Attaching the labels “public” and “private” to governmental and non-governmental organizations does not automatically create the institutional setting that would ensure characteristics associated with the accepted meanings of these terms. Under such conditions, costs and risks are regarded with entirely different eyes than they are in the West.

Providing entire industrial sectors with the wherewithal to expand massively has been a primary concern for these scarce-capital countries, and thus their financial systems were designed to allocate capital on an insider basis for the purpose of improving productivity and growth of capacity. The close connections between authorities and businesses were the only way to do this, and were essential to the allocation process. Capital allocation has taken place mainly through a protected banking system that tolerates very high levels of debt. Just like Japan, the Asian tigers wanted to be industrially strong rather than rich, but unlike the Japanese authorities, who have always made sure that their economy would never be at the mercy of jittery and capricious foreign investors by closely controlling foreign investment, the authorities of Thailand, the Republic of Korea, and Indonesia followed a fundamentally different strategy of attracting capital from abroad. Most significantly, protective walls surrounding the credit systems of these countries – which have

always been taken for granted in Japan – were removed under pressure from Washington and international organizations.

The markets in these Asian countries are administered in a way comparable to the internal markets of large Western transnational corporations. Market indications of where development would be most fitting are frequently disregarded. This economic reality may be capable of causing indignation among those imbued with mainstream economic dogma. But it follows the formula that produced the famous post-war Japanese economic miracle, which has inspired Asian governments to varying degrees. The implication that industrial systems with endemic favouritism deviate from established standards that determine economic health begs the question of the validity of these standards. Indignation with a method that has produced remarkable results of economic development, as well as indignation with structural realities that are unlikely to change fundamentally, would appear to be inappropriate in the context of the search for long-range solutions. Current mainstream opinion advocates new rules forcing transparency and laws regulating bankruptcy. A perspective informed by knowledge of local institutions, however, would reveal that relevant laws could not be implemented in a political economy that is hostile to them. Means for international economic harmonization must be found, other than exhortations on behalf of reforms that are unlikely to take place or that will not be effective.

The conceptual challenge in this context is huge and clear. Once it is accepted that Japan achieved its industrial power status through an incentive structure that is radically different from those taken for granted in American and most contemporary European settings – an inescapable conclusion when we prevent ideology from taking over thought – we can also discern an unacknowledged, but fundamental, discordance of successful economic systems.

Many foreign investors who understand that they cannot fully be part of the local credit systems have implicitly acknowledged the incompatibility of mainstream opinion and a locally informed perspective. Knowing that they would not be protected by the advantages that these same systems offer insiders, they insisted on short-term lending and subsequently were quick to pull out. Some of this appears to be understood in informed circles, but the continued emphasis on moral hazard, on transparency, and so on, prevents the policy discourse from moving in a more profitable direction.

Western businesses normally develop a tacit understanding of and accommodation with the reality of political economies in other parts of the world; they must do so in order to be successful and maintain their risks from regional involvement at manageable levels. But for the well-being of local populations it is necessary that policy-makers and international

organizations develop an explicit understanding of discrepancies that are part of unalterable reality. Only then can policy aims be formulated to help prevent the process of globalization from causing major economic dislocations and distortions. It would seem obvious that a profound knowledge of the determining characteristics of local political economies, an understanding of their history, and informed assessments of their potential for desirable transformation are the basic requirements for an institutional approach to economic reality in general, and to the problems of globalization in particular. The UNU could perform a major role in deepening knowledge towards this aim, and in broadly disseminating arguments that deserve contemplation. Such arguments have so far hardly reached the surface of discussions shaped and guided to a large extent through simplified mass-media information porridge.

Related to the abovementioned conceptual challenges are a number of policy recommendations that could serve the long-term purposes of UN agencies and enhance their stature in the eyes of the world.

### Fostering an economically strong and politically significant middle class

In line with the general mandate of various UN organizations to help reduce poverty and develop democracy, there would appear to be one outstanding policy priority: to help foster conditions that will lift the lower echelons of society into a solid, politically significant, middle class. Without losing sight of the need for fundamental assistance to the desperately poor in countries negatively affected by globalization, economic policies aimed at lifting the recently poor and less poor into an enlarged middle class with money to spend, and with political aspirations, would seem to be the best hope for all developmental areas of the world. Such a class, strongly motivated to help engender further development, can have a very significant psychological and moral impact as it demonstrates that all people can gradually gain an ability to help shape their destiny. But more often than not, such a policy demands government programmes and much more government spending than is believed to be responsible in current conventional thinking about the relationship of states and markets.

Before the Asian financial crisis, Indonesia had drawn attention because of its growing economic prosperity, and had received applause because wealth was distributed in such a way as to foster a growing middle class. Aside from bringing potentially disastrous political instability, the misguided handling of the crisis there and elsewhere pushed tens of millions of people below the poverty line.

This priority also makes immediate sense from an economic development point of view. The great weakness of several of the political economies of East Asia, in which investments are made for industrial strength rather than profit, is that after a period of rapid growth a major liability emerges when foreign markets are no longer able to absorb what the pumped-up production apparatus delivers. At the outset of the high-growth periods of the tigers, attractive investment opportunities exceeded available capital. But when available capital increases rapidly, the economic system pioneered by Japan becomes problematic. Only a middle class with the means to buy consumer products can compensate for this. A viable middle class will make the Asian economies less dependent on exports, and therefore less vulnerable to external vicissitudes.

### Maximizing conditions for economic self-determination

While acknowledging the fact of economic interdependence and its benefits, policies that ensure a high degree of self-determination are ultimately desirable for obvious reasons. Globalization has so far significantly increased the dependence of economic entities in less developed countries on foreign interests. Exploitation, the potential for which comes with the greater reach of international investors, is a built-in threat for these countries. To see this in proper perspective, one must forget arguments implying ill intent on the part of foreign economic interest, but rather conceive of exploitation as following from the logic of international economic processes (for instance as outlined by Zakri in Chapter 16 on the exploitation of genetic resources).

A substantial danger for the long term is the transformation of countries with promising economic prospects into subcontracting positions for more powerful political economies. While a subcontracting function of part of a developing industry can be conducive to growth and a limited degree of technology transfer, accompanying infrastructural developments may in the long run serve the foreign investor more than they do the domestic economy. A watch over such developments is not a superfluous luxury, and UN agencies could also help popularize the notion of economic self-determination as a desirable cause.

### Addressing the challenge formed by international corporate power to the political independence of states

The power of gigantic business empires, operating mainly from American, European, and Japanese bases, must be made the subject of a dis-

cussion that must not be deemed politically controversial. A significant number of transnational companies have become empires with a financial wherewithal that is greater than medium-sized members of the United Nations. The Global Compact initiative of UN Secretary-General Kofi Annan (also discussed by Domoto in Chapter 17), which constitutes a recognition of large transnational corporations as entities with significant political power that must be held to account, appears to be an important step in this direction. It is necessary that such corporations be reminded of the extensive social distortion and economic dislocation their power is capable of bringing about. No other respected international agency exists today for stimulating such awareness on a global scale, and an ongoing programme pointing out their responsibilities could have far-ranging effects.

### Reversing the trend of minimizing the importance of the state

This is connected to the previous recommendation. Assumptions that hold certain idiosyncratic politics and administrative habits as hindrances to economic development must be reviewed. In numerous cases existing structures of power could be harnessed to the goal of building institutions for development. States are indispensable to well-balanced economic pursuits. The Russian case is a reminder of how important a well-functioning state is for economic policy to be effective. Because the state had ceased to be effective, much financial intervention in Russia was misdirected. In neoliberal economic imagination the state and markets tend to be viewed as if they can exist only in opposition to each other – where there is more state-sponsored economic activity there is less market activity, and vice versa. This is a fallacy that requires speedy correction. A policy discourse that seeks to help ameliorate the negative social consequences of globalization, and help prevent a recurrence of financial crisis, must acknowledge the impossibility of separating the economy from political and other social institutions, and must thus recognize the importance of the state.

In a wider perspective, one need not believe in prophecies of disappearing states in the wake of globalization to be concerned about the long-term prospects of democracy in countries with governments whose effectiveness and resolve are undermined by the growing power of mostly unaccountable business bureaucracies. Much attention concerning this matter has been misdirected in recent years, through the widespread notion that entirely unfettered markets foster democracy. This is an ideological conceit, without any support from historical experience.

The state forms the only possible protection for the citizen. Globalization mythology has blinded many to the fact that the democratic state is the personification of the community as legally constituted. You can talk with it, negotiate with it, and if necessary take it to court for redress of a grievance. Without the state, individuals and families would be delivered to the vagaries of whims and fashions and prejudices of social communities or to powerful but unaccountable economic interests. States are the site where citizens resolve their political arguments, including those concerning the purposes of economies. Without the state human rights cannot be enforced.

Such arguments cannot be resolved on a global level and cannot be left to the mediation of corporations. Whether its advocates have been conscious of this or not, the neoliberal programme of globalization aims at separating the economy from political and social reality. Its global utopia can only exist in a realm where there is no interference from regional social and political exigencies. This will of course always remain an imaginary realm. The evolution of markets in a Western setting has inspired the illusion of the possibility of human endeavour that is self-contained and self-ordering, unaffected by particularistic history and politics. But the world as a whole cannot be ordered by markets, because markets must always rest on legal and moral guarantees preventing their self-destruction through inherent extremist tendencies, and such underpinnings do not exist on a global scale. Since a global state is not conceivable, the nation-state is left as producer of guarantees. Besides all that, without nation-states there will of course be no United Nations.

## Into the twenty-first century: Assessing social and political concerns

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### Introduction

The start of the twenty-first century is marked by a process of globalization that is posing opportunities and serious challenges for economic and social progress. In considering the benefits and costs of globalization it might be good to recollect, as mentioned in Chapter 1, the major types of rights and opportunities that Nobel laureate Amartya Sen discusses in *Development as Freedom*.<sup>1</sup> These include political freedom, economic freedom, social opportunities, transparency guarantees, and protective security. These freedoms are interlinked and play an important part in shaping the economic development of any society. Furthermore, there seems to be an important two-way relationship between economic and social development on the one hand and political development on the other. Economic development may lead to a certain political climate, but conversely a certain political system may determine economic development. And in certain cases a country's successful integration in the world economy is conditioned by finding political solutions for existing problems of democracy and equity. As Alain Touraine<sup>2</sup> has argued in the case of Latin America's integration in the world economy:

In Latin America, there appears to be three possibilities. The first is regressive and consists of having a decreasing share or a minority of the population participating in the world market. The second consists of improving the situation of a

substantial proportion of the population, half or more, but with a growing gap between the insiders and outsiders. Neither of these two solutions corresponds to the consensus definition of development. It is therefore necessary to consider under what conditions the third solution is possible, that which combines growth, fairer distribution and integration.

The third solution of Touraine calls for political solutions.

In this chapter, there is not the space to develop the argument on political solutions in a substantial way. Rather, it limits itself to indicating some important economic and social challenges which, if continuing at the current pace, warrant political solutions at the national and international levels. The environmental challenges, though equally significant and interrelated, are not discussed here since they are covered in detail in the second part of this volume. This chapter identifies seven economic challenges globalization poses that are relevant for social and political concerns: integration, inadequacy of growth, informalization, inequality, insufficient human capital, instability, and insecurity.

## Integration

As mentioned in Chapter 2, globalization has under the current circumstances aggravated the position of most developing countries. As the 1999 *Trade and Development Report*<sup>3</sup> indicates, the increased import content of growth together with the continued decline in terms of trade imply that growth in most developing countries is associated with higher current account deficits than in the past, necessitating higher inflows of capital. The surge in capital inflows in the 1990s can be shown to be a recovery from previous depressed trends in the 1980s rather than being an upward trend. The recent inflows have also been highly concentrated in a small number of countries, leaving many countries still with large unmet financing needs to support their economic and social development. This would thus call for continuation or strengthening of development aid to finance economic and social development, as was agreed by the world leaders in 1995 at the World Summit for Social Development in Copenhagen.

Yet one of the striking facts of the wave of globalization in the 1990s is the starkly declining importance of aid in the global financial flows. Aid, as part of global financial flows, declined from 56 per cent in 1990 to less than 20 per cent in 1998, mainly due to important increases in private flows but also due to a stagnation of aid flows. This is a huge shift in a very short time period of less than 10 years. Aid is important for countries that are not able to attract private capital flows nor foreign direct

investment; these are the poorer countries. A small number of countries which have good economic management and trade policies attract capital flows. But countries which do not score high on this account are doubly punished under the current system of international capital flows and development assistance: they are not receiving any private flows, and may also be locked out of receiving an increase in development aid. Hence it becomes very important to consider the political question of what the conditions for aid should be for countries which do not have a good track record on good economic policy and which are not able to attract private capital flows. Would this imply an increase in conditionality in order to force countries to apply better economic management, or would there be other means adopted in order to improve good economic management? Increasing conditionality will not work. In order to develop a solid basis for economic and social development, institutional capacity for economic and social policy should be improved as well as the capacity of the people taking decisions. Democratic control and participation by those involved in the consequences of the policies should be increased to provide necessary countervailing power. This would call for less conditionality and for increasing building up of capacity for people to take decisions. This would imply support for research at universities, investing in future leaders in developing countries, and support for civic organizations such as those for the self-employed, trade unions, etc.

### Inadequacy of growth

Globalization needs to deliver equitable growth. If continued efforts for globalization do not translate themselves into equitable growth, there will be a risk of social unrest. Yet many countries have a GDP growth rate today which is lower than it was in the 1960s or early 1970s. This indicates, therefore, that coordinated international action to revive growth in all countries remains a necessary element of a global economic and social strategy. Globalization calls for more rather than less coordination between states. There is thus a need to make social concerns and employment creation at a global level a major objective. Toward this end, international efforts need to ensure that growth initiatives in industrialized countries create the necessary demand pull in developing countries (and not frustrate this through artificial trade barriers).

Increased coordination in the international financial system also needs to consider that countries are seriously constrained to adopt short-term macroeconomic policies to withstand a crisis and safeguard social gains. For example, the use of monetary policy in the absence of capital controls becomes difficult, as lowering interest rates to increase capacity

utilization, growth, and employment can lead to capital outflows. Increasing interest rates to stem capital outflows will lead to instability and job losses and induce a recession. In the recent past, controlling inflation has been an overriding preoccupation in macroeconomic policy-making, both in advanced industrialized countries and in the developing world. However, the main constraints to growth for both groups of countries lie as much on the demand as on the supply side. Thus, to raise the world rate of economic growth, it is necessary both to consider supply-side constraints and to increase the trend rate of growth of real demand. However, increasing real demand today is not a matter of simply instituting expansionary fiscal and monetary policies. It involves complex structural change given the conditions of increased competition in a globalized world economy. There remains the need to strike a balance between the desire to control inflation and the necessity of stimulating faster growth.

Finally, improving gender equality is likely to enhance economic growth. Eliminating gender discrimination in job opportunities and pay would increase both women's income and the country's GDP. Thus, macroeconomic policies should be applied which promote gender equality and produce gender-aware policy tools.

### Informalization

Informalization in many of the economies of the South (and more recently of the North) is caused by the fact that although liberalization in national and international markets has in many cases resulted in productivity growth in enterprises, this productivity growth has often led to cost reductions and increases in profits rather than to the rapid expansion of formal sector employment in order to absorb the growing labour force. Some countries managed to combine increased productivity with expansion of employment in the formal sectors, but for many countries, informalization keeps challenging conventional labour market policies (and social security).

In Africa, since the introduction of adjustment programmes, the percentage of the labour force working in formal sector jobs has declined (Table 3.1). This is mainly due to a declining number of workers in state enterprises and the inability of the economic and social system to generate sufficient jobs in other sectors to accommodate both the retrenched workers from the public sector and the new school leavers. Despite policy changes such as adjusted exchange rates and decreased budget deficits and some positive per capita growth, this recovery in Africa has not translated itself yet into massive creation of new jobs. Industrial and formal sector employment have hardly increased. Adjustment may take

Table 3.1: Sub-Saharan Africa: Evolution of employment in the formal sector during the adjustment phase (as percentage of the active population)

Country	1990	1995
Kenya	18.0	16.9 <sup>a</sup>
Uganda	17.2	13.3
Tanzania	9.2	8.1
Zambia	20.7	18.0 <sup>a</sup>
Zimbabwe	28.9	25.3

Note: <sup>a</sup> 1994.

Source: W. van der Geest and R. van der Hoeven, *Adjustment Employment and Missing Institutions in Africa: The Experience in Eastern and Southern Africa* (London and Geneva: ILO and James Currey, 1999).

time, but nevertheless results are very slowly forthcoming, putting the achieved adjustment measures under pressure. International markets have sensed this ambivalence in African adjustment programmes. Despite the richness in terms of primary commodities, climatic conditions, and low (international) cost of labour (following successive devaluation of the currencies, especially in English-speaking Africa), foreign domestic investment, which is needed to provide the financial backing for the necessary structural changes, has not been forthcoming. This makes it even more difficult to manage the transitional cost of the present reforms in Africa.

Some recovery took place in Latin America in the 1990s, with almost all countries having a positive GDP growth rate, but unless the GDP growth rate is robust at levels well above the labour force growth rate and also sustainable, growth in formal sector jobs remains limited. In effect, in most countries in Latin America one detects an increase in the number of workers in the informal sector (Table 3.2) which makes many workers understandably fearful of globalization and further liberalization measures.

## Inequality

Globalization has resulted for many countries in an increase in wage and income inequality. For those countries where reliable data are available in the 1980s, we notice that inequality increased for four out of eight countries in the lower income inequality band, in eight out of 14 countries in the medium income inequality band, in six out of nine countries in the high income inequality band, and in both of the two countries in the very high income inequality band (Table 3.3). A more comprehensive analysis can be found in Chapter 5 of this volume.

Table 3.2: Informal employment as percentage of labour force (non-agricultural), selected countries in Latin America

	1990	1991	1992	1993	1994	1995	1996	1997
Latin America	51.6	52.4	53.0	53.9	54.9	56.1	57.4	57.7
Argentina	47.5	48.6	49.6	50.8	52.5	53.3	53.6	53.8
Brazil	52.0	53.2	54.3	55.5	56.5	57.6	59.3	60.4
Chile	49.9	49.9	49.7	49.9	51.6	51.2	50.9	51.3
Colombia	55.2	55.7	55.8	55.4	54.8	54.8	54.6	54.7
Mexico	55.5	55.8	56.0	57.0	57.0	59.4	60.2	59.4
Paraguay	61.4	62.0	62.2	62.5	68.9	65.5	67.9	59.4
Uruguay								
(Montevideo only)	36.3	36.7	36.6	37.0	37.9	37.7	37.9	37.1
Venezuela	38.8	38.3	37.4	38.4	44.8	46.9	47.7	48.1

Source: ILO, *Labour Overview: Latin America and the Caribbean* (Geneva: ILO, 1998).

Theory on income inequality and adjustment and globalization often points to declining inequality, as adjustment and trade liberalization will favour the production of goods by the production factor in which a country has comparative advantage (for most developing countries, unskilled labour). However, evidence is often not supportive of these theoretical outcomes. The ILO<sup>4</sup> indicates, for example, that in most countries which underwent structural adjustment programmes in the 1980s, wage dispersion increased with falling real wages. Also the World Bank<sup>5</sup> argues that:

information on wage inequality in developing countries is sparse and mixed ... Evidence from East Asia supports the view that greater openness in countries with an abundance of unskilled labour benefits this type of labour [but] even for these countries however, the picture of relative wages is more complex, reflecting the interplay of the increase in relative demand for unskilled labour and the supply of skilled labour.

The recent financial crisis has, however, demonstrated that wage and social security systems were vulnerable to external shocks. For Africa, “greater openness and policy changes in the 1980s are associated with recovery in growth and some reduction in poverty, but with an increase in equality in some cases”. The World Bank report continues: “The generally favourable verdict on East Asia in the 1960s and 1970s has been brought into question by analysis of experience in Latin America in the 1980s. In some countries increased openness has been associated with widening wage differentials.”<sup>6</sup>

The facts thus seem to be clear. The increasing inequality may lead to different policy conclusions, however. One conclusion is that liberalization has not been advanced sufficiently and that domestic labour market

Table 3.3: Gini ratios and per capita growth for selected countries, 1970s–1990s

	Gini ratios			Per capita growth		
	1970s	1980s	1990s	1970– 1980	1980– 1990	1990– 1995
Taiwan	20.9	21.1	–		–	–
India	30.9	31.4	31.1		3.7	2.8
China	–	31.5	36.2		8.7	11.7
Indonesia	36.6	33.4	33.1		4.3	5.9
Pakistan	35.5	33.4	–		3.2	1.7
Republic of Korea	36.1	35.6	–		8.2	6.2
Bangladesh	34.8	37.3	–		1.9	2.5
Jamaica*	–	43.2	39.8		0.8	1.9
Côte d'Ivoire	–	39.1	41.4		–3.7	–2.2
Singapore	–	39.0	40.0		4.7	6.8
Uganda*	–	33.0	41.0		0.7	3.5
Venezuela*	41.5	42.9	44.4		–1.6	0.2
Jordan*	40.8	36.1	40.7		–5.2	3.4
Sri Lanka	38.8	43.7	–		2.8	3.6
Tanzania*	–	44.0	48.6		0.3	0.2
Tunisia	44.0	43.0	41.0		0.8	2.1
Philippines*	41.9	45.0	45.0		–1.6	0.0
Hong Kong	41.9	41.4	45.0		–	–
Bahamas	48.2	44.4	43.0		–	–
Costa Rica	46.1	45.1	–		0.2	3.0
Trinidad and Tobago	48.5	41.7	–		–3.8	0.2
Thailand	41.9	47.4	50.1		5.9	7.2
Senegal*	49.0	45.1	54.1		0.2	3.0
Chile	48.0	51.0	50.3		2.5	5.7
El Salvador*	46.1	48.4	50.0		–0.8	3.9
Guatemala	–	58.6	59.5		–2.0	2.8
Malaysia	51.5	48.0	–		2.6	6.4
Colombia	52.1	51.2	–		1.8	2.8
Honduras	–	54.0	52.7		–0.6	0.5
Mexico*	55.0	52.7	57.0		–1.3	–0.7
South Africa	51.0	49.0	62.3		–0.9	–1.1
Brazil	57.0	58.7	60.6		0.5	1.0

Note: \* Indicates data taken from a database maintained by UNU/WIDER.

Sources: M. Bruno, M. Ravallion, and L. Squire, “Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issue”, in V. Tanzi and K.-Y. Chu (eds) *Income Distribution and High-Quality Growth* (Cambridge, MA: MIT Press, 1998); World Bank, *World Development Indicators: World Development Report 1998–99* (Washington, DC: World Bank, 1999).

constraints have inhibited the markets in profiting from liberalization (as in the World Bank report cited above). One might also conclude that the liberalization process is influenced by other mechanisms which are not explained by the traditional theories of comparative advantages. Alter-

native explanations for increased inequality introduce more than two categories of labour (namely no education, basic education, and higher education), and argue that for successful export production at least basic education is necessary.<sup>7</sup> Other explanations are that manufacturing tends to be dominated by large companies in the formal sector, where wages are higher, which have weak linkages to the small-scale sector (“globalization accentuates the disadvantage of small scale producers”), or that liberalization makes it easier to import capital goods (especially if exchange rates are overvalued), which increases productivity and raises the demand for skilled labour at the expense of unskilled labour.<sup>8</sup> Furthermore, Amsden and van der Hoeven<sup>9</sup> observe that the distribution between incomes from labour and capital in industry has shifted in the direction of capital in the 1980s, which has led to changes in consumption patterns and lifestyles, adding to inequity.<sup>10</sup> Also liberalization has resulted in the decline of trade union membership, which has weakened the bargaining power of workers.

In the process of globalization there are thus tendencies to widen inequality. Special measures to reduce inequality need therefore to be a necessary component to “traditional” policies which encourage globalization, such as trade and capital market liberalization. Countries that reduced income inequality and had a reasonable growth record relied amongst others on a set of income policies that included an active minimum wage policy. They also relied on mesopolicies dealing with the distribution of the fiscal burden of targeted public expenditure and on microeconomic policies.

However, a pro-equality set of policies depends not only on the economic policies themselves but on the social situation in the country, and especially on the question of whether a society is willing to give priority to distributional issues in times of economic crisis.<sup>11</sup> Politically it is often more difficult to develop a distributional strategy in times of economic difficulty than in times of economic growth.

The paradox is therefore that economic policies can have elements favouring an equal distribution, especially in those countries which already had a more egalitarian society, but that applying more equity-oriented economic policy in a less egalitarian society is probably doomed to failure. Changes in distribution of assets and human capital should become a necessary complement of macroeconomic policies to reduce inequality and stimulate growth.<sup>12</sup>

### Inadequacy of human capital

Globalization and adjustment programmes in developing countries have put social expenditure under strong pressure. However, in some coun-

tries downward pressure on expenditure on education, health, and social welfare had already started during the economic crisis in the 1980s, before globalization took off and adjustment programmes were applied. Globalization and adjustment programmes are therefore not necessarily the principal cause of decline in social expenditure, although the programmes often failed to reverse the decline. A recent evaluation of adjustment programmes by the World Bank has pointed out that, especially in Latin America and Africa, these programmes were accompanied by a decline in the percentage of social expenditure in total government expenditure (Table 3.4).<sup>13</sup> Given the fact that total government expenditure often declined in absolute terms, this resulted in declining per capita expenditure figures.

However, average expenditure figures are not always a good indication of quality, and may also hide shifts in distribution of expenditure between various groups. Educational and health indicators which measure results rather than inputs, such as primary and secondary school enrolment and infant mortality, are more relevant to the poor. The evidence points to a deterioration in education standards and a slowdown in the decline in infant mortality rates during adjustment, and less than full recovery after adjustment (Table 3.5). This is most noticeable in Africa, where in a number of countries primary school enrolment rates actually declined (a phenomenon unprecedented in history), affecting large parts of the population especially in poorer areas,<sup>14</sup> as well as in Latin America, where the middle class in particular suffered large setbacks in providing their children with accessible quality education. Limited or absent progress in education has serious implications for efforts by countries to increase productivity for production for domestic and export markets, and will thus stifle efforts to take part in the global economy.

Women's contribution to wealth creation is hampered not just because of discrimination in job opportunities (as indicated in the section on inadequacy of growth) and pay, but also by the unequal access to inputs such as human capital, tools and equipment, knowledge, technology, and, sometimes, markets. The policy mix should therefore not just promote employment equality but equality in access to inputs and markets as well.

However, educational attainment is a necessary but not a sufficient condition for skill-intensive production.<sup>15</sup> All countries with a high share of skill-intensive exports also have a relatively high educational attainment, but countries such as Argentina, Chile, Peru, and Uruguay, with a relatively high educational attainment, have not achieved massive progress in skill-intensive exports. UNCTAD<sup>16</sup> argues that almost all countries where high educational attainment has translated into skill-intensive exports are those that have sustained a rapid pace of capital accumulation, technological upgrading, and productivity growth over many decades.

Table 3.4: Composition of social sector expenditure (percentage of GDP)

Expenditure	Asia			Latin America <sup>a</sup>			Sub-Saharan Africa <sup>a</sup>		
	Before adjustment programme	During adjustment programme	After adjustment programme	Before adjustment programme	During adjustment programme	After adjustment programme	Before adjustment programme	During adjustment programme	After adjustment programme
Total social spending	2.7	3.3	3.4	7.1	7.3	7.8	5.9	5.6	5.3
Education	1.8	2.2	2.2	3.0	2.7	2.6	3.4	3.3	3.1
Health	0.5	0.6	0.6	1.7	2.1	2.4	1.3	1.2	1.1
Percentage of total expenditure									
Total social spending	17.9	19.6	19.6	23.7	23.4	19.3	26.1	22.4	19.9
Education	11.8	12.9	12.6	19.6	16.9	14.3	16.3	14.2	13.5
Health	3.6	3.4	3.7	9.2	10.9	11.0	6.0	5.4	5.2

Note: <sup>a</sup> Only countries with data for the post-adjustment period.

Source: World Bank, *Social Dimensions of Adjustment: World Bank Experience 1980–93* (Washington, DC: World Bank, 1996).

Table 3.5: Trends in selected social indicators

Indicator	Asia			Latin America <sup>a</sup>			Africa <sup>a</sup>		
	Before adjustment programme	During adjustment programme	After adjustment programme	Before adjustment programme	During adjustment programme	After adjustment programme	Before adjustment programme	During adjustment programme	After adjustment programme
% change in gross enrolment ratio	1.3	0.5	0.3	1.4	-0.4	1.0	4.7	-0.5	-0.4
% change in infant mortality rate	-2.5	-3.1	-3.6	-5.6	-2.5	-2.4	-1.8	-1.7	-1.4

Note: <sup>a</sup> Only countries with data for the post-adjustment period.

Source: World Bank, *Social Dimensions of Adjustment: World Bank Experience 1980-93* (Washington, DC: World Bank, 1996).

The relation between openness, adjustment, human capital, and productivity increases is thus complex, but data are sufficiently robust to argue that a slowdown or reversal in primary and basic secondary and vocational education contributes to greater inequalities in societies, and that such a slowdown restricts increased production for exports.

### Instability

Globalization has led to increasing instability at the international level. For example, the Asian crisis triggered off a decline in producer prices for primary commodities of more than 15 per cent in 1998. This, combined with a decline in the growth of exports of developing countries to developed countries from about 10 per cent to 3 per cent per year in 1998, and a drying up of capital flows to developing countries, has led for the totality of developing countries to a demand outfall of 3–4 per cent of their GDP in 1998.<sup>17</sup> This is far larger than the percentage of aid to GDP provided, which for all developing countries was less than 1 per cent.<sup>18</sup> Only countries in Africa and some in Central America and Asia have a higher percentage of aid to GDP than 3–4 per cent. Hence in many cases aid can still not compensate for the sometimes adverse instability on trade and capital markets which many developing countries undergo. But what is also worrying is that in those countries where aid can compensate for large shocks in GDP, the large percentage of aid to GDP (over 5 per cent) restricts developing countries in their own decision-making processes. This is due to the fact that still 60 per cent of official development assistance (ODA) is bilateral. This means that developing countries have to spend an enormous effort on coordination, and have to accept continuous interference in their national planning processes to deal with a score of bilateral donors. Hence we notice a paradox: aid often cannot help in coping with external shocks and, if it does, by the very nature of the aid process it interferes too much in the decision-making processes of the developing countries. This means that aid is not a proper instrument to assist poorer countries in coping with increased instability following globalization. Weder presents an interesting assessment of aid effectiveness in Chapter 8.

### Insecurity

Globalization also leads to instability and insecurity at the national level, affecting the employment situation of many workers and especially female workers.

As markets become more global, even well established enterprises can be challenged. Moreover it has become technically possible to outsource part of the production process and locate it in other countries. The comparative advantage of countries is increasingly subject to change. New forms of employment are emerging. Although some of these deviations from standard forms of employment correspond to new options for many workers, there is justified concern about their negative social consequences.<sup>19</sup>

Although data are not always compatible, there are indications that temporary work in industrialized and some Latin American countries increased (Table 3.6). Also in Latin America, there are indications that the number of persons working under more precarious contracts increased (Table 3.7). Information for industrialized countries points in the same direction.<sup>20</sup>

The breaking down of traditional protection mechanisms has resulted in the tendency for women in developing countries to accept more vulnerable jobs with lower remuneration. These jobs (often in sweatshops) are also frequently physically hazardous for employees. Furthermore, low-income households show that the women members respond to economic distress by increasing their labour force participation rate, as well as the hours and intensity of their non-market labouring activities, and adapt their behaviour in an effort to maintain the real consumption level of the household. A large part of the burden of increased instability in developing countries generally falls on women.

Many countries, either because of external disequilibrium or because of domestic imbalances, have to implement stabilization and adjustment policies in order to reduce their fiscal and external deficits and so reduce instability. Structural adjustment policies were introduced for that pur-

Table 3.6: Temporary employment as a share of total salaried employment

	Mid-1980s	Around 1990	Latest available
EU-12	8.9	10.2	12.2 (1997)
Finland	11.2	13.1 (1991)	17.1 (1997)
Canada		8.0 (1989)	11.0 (1995)
Australia	21.2	19.3	24.1 (1996)
Japan	10.5	10.7 (1988)	11.4 (1998)
Republic of Korea	17.2 (1985)	16.8	14.2 (1998)
Argentina		8.9	10.2 (1996)
Colombia		15.7	18.0 (1996)

Source: ILO, Working Party on the Social Dimensions of Trade Liberalization, *Country Studies on the Social Impact of Globalization*, GB 276/WP/SDL/1 (Geneva: ILO, 1999).

Table 3.7: Indicators for “unprotected” salaried employment (percentage shares)

	Early 1990s	Latest available
Argentina	21.7 (1990)	34.0 (1996)
Bolivia	28.0 (1991)	34.8 (1997)
Brazil	31.8 (1992)	32.6 (1997)
Chile	17.0 (1990)	22.3 (1996)
El Salvador	59.1 (1994)	61.3 (1997)
Mexico	43.4 (1990)	49.6 (1997)
Peru	25.5 (1990)	34.1 (1996)

Source: ILO, Working Party on the Social Dimensions of Trade Liberalization, *Country Studies on the Social Impact of Globalization*, GB 276/WP/SDL/1 (Geneva: ILO, 1999).

pose in the early 1980s, and although these policies managed in most cases to reduce external and internal deficit, the progress on the social front leaves much to be desired. The lack of creation of decent jobs in many countries is still noticeable, along with a pause in or a slowing down of human capital formation.<sup>21</sup> Furthermore, reducing external stability through structural adjustment programmes has often resulted in increased insecurity for a large part of the population. Thus the content and nature of adjustment programmes need to change. At the national level, this would require a better knowledge of the linkages between the short-term stabilization elements, such as fiscal tightening and employment creation, as well as between the medium- to long-term elements of structural adjustment policies (such as liberalization of factor and product markets), and of the sectoral adjustment policies (such as agricultural, industrial, and financial sector adjustment policies) and employment creation. This calls for the development of alternative models for adjustment which include equal attention to social and political variables.

It has become commonplace, especially after the Asian crisis, to suggest that developing countries should establish so-called safety nets to deal with insecurity. The experience with schemes of targeting has been generally unsuccessful in providing safety nets for the poor, particularly for the poorest. Rapidly designed safety nets are not a substitute for anti-poverty policies or social security systems. The primary focus should be on full-fledged social policies and on policies to generate full employment. Emergency programmes should seek to contribute as much as possible to increased opportunities for improved reinsertion in the labour market.

Increased insecurity and instability make people unsettled. A growing feeling of uncertainty will cause large parts of the population to reject globalization. Paradoxically, it has been the countries with superior systems of social insurance which were able to open up their economies and

to profit from globalization.<sup>22</sup> Political support for globalization will remain uncertain unless systems of social insurance and social security are expanded and not eroded. For industrialized and transition economies this would imply an actualization of current social insurance and social security systems to new labour market trends of more precarious jobs and more frequent job changes. For developing countries this would imply combining traditional forms of support with the introduction of social security systems. For instance, in the wake of the Asian financial crisis the ILO's work has demonstrated the need for social security systems to be in place ahead of the crisis in order to reduce its impact and ensure that the costs are not borne by the poor and vulnerable.<sup>23</sup>

## Conclusions

A major conclusion of this chapter, somewhat similar to the views of van Wolferen in Chapter 2, is that unless social and political concerns of globalization are properly dealt with, groups in the world might find it difficult to accept policy prescriptions to promote further globalization. It is therefore extremely important that the social and political challenges caused by globalization are fully recognized. This chapter has distinguished seven such challenges.

First is the need for better integration of developing countries into the world economic system as a precondition for a better distribution of the benefits of globalization between North and South. Second, in order for developing countries to achieve a higher growth rate, international co-ordination is needed as part of a global strategy to deal with the inadequacy of growth. Third is the need to contain growing informalization of economies in developing countries and developed countries, leading to increased duality in the labour markets. Fourth, there is a need to reduce growing inequality between different groups in society, and especially between those who are able to profit from globalization and those who are negatively affected by globalization. Fifth, there is a need to deal with the inadequacy of human capital formation in many parts of the world in order to help prepare for future globalization. Sixth and seventh are the need to reduce increased instability and insecurity at the international level and the national level; countries have to face more unstable economic systems while persons and families have to face a more unstable social and economic system.

It is important for national governments and the international community jointly to address these issues, as they often transgress national borders. One of the problems that one notices with the current processes of globalization (and also indicated by the protests against the WTO minis-

terial conference in Seattle in December 1999) is that partial solutions to the economic and social problems of globalization are not sufficient. One needs an integrated approach to deal with economic, social, and political concerns simultaneously. For example, when countries negotiate and prepare for a more open trading system and a more global financial market system, it is imperative at the same time to increase and actualize social security systems. Also the increased open trade and financial market systems may reduce the autonomy national governments have in macroeconomic and fiscal policy measures and therefore necessitate greater coordination of macroeconomic and fiscal policy between the different nations. Care should be taken in such a coordinated system not to resort to the lowest common denominator in setting social policies. Countries should, through intergovernmental negotiations as part of the UN system, arrive at acceptable forms of social protection and social policies in all countries.

The UN system has a comparative advantage in streamlining, organizing, and supervising these international governmental discussions and standard setting of economic and social policy. Firstly, no government can do that on its own. Secondly, a strong linkage between the economic, social, and political elements of the negotiations between the national governments is warranted. Standard setting has mostly increased in economic and financial fields, but globalization is equally necessitating standard setting on social policies. A recent example of international standard setting is the ILO Declaration of Fundamental Principles and Rights at Work and its Follow-up, which elaborates five fundamental labour rights.<sup>24</sup>

It is obvious that social policies cannot be decided by governments but need to be decided in partnership with different groups of society. This does not only make political sense, but also makes economic sense. Rodrik<sup>25</sup> has demonstrated that countries which have a democratic system were able to profit more from globalization than countries with an undemocratic system. As argued in this chapter, globalization will bring larger elements of unpredictability and surprise. These can only be dealt with by national systems which are able to share the costs of such external shocks equally and give people the feeling that all groups in society have a say in policy formulation. Therefore the design of different policy elements of globalization, such as trade, financial policies, and social policies and the political control over these policies, needs to be part of a negotiated agreement between the different groups in the society. Only in that way can a society deal with the surprise and unpredictable elements that will accompany globalization in the twenty-first century.

The UN system in the twenty-first century must therefore also acknowledge the role of groups in society other than governments in find-

ing new solutions and in monitoring the outcome of the globalization process. In the ILO there is experience with including non-governmental groups in decision-making, to the effect that trade unions and employers' organizations form part of the governing body of the ILO and contribute to politically accepted policies by arriving at a consensus approach. Inclusion of civil society in other UN organizations seems therefore to be warranted.

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## Prospects for accelerating human development in the twenty-first century

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*Ruth Kagia*

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### Introduction

Our goal must be to reduce these disparities across and within countries, to bring more and more people into the economic mainstream, to promote equitable access to the benefits of development. . . . This – the challenge of inclusion – is the key development challenge of our time.

James Wolfensohn, President, World Bank<sup>1</sup>

With globalization, all of humankind today paddles in a single microbial sea – and we have to conclude: There are no health sanctuaries.

Gro Harlem Brundtland, Director-General, World Health Organization<sup>2</sup>

At the start of the new millennium, human development is at a major crossroads. Globalization presents tantalizing prospects for shared global prosperity, but it could also lead to a widening of the economic and social gap between the rich and the poor. While the lives of some 1.5 billion people have been greatly improved by the dramatic economic growth in 15 Asian countries, the quality of life for another 1.6 billion in 100 countries has steadily declined. In 70 of these countries, average incomes are lower today than in 1980.<sup>3</sup> While more than 1 billion people live on less than one dollar per day, the assets of the top three billionaires are more than the combined GNP of the 600 million people in the least developed countries.<sup>4</sup> And while there is strong international consensus on the

policies and actions that would accelerate human development, there is a yawning gap between rhetoric and action, between the resource requirements and the level of basic social expenditure by national governments in many developing countries as well as by donors in the form of official development assistance (ODA).

Opportunity and risk, integration and polarization have never before been so closely intertwined. The world is much wealthier than 50 years ago: global GDP has increased from \$3 trillion to \$30 trillion during that period, and yet, at the start of the new millennium, the absolute number of poor people in developing countries is growing.<sup>5</sup> Information technology has made possible a free and unfettered global flow of information and ideas. This appears to have contributed to the further expansion of democracy, the growth of civil society, and an increase in transparency and accountability. These gains have, however, not benefited most of the world's poor. A young child dies every three seconds, in most cases from an infectious disease; every day 3,000 people die from malaria.<sup>6</sup> There are nearly 1 billion people who cannot read or write, two-thirds of whom are women.<sup>7</sup>

The pattern of development in the twenty-first century will be shaped by the choices we make today. Those choices will either lead to enabling conditions for the eradication of poverty, or to deepening it. They will determine whether all economies become truly integrated or whether some of them will become increasingly marginalized. At this juncture, the development path countries will take is not predestined. The next century could be shaped into one of unprecedented improvement in the quality of life for people everywhere. Success is within reach of national governments and their internal and external partners if they take effective public actions to develop policies and institutions that promote inclusive growth. Such actions include creating enabling conditions for all economies to compete fairly in the global economy; establishing strategic partnerships with all stakeholders; and supporting national governments to design and implement human-centred, equitable, and participatory programmes.<sup>8</sup>

In an increasingly interdependent world, the manifestation of extreme poverty and the growing gap between the rich and the poor decrease the prospects for global integration and for peace and security.<sup>9</sup> The challenges of development can only be met through coordinated and adequately funded international efforts. This chapter looks particularly at the international community, led by the UN<sup>10</sup> family, which should spearhead these efforts in order to assist countries to unleash the positive forces of the global market, attract private capital, accelerate the momentum for poverty reduction, and reduce the risk of increased marginalization and inequality.

## The human development context

Progress in human development has been extraordinary. During the last 50 years, living standards have risen dramatically and today, on average, the developing world is healthier, wealthier, better fed, and better educated. There have been greater gains in life expectancy and greater decreases in birth rates throughout the world over the past 40 years than during the previous 4,000 years.<sup>11</sup> Between 1970 and 1997, life expectancy rose from 59.1 to 66.7 years, and under-five mortality fell from 149 per 1,000 live births to 85 during the same period.<sup>12</sup> Similarly, in education great advances have been made. In 1960 slightly less than half of all children of primary school age were enrolled in school; today, the proportion has more than doubled. The literacy rate rose from 48 per cent to 76 per cent between 1970 and 1997, and gender disparities in school enrolments have narrowed in most regions. But progress in poverty reduction has been mixed, more so after the recent setbacks in East Asia (Table 4.1).

However, some countries have made greater progress than others. Table 4.1 shows some of the regional differences in social development. After making a strong social and economic start in the 1960s and 1970s, many of the newly independent states in sub-Saharan Africa (SSA) lost the momentum, growth halted or declined, and the gap in basic health and learning outcomes widened between SSA and the rest of the world. More recently, countries of the former Soviet Union have registered a reversal trend in development. In 70 countries average incomes are lower today than they were in 1980.

The wide disparities in outcomes are increasingly clear. Average life expectancy in the most advanced countries (about 80 years) is twice that of the least developed countries. Ninety-three per cent of the global burden of disease is concentrated in low- and middle-income countries, but 90 per cent of resources allocated to health are spent on 10 per cent of the world's population – the wealthy part. Although child mortality rates throughout the world continue to fall, 50 countries, most of them in sub-Saharan Africa, had mortality rates of over 100 per 1,000 live births, and in nine countries one in every five children born alive died before their fifth birthday.<sup>13</sup> More than 1.5 million people lack access to safe drinking water. More than 120 million primary school age children are not in school, most of them girls. Of those children who start school, 150 million drop out before they are functionally literate. And yet, as Oxfam has so graphically outlined, the cost of attaining universal primary education in the next 10 years (\$7–8 billion) is less than what Europeans spend on mineral water in one year.<sup>14</sup>

It is also clear that any progress is fragile and can be reversed. As we

Table 4.1: Progress in social indicators, 1970–1998

Region	Gross enrolment rate: primary, % of relevant age group*			Gross enrolment rate: secondary, % of relevant age group*			Pupils in primary: % female		Number living on less than \$1 per day (millions)		Life expectancy at birth (years)		Infant mortality rate per 1,000 live births	
	1980	1996	1980	1980	1996	1980	1980	1996	1987	1998 (est)	1970	1997	1970	1997
East Asia and Pacific	111	118	43	43	69	45	45	47	417.5	278.3	59	69	79	37
Europe and Central Asia	99	100	87	87	83	49	49	48	1.1	24.0	–	69	–	23
Latin America and Caribbean	105	113	42	42	52	49	49	–	63.7	78.2	61	70	84	32
Middle East and North Africa	87	96	42	42	64	42	42	45	9.3	5.5	53	67	134	49
South Asia	76	100	27	27	48	38	38	43	474.4	522.0	49	62	139	77
Sub-Saharan Africa	78	77	15	15	27	44	44	45	217.2	290.9	44	51	137	91
Developing countries	–	–	–	–	–	–	–	–	1,183.2	1,198.9	55	65	107	60

Note: \* Average weighed by population.

Source: World Bank, *World Development Indicators* (Washington, DC: World Bank, 1998 and 1999).

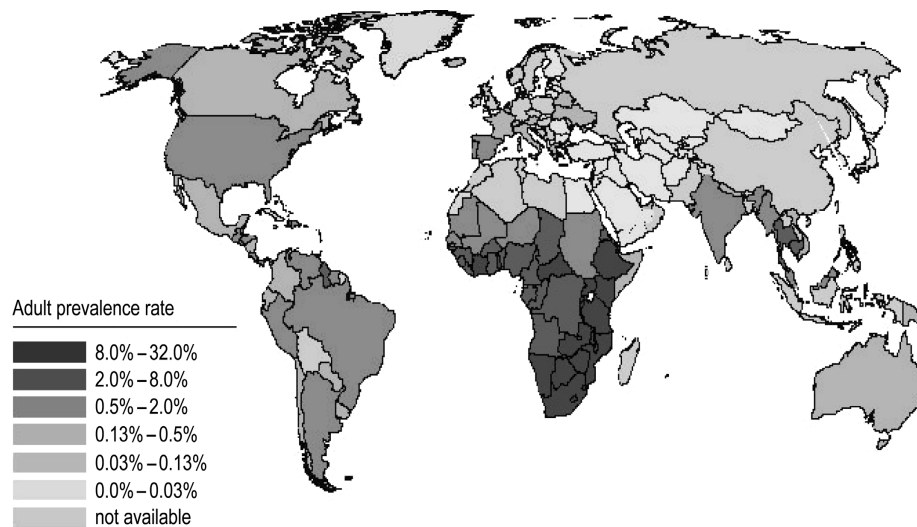


Figure 4.1: A global view of HIV/AIDS: 33.4 million infected adults and children, 1998

Source: *UNAIDS Report*, UNAIDS/99.29E (Geneva: Joint UN Programme on HIV/AIDS, 1999): 16.

start the twenty-first century, all regions have lost the momentum for achieving poverty reduction goals, and the number of poor people in most developing nations is rising. This reflects faltering growth in East Asia and Latin America after the financial crisis, continuing slow growth in sub-Saharan Africa, and a sharp decline in living standards in Eastern Europe and the former Soviet Union during the difficult transition to modern market economies. More than 80 countries in sub-Saharan Africa and Eastern Europe have lower per capita incomes than a decade ago. In 1989, about 14 million people in the transition economies of the former Soviet Union were living under a poverty line of \$4 per day. By 1995 that number had risen to about 147 million, or about one person in three.<sup>15</sup>

Progress in human development is being further halted by the emergence of new health problems, in particular HIV/AIDS. It is now the number one overall cause of death in Africa, and has moved up to fourth place among all causes of death worldwide. While the epicentre of the disease is in Southern Africa (Figure 4.1), it is spreading fast to other regions. The number of HIV infections in Eastern Europe has increased ninefold in just three years, growing from less than 30,000 HIV infections in 1995 to an estimated 270,000 infections by December 1998. South-East Asia is registering the most dramatic increases in HIV infections. Of the

7.2 million people living with HIV/AIDS in the region, one-fifth became infected in 1998. More than half of all new infections are occurring among those aged under 25.<sup>16</sup>

UNAIDS<sup>17</sup> gives some other global statistics relating to the spread of HIV/AIDS.

- There are 33.6 million people living with HIV/AIDS worldwide; 23.3 million of them are in Africa.
- In 1999, 5.6 million people were newly infected and 2.6 million died from AIDS.
- Globally, HIV/AIDS has created about 11.2 million orphans since the onset of the epidemic.
- In nine Southern African countries, HIV/AIDS will erase 17 years of potential gains in life expectancy. Instead of reaching 64 years by 2015 in these countries, life expectancy will regress to an average of 47 years.

### Accelerating human development in the context of globalization

Globalization can free the positive forces of the global market if effective public action is taken at the national and international levels to develop the institutions and policies that would bring about inclusive growth. In addition, globalization can facilitate the unleashing of our combined efforts and expertise to reach global solutions. The goal would be to bring more and more people into the economic mainstream, to reduce the disparities across and within countries, and to promote equitable access to the benefits of development.

What, then, are the key public actions that would accelerate human development? They should be those which lead to:

- inclusive growth and shared benefits of that growth;
- broad-based quality education as a bedrock of economic development;
- poverty reduction, because poverty is the main cause of ill health and illiteracy, and ill health and illiteracy are causes of poverty.<sup>18</sup>

The following pages provide a list of public actions that could help achieve these goals. The list is far from exhaustive, and is intended to highlight a few of the most critical issues.

The first key point concerns the imperative to address human needs directly. Human development and economic growth are mutually reinforcing. For development to be sustainable, both should be accelerated in tandem. Markets must therefore be supplemented with investment<sup>19</sup> in human capital at four levels. First, in order to build secure foundations for growth and development, countries need to complete the unfinished

agenda of the twentieth century by accelerating expansion of equitable, broad-based, and quality basic services: education, especially of girls, primary health care, adequate food, clean water, and sanitation. Secondly, countries will need simultaneously to address the agenda of the twenty-first century in order to become competitive participants in a global economy and bridge the digital divide. They will need to develop policies and institutions that promote science, technology, and enterprise, and actions which encourage high levels of private and public investment as a means of creating jobs and stimulating economic growth. Thirdly, the poor need to be active participants in the design and implementation of development programmes. This is not just good for building social capital but also ensures that resources benefit the most needy. And finally, these actions must be rooted in processes that are socially inclusive and responsive to changing circumstances, and which work in the interest of the poor by, for example, providing adequate basic services.

Second, more needs to be done to enable weak economies to participate in the global economy. Globalization disproportionately favours those with resources, expertise, and power. Ten years ago, the private sector invested \$35 billion in developing countries while ODA was \$65 billion. Today, private sector investment in developing countries has grown to \$300 billion while ODA has dwindled to \$45 billion. But 70 per cent of those private capital flows went to 12 out of 108 developing countries. Sub-Saharan Africa received less than 5 per cent of that share.<sup>20</sup> The international community should work flexibly to reduce barriers to fair competition in the global economy, by, for example, opening up trade especially in agriculture and labour-intensive industries, and supporting countries to attract private capital.

The third issue concerns the need to recognize more clearly the interdependence of nations. Globalization continues to strengthen the interdependence of nations through multiple avenues: trade, the Internet, migration, health, crime, and environment. Many long-standing problems have taken on international dimensions and no one country can solve them alone. Many new pathogens, for example, have the capacity to reach anywhere in the world within 24 hours through the more than 1 million travellers who traverse the globe every day. Some well-known pathogens have been rekindled by changing conditions such as mass population movements<sup>21</sup> and travel, rapid urbanization, and urban squalor.<sup>22</sup>

- Dengue fever: an outbreak in New Delhi in 1992 affected one in five people.
- Hepatitis C was first identified in North America in 1989. There may now be as many as 170 million infectious carriers of the disease worldwide.
- Diphtheria: since 1993 diphtheria cases have skyrocketed in the Rus-

sian Federation and newly independent states. Over 50,000 cases were reported in 1995.

- Cholera: an outbreak in Latin America infected over 500,000 people in 1991.
- Typhus: 100,000 cases emerged in Burundi between 1996 and 1998.
- TB has resurfaced. About 1.5 million people die from TB each year. Nearly 2 billion people have latent TB infection and they constitute a huge potential reservoir for the disease.

Fourth, there is need for greater cooperation between all actors. The foregoing demonstrates the importance of developing strategic alliances and linkages with all the stakeholders. In Chapter 3, van der Hoeven talks about the way that the ILO has been able to engage trade unions and employer associations. There are other successful examples of such strategic alliances. UNAIDS,<sup>23</sup> the joint UN Programme on HIV/AIDS, has within a very short time become a powerful global force in the fight against the disease. The ONCHO programme which was established to eliminate river blindness and the international programme to eliminate polio are outstanding examples of successful and value-enhancing partnerships. The Education for All initiative, started in Jomtien 10 years ago, has proven to be an effective mechanism for galvanizing international and national action towards the attainment of education for all.

Some new players have altered the dynamics of the development agenda. The debt relief programme, discussed below, was reshaped and strengthened in part because of sustained pressure from several NGOs. Oxfam has proposed a Global Action Plan for Basic Education that would, *inter alia*, mobilize resources, push harder for debt relief, and engender national commitment and reform in education, with emphasis on sub-Saharan Africa. The private sector is becoming an increasingly important player in the social sectors, especially in health: examples are the Bill and Melinda Gates Foundation's support for vaccine research, and Smith, Kline, and Beecham's free drug supply for the treatment of filiaris. All these relationships need to be effectively managed and leveraged.

Fifth, it is increasingly clear that development policies are interdependent. Countries need integrated policy packages and institutional environments that foster transparency and accountability, reward hard work and creativity, and facilitate participation. While coordination is most easily achieved at the national level, international organizations also need to place more emphasis on an integrated approach. This is increasingly the case, although much work needs to be done. For example, the World Bank has scaled up its efforts to strengthen the interdependence of policies through the Comprehensive Development Framework, which is being piloted in 13 countries. It aims to sharpen the focus on the major goals of development, to highlight the integrated nature of policy-

making, to emphasize institutional processes required to sustain development, and to coordinate development efforts. The framework underscores the growing realization that the many elements which make up the development process must be planned together and coordinated in order to obtain the best results. It seeks a better balance in development efforts by emphasizing the interdependence of all elements of development, economic and financial, social, structural, governance, and the environment. Although the framework is anchored in the principles of national ownership of the policy agenda and on a long-term holistic vision, care will need to be taken in its implementation. The World Bank has sometimes received criticism for advocating standard solutions in countries with markedly different historical, economic, social, and political contexts.

Sixth, there is need for much greater commitment to the international development goals. The international development goals (IDGs) have been agreed upon as global milestones against which progress toward the goal of poverty elimination can be measured.<sup>24</sup>

- A reduction by half in the proportion of people living in extreme poverty by 2015.
- Universal primary education in all countries by 2015.
- Demonstrated progress towards gender equality and empowerment of women by eliminating gender disparity in primary and secondary education by 2005.
- A reduction by two-thirds in the mortality rates for infants and children under age five and a reduction by three-quarters in maternal mortality by 2015.
- Access through the primary health care system to reproductive health services for all individuals of appropriate ages as soon as possible and no later than the year 2015.
- The implementation of national strategies for sustainable development in all countries by 2005 so as to ensure that current trends in the loss of environmental resources are effectively reversed at both global and national levels by 2015.

These goals were reaffirmed at the Millennium Summit. Progress on attaining the goals has been disappointing, however, and most of them will not be met by the target date. Current forecasts indicate that only South Asia and China will grow sufficiently quickly to achieve the international goal of a 50 per cent reduction in poverty by 2015. Progress towards achieving these goals can be accelerated through renewed emphasis on quality social service delivery with increased focus on the poorest countries in Africa and South Asia, which are also most vulnerable to the forces of globalization. It also means putting greater emphasis on results: “judging our efforts not by the prosperity of a few but by the needs of the many”.<sup>25</sup>

A seventh issue concerns the need to leverage better the power of modern research and information technology. As other contributors to this volume also argue (in Chapters 6 and 14), information technology and research provide infinite possibilities for quantum leaps in human development. There is no doubt that the technological revolution will have an enormous impact on development. It would be a giant step forward to make the information revolution truly universal – to bridge the growing knowledge gap, to connect all developing and transitional economies to the world and to each other, and to be a vehicle for sharing and learning via satellite and the Internet. Combining the power of modern research and information technology could democratize health. Well harnessed, information technology can enable countries to “leapfrog, share experiences, and promote cross-fertilization of ideas”.<sup>26</sup> The African Virtual University provides an example of efforts to harness information technology. Using satellite links and the Internet, university students in 12 African countries are able to access the latest knowledge in science and engineering from several industrialized countries. The World Links Programme connects secondary school students across the world on the Internet, broadening their horizons beyond the confines of a classroom. Much more could be done to improve education quality through more widespread use of information technology. However, one should not ignore the advances that simpler technologies can bring. The majority of communicable diseases, for example, can be prevented with existing cost-effective strategies: bednets can prevent 50 per cent of all malaria deaths, while strategies such as condom promotion, sex education, and treatment of sexually transmitted diseases have been proved to reduce the spread of HIV/AIDS.

Developing countries need financial and technical assistance to support economic reform efforts, invest in growth, and expand access and quality. At a time when many countries have been undertaking fundamental reforms, the level of ODA has been steadily declining: between 1992 and 1997, it fell 20 per cent in real terms and declined by \$7 billion in 1997. Appropriate and effective aid levels need to be established to give governments the space they need to put economic reforms on a self-sustaining path. Given that overall levels of ODA are falling, this implies there may be greater selectivity of recipients according to the level of need and the existence of sound policy and institutional frameworks. In addition, development assistance needs to be restructured, to focus on people-centred, inclusive development, and, as Weder argues in Chapter 8, it should be designed to reach those countries with good institutional infrastructure capable of ensuring effective delivery against aims.

The heavily indebted poor countries (HIPC) initiative arose out of a recognition that high levels of debt act as a serious brake to sustainable

development. The initiative was launched in 1996 by the World Bank with support from other partners, and endorsed by 180 governments around the world.

The new HIPC initiative should be built on an enhanced framework for poverty reduction, developed by the International Financial Institutions (IFIs). This is critical to ensure that more resources are invested in health, education and other social needs, which are essential for development. Integrating their efforts, the World Bank and IMF should help qualifying countries with the drafting and implementation of poverty reduction plans for the effective targeting of savings derived from debt relief, together with increased transparency of budgetary procedures to protect social expenditures. Throughout program design and implementation, there should be consultations with broader segments of the civil society. Such dialogue will be the basis for deepening the sense of “ownership” with governments and citizens in debtor countries when necessary adjustment programs are to be adopted.<sup>27</sup>

As a follow-up to the Cologne Summit in June 1999, the HIPC initiative was expanded to provide more debt relief to more countries faster, and redesigned to link debt relief to poverty reduction. The World Bank and the IMF are collaborating closely to integrate the poverty reduction objective into the debt programme.<sup>28</sup>

In order to ensure that there is a robust link between debt relief and poverty reduction, countries will be expected to prepare poverty reduction strategies. For each country, the strategy would *inter alia* define the nature and level of poverty, establish poverty reduction targets, and specify the public actions that would be taken to ensure the attainment of these targets.

Finally, however, the overall responsibility and accountability for poverty reduction and human development rests with the impoverished countries themselves. Strong political and intellectual leadership is a necessary condition for effectively utilizing international support. There must be a vision and the political will to design and implement the policies needed to establish the foundations for economic growth and reduce poverty, and promote good governance and the rule of law. The international community, however, should be an effective catalyst for change, sharing international experiences on what works and what does not work, and supporting countries to customize the global into local situations.

## Conclusions

There are good prospects for accelerating human development on the threshold of the new millennium – but only if the right actions are taken

to manage global forces so that they work for the benefit of all. If these forces are not well managed, the gap between rich and poor countries will widen and the prospects for global peace and stability will be severely undermined. A quote from Shakespeare aptly captures the crossroads that we are at as we start the third millennium:

*There is a tide in the affairs of men,  
Which taken at the flood, leads on to fortune;  
Omitted, all the voyage of their life  
Is bound in shallows and in miseries,  
On such a full sea are we now afloat;  
And we must take the current when it serves,  
Or lose our ventures . . .*

*Julius Caesar*, Act IV, Scene III

## Notes

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9. Since 1970, more than 30 wars have been fought in Africa, the vast majority of them intrastate in origin. In 1996 alone, 14 countries in Africa were afflicted by armed conflicts, accounting for more than half of all war-related deaths worldwide and resulting in more than 8 million refugees, returnees, and displaced persons. K. Annan, *The Causes of Conflict and the Promotion of Durable Peace and Sustainable Development in Africa*, Address to the Security Council, United Nations, April 1998.
10. In this chapter, the UN system refers to the UN family which includes the specialized and autonomous agencies such as the Bretton Woods institutions. Given the large number of international players involved in the development process – regional multi-lateral banks, the OECD, and NGOs – the chapter discusses the role of key international players rather than just the UN family.
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16. UNAIDS, 1999 <<http://www.unaids.org>>.
17. *UNAIDS Report*, UNAIDS/99.29E (Geneva: Joint UN Programme on HIV/AIDS, 1999).
18. Studies in Zambia, Peru, and Viet Nam demonstrate that about two-thirds of extremely poor households are headed by someone with no education.
19. Female education is associated with a whole range of development outcomes – including lower fertility and lower infant mortality rates. Increasing the average amount of education by one year raises GDP by 9 per cent, while one or two years of schooling for the mother reduces child mortality by about 15 per cent, all else being equal. K. Annan, *Agenda for Development* (New York: United Nations, 1999).
20. World Bank, *Global Economic Prospects and the Developing Countries 2000* (Washington, DC: World Bank, 1999).
21. Between 1985 and 1996, as many as 50 million people were uprooted from their homes. Refugees and displaced people are especially vulnerable to infectious disease, and their movement can help spread infectious diseases into new areas.
22. World Health Organization, *The World Health Report: Making a Difference* (Geneva: WHO, 1999).
23. When it became clear that the relentless spread of HIV was creating an emergency that would require an expanded international effort, the United Nations in 1996 drew six organizations together in a co-sponsored programme – UNICEF, UNDP, UNFPA, UNESCO, WHO, and the World Bank, joined in April 1999 by UNDCP.
24. DfID, *Eliminating World Poverty: A Challenge for the 21st Century*, UK White Paper on International Development (London: DfID, 1997).
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26. World Bank, *World Development Report 1998–99: Knowledge for Development* (Washington, DC: World Bank, 1999).
27. Group of 7 Ministers, *Report of the G-7 Ministers on the Köln Debt Initiative to the Köln Economic Summit*, Cologne, 18–20 June 1999 <<http://www.g8cologne.de/06/00114/index.html>>.
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## Poverty and inequality in the era of liberalization and globalization

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### Introduction

Since the late 1980s, the international community has increasingly made the eradication of poverty its foremost development objective. A decade ago, the Development Assistance Committee (DAC) of the OECD established the objective of reducing the incidence of income poverty in developing countries from 30 per cent to 15 per cent between 1990 and 2015. This growing poverty focus has been simultaneously accompanied by the emergence, consolidation, and diffusion of a new economic paradigm (the Washington Consensus) which emphasizes macroeconomic stability, domestic liberalization, privatization, and the search for market solutions in the provision of public goods.<sup>1</sup> During the last decade, the Washington Consensus has also emphasized policies – such as the removal of barriers to international trade, opening up to FDI, and liberalization of short-term portfolio flows – which help accelerate the pace of globalization of the world economy.

This approach – which has deeply marked policy-making in developed, developing, and transitional countries – is claimed to reduce rent-seeking, improve competition, offer major opportunities for export and growth to developing countries, promote the convergence of the living standards of poorer countries with those of the advanced nations, and reduce the incidence of poverty worldwide. It is also claimed that the within-country distributive impact of these policies is – on the whole –

neutral, that long-term income distribution is broadly stable, and that there is no clear association between inequality and growth.

This chapter challenges several of these conclusions. It argues that, during the last two decades, no or only limited convergence has been achieved at the global level. For the majority of the developing and transitional economies, the North-South and East-West income gap was bigger in the late 1990s than in 1980 or 1960. The chapter also argues that growing polarization among countries has been accompanied by a surge in inequality within most nations. In most of these countries, growth and poverty alleviation have suffered substantially. To an important extent, the recent surge in inequality was triggered by policies that are part of the Washington Consensus. The chapter concludes that to deal successfully with poverty, it is necessary not only to tackle the traditional sources of inequality but also to introduce macroeconomic and structural policies which avoid the distributive bias of the Washington Consensus.

## Inequality trends in the post-war period

### *Trends in global income distribution*

Most studies in this area are concerned with between-country inequality, and assume that all people from a nation have the same mean income. Most of them suggest that while over the last 30 years China and a few East and South-East Asian countries grew fast enough to converge towards the income per capita of the OECD group, the majority of the developing countries have further diverged from it. The UNCTAD 1997 study, for instance, covers 124 countries representing 94 per cent of the world population, and shows that the income share of its richest 20 per cent rose from 69 per cent to 83 per cent between 1965 and 1990. The study concludes that increasing global inequality has been a persistent feature of this period, with a noticeable worsening over the 1980s, and that there is little evidence that this tendency has since been reversed.<sup>2</sup>

A second group of studies concerns the distribution of income among individuals, so as to account for changes in income per capita both between and within countries. Most of these analyses do not make use of survey data, which alone can provide precise information on the shape of the income distribution, but rely on synthetic inequality indices and assumptions about the shape of income distribution. In an analysis of changes in the world distribution of GNP per capita in 46 nations, Korzeniewicz and Moran<sup>3</sup> found that the Theil inequality index rose from 1.15 to 1.32 over the period 1965–1992, and that between-country inequality accounted respectively for 79 per cent and 86 per cent of world

inequality in 1965 and 1992. Similar results are arrived at by Schultz,<sup>4</sup> who found that between 1968 and 1989 the convergence in inter-country income per capita offset any increase in within-country inequality. If China is excluded from the sample, however, the decline in world inequality after 1975 is not evident.

A third group of studies relies on detailed survey data.<sup>5</sup> The 1999 study by Milanovic makes use of PPP-adjusted income data for 1988 and 1993, covering 88 countries accounting for 84 per cent and 93 per cent respectively of the world population and GDP. The study treats the rural and urban sectors of China and India as separate nations, and shows that three-quarters of the observed increase in the world Gini coefficient was due to an increase in between-country inequality and a quarter due to within-country inequality. The most important contributors to the rise were the soaring urban-rural differences in China and the slow growth of incomes in rural South Asia relative to the OECD.

All in all, these analyses suggest that global inequality has risen during the last three decades, mainly because of an increase in between-country inequality but also because of greater within-country inequality. These conclusions are less pronounced if survey-derived and PPP-adjusted income data are used, and if the urban and rural sectors of China and India are treated as separate nations. In all cases, removing China from the sample increases sharply world income inequality.

### *Inequality trends in the main regions and countries*

This section reviews the main inequality changes for major groups of countries.<sup>6</sup>

#### *The OECD countries: A common U-shaped inequality pattern*

These economies emerged from the Second World War with fairly high income inequality. This, however, declined steadily until the 1970s, thanks to a rapid fall in unemployment, stable earnings inequality, and a rapid expansion of social security.<sup>7</sup> From the late 1970s this trend was halted or reversed in most of the region: inequality first started rising again in the mid- to late 1970s in the Anglo-Saxon group (Figure 5.1).

The Nordic countries, the Netherlands, and Italy were part of a second wave of countries with rising inequality. In turn, Finland and France experienced a gradual flattening of their declining inequality trend. And, despite its reputation for having achieved fast growth with equity, Japan also experienced a surge from 0.30 to 0.44 in the Gini coefficient of the distribution of pre-tax pre-transfer income between 1980 and 1993.<sup>8</sup>

Most of this increase in income inequality is explained by a rise in earnings inequality.<sup>9</sup> Countries with centralized wage-setting institutions

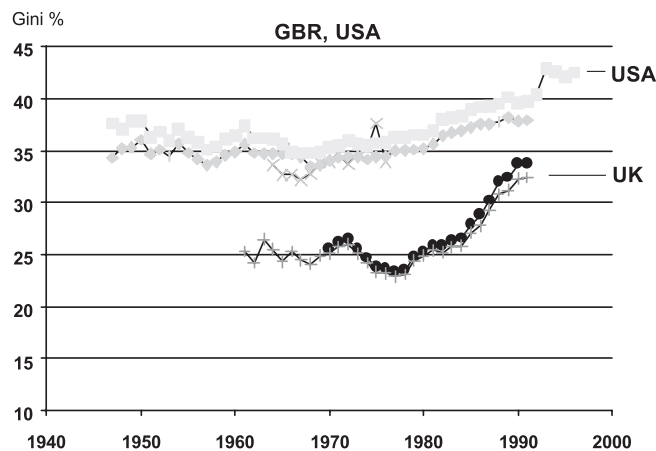


Figure 5.1: Trends over time in the Gini coefficient for the UK and the USA

(Germany and Italy), a high union density, and adequate minimum wages (France) contained the pressures towards higher earnings inequality. At the other end of the spectrum, countries with decentralized wage negotiations and flexible labour markets experienced the largest increases. In the USA, respectively 30 per cent and 20 per cent of the rise in earnings concentration are explained by a 44 per cent fall in the minimum wage and the decline in unionization. An upsurge in the share of financial rents, urban land rents, and profits contributed to the growing dispersion of market incomes. Returns to financial capital, in particular, increased in line with the rapid surge in interest rates of 1982. Finally, the redistributiveness of the tax and transfer system declined, as transfers fell relative to GDP and personal income tax became less progressive.<sup>10</sup>

#### *The widespread rise of inequality in the former Soviet bloc*

Since 1989, income concentration has risen moderately in the countries of Central Europe, which maintained and extended the fairly comprehensive welfare state inherited from the socialist era and which witnessed an increase less steep than anticipated in earnings inequality. In contrast, in the former USSR and South-Eastern Europe, Gini coefficients rose by 10–20 points, three or four times faster than in Central Europe. In these countries, the transitional recession and fall in the wage share were very pronounced, social transfers declined, their composition and targeting deteriorated,<sup>11</sup> and privatization was less egalitarian than in Central Europe.<sup>12</sup>

Also in these economies, rising earnings inequality played a key role in the surge of total inequality (Table 5.1).<sup>14</sup> Such a rise has been attributed

Table 5.1: Decomposition of the increase in the Gini coefficient of the distribution of household incomes between the pre-transition period (1989) and the years 1993–1996

Country	Change in income structure	Due to change in concentration of:					Overall Gini change
		Wages	Social transfers	Out of which		Non- wage private sector	Interaction term
				Pensions	Non- pension transfers		
Hungary (1989–1993)	–1.3	+5.9	–0.6	+1.4	–0.2	–0.6	+2.2
Slovenia (1987–1995)	–0.2	+3.6	–0.6	–0.1	–0.4	+0.4	+2.6
Poland (1987–1995)	–1.7	+3.4	+3.5	+3.2	–0.1	+0.8	+7.0
Bulgaria (1989–1995)	+1.4	+7.8	+0.9	+0.4	+0.4	–0.4	+10.0
Latvia (1989–1996)	–1.6	+15.0	–1.5	–2.0	+0.5	+1.4	+10.0
Russia (1989–1994)	–3.4	+17.8	+5.1	+3.9	+0.4	+3.0	+23.6

to the emergence of “scarcity rents” for professionals such as accountants, bankers, and so on, a rise in returns to education,<sup>13</sup> a fall in the minimum wage relative to the average,<sup>15</sup> and a surge in inter-industrial wage dispersion unexplained by productivity differentials which favoured workers in politically influential sectors such as mining, power generation, and water.<sup>16</sup>

*Latin America: A rise in inequality from already high levels*

In the early 1950s, Gini coefficients in Latin America typically ranged between 45 and 60, among the highest in the world.<sup>17</sup> While the rapid growth of the 1950s and 1960s had – on the whole – a disequalizing impact, in the 1970s inequality declined moderately in most of the region outside the Southern Cone.<sup>18</sup> In contrast, the 1980s were characterized by regressive distributive outcomes. Iglesias<sup>19</sup> notes that “at the end of the decade, there was a substantial rise in inequality in most cases. That means that recessions in the 1980s hit the poor harder than the rich”, a phenomenon which was not reversed with the return to full-capacity growth between 1988 and 1994.<sup>20</sup> As a result, in the 1980s the labour share declined by 5–6 per cent in Argentina, Chile, and Venezuela, and 10 per cent in Mexico, owing to a slowdown in job creation, growing informalization of the labour market, a faster fall in formal sector wages evolved than GDP per capita, an even faster contraction of minimum wages, and a widening in wage differentials by skill and educational level.<sup>21</sup>

*China: A recent steep rise in regional and urban-rural inequality*

In China inequality has also followed a U-shaped pattern over the last 50 years. The creation of agricultural communes, socialization of industrial assets, and development of an embryo of social security in the 1950s and 1960s led to egalitarian growth. Thus, despite large regional differences in natural endowments, the national Gini coefficient fell from 56 in 1953 to 31 in 1964 and 26 in 1975 (Table 5.2).<sup>22</sup> The market reforms introduced in agriculture since 1978 and industry since 1984 induced a sharp acceleration of growth, which averaged 9–10 per cent a year over the period 1978–1995. While between 1978 and 1984 there was only a modest upsurge in inequality, income concentration rose fast between 1985 and 1990, and very fast after 1990 (Table 5.2). The rise in income disparity in the second part of the 1980s can be traced to the rapid expansion of non-farm activities, which exacerbated rural regional differentials.<sup>23</sup> In spite of this, until 1990 there was convergence among provincial incomes, possibly due to changes in the urban-rural mix of the provincial economies.

Inequality rose very fast in the 1990s, and by 1995 the national Gini coefficient reached 43. A first cause of this increase was the widening

Table 5.2: Evolution of the Gini coefficients and the income gap in China, 1978–1995

Year	Overall Gini	Urban Gini	Rural Gini	Income gap, urban/rural <sup>a</sup>	Regional income gap (rural) <sup>b</sup>	Regional income gap (urban) <sup>b</sup>	Regional income gap (total) <sup>b</sup>
1978	0.32	0.16	0.21	2.37	–	–	–
1981		0.15	0.24	2.05	2.80	1.81	12.62
1984	0.28 <sup>c</sup>	0.16	0.26	1.71	3.16 <sup>d</sup>	1.59 <sup>d</sup>	9.22 <sup>d</sup>
1988	0.38	0.23	0.30	2.05	–	–	–
1990		0.23	0.31	2.02	4.17	2.03	7.50
1995	0.43	0.28	0.34	2.47	4.82	2.34	9.79

Notes:

<sup>a</sup> Ratio between average urban and average rural income.<sup>b</sup> Ratio between average income of the highest to the lowest province, by rural, urban, and total area.<sup>c</sup> Refers to 1983.<sup>d</sup> Refers to 1985.

again of the urban-rural income gap, as most new industrial and commercial developments were concentrated in the urban sector. Second, in view of the unequal spread of non-agricultural activities across provinces, interprovincial inequality also became an important contributor to overall inequality, as indicated by the widening of the gap between mean incomes per capita of poor (interior) and rich (coastal) provinces (last column of Table 5.2). Public policy (fiscal decentralization and an industrial policy favouring explicitly urban areas and coastal provinces) accentuated this disequalizing trend.

#### *South-East and East Asia: A mixed picture*

It is widely believed that countries in this region were able to combine fast growth with low assets and income inequality. This view is not accurate, however. First, the initial level of income inequality varied considerably within the region. Second, and most important for the focus of this chapter, between the mid- to late 1950s and the 1990s, the Gini coefficient of income distribution rose steadily in Thailand (from 0.41 to 0.52) and the Republic of Korea (from 0.34 to 0.39), remained constant in Indonesia, and followed an inverted U pattern in Malaysia.<sup>24</sup>

In turn, Taiwan, Hong Kong, and Singapore show a mild U pattern, with fairly rapid declines in inequality until the late 1970s and early 1980s, followed by rises offsetting half of the earlier fall.<sup>25</sup> In Taiwan, inequality fell steadily thanks to a rapid expansion of employment for both well-educated and low-skilled workers. Over the period 1980–1993, however, the development of skill-intensive sectors pushed up wage inequality

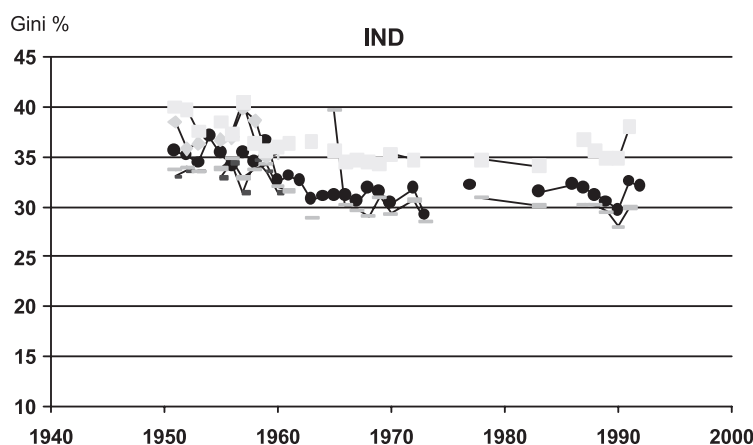


Figure 5.2: Trends over time of the Gini coefficient of India

again, while the share of capital and property incomes in the total surged in line with the development of large corporations and escalation of land prices. By 1993, Taiwan had reached again the level of inequality of 1964, though it was still below that of the 1950s.

*The late liberalizers of South Asia: A mixed picture*

During the post-Second World War period, income distribution in the region changed less than elsewhere. In India, the Gini coefficient of per household consumption expenditure fell from 0.36 in 1951 to 0.31 in 1961 and has stagnated since then, including during the liberalization of the 1990s (Figure 5.2). The policy factors behind this “moderate growth with stable inequality” (but with a limited impact on poverty) are still to be fully understood – but may have to do with the size of the Indian economy and its gradual pace of liberalization, particularly for capital movements. There is, however, some indication that poverty stagnated in rural areas during the 1990s,<sup>26</sup> possibly because of a 35 per cent rise in procurement and administered food grain prices (to which the incomes of the poor are very sensitive). Though the economy kept rising at 4–5 per cent a year, real rural wages appear to have stagnated (or declined, if expressed in relation to food grain prices).

In Sri Lanka, Bangladesh, and Pakistan inequality followed a typical – though not very pronounced – U-shaped pattern. In Pakistan, the Gini coefficient declined moderately (from 0.39 to 0.33) during the growth years of 1963–1973 but gradually climb back to 0.41 in 1992–1993.<sup>27</sup> It is suggested that inequality rose during spells of slow growth and declined during periods of expansion of the manufacturing sector, and that social

policies had only a limited impact on distribution. In Bangladesh, the limited evidence available suggests a moderate decline in overall inequality until the mid-1970s followed by an upturn of three to four Gini points in the subsequent 12 years. In this case, rural inequality also follows a more pronounced U-shaped pattern than urban inequality.

#### *Sub-Saharan Africa*

In Africa, inequality has traditionally depended on a large urban-rural income gap resulting from colonial policies and the “urban bias” of newly independent governments – plus, in Southern and Eastern Africa, a high land concentration. The 1980s were characterized by the massive application of adjustment policies, which were aimed at reducing such a gap. Their impact was harshest in the urban sector, while rural areas were less affected. In this way, the urban-rural gap was reduced by a process of “equalizing downward”.<sup>28</sup> There is also fragmentary evidence that while the rural-urban income gap declined, within-rural and within-urban inequality rose. Lack of data prevents a full assessment of inequality changes, but poverty incidence appears to have stagnated and the number of poor increased by some 73 million.

#### *Econometric analysis*

In a much-cited paper, Deininger and Squire<sup>29</sup> note that “Decadal averages of inequality indexes across regions . . . are relatively stable through time, but they differ substantially across regions, a result that emerges for individual countries as well.” A recent study by Li, Squire, and Zou also comes to the conclusion that long-term income inequality is stable. After fitting linear trends to data from 49 countries, the authors conclude that “there is no evidence of a time trend in 32 countries or 65% of our sample”.<sup>30</sup> From this, they infer that growth is the only realistic option for poverty alleviation.

These findings, however, run counter to the evidence reviewed above. An examination of the estimation procedure followed by Li, Squire, and Zou<sup>31</sup> furthermore suggests that their conclusions are biased by the methodology adopted. To start with, some of the country trends are estimated on only few and poorly spaced data, which are bound to yield statistically non-significant results. Second, the data were fitted only with linear trends, a functional form which does not permit the capture of trend reversals. Third, their sample did not include most economies in transition, the great majority of which witnessed sharp inequality rises over the last 10 years. Fourth, their time series stopped in 1991–1993, and could not capture the most recent impact of globalization. Fifth, Li, Squire, and Zou did not weigh their country results by the share of world

population and GDP-PPP, though even their results show that inequality rose in large countries (the USA, the UK, and China) while it decreased mostly in small ones.

Inequality trends were therefore re-estimated following an unbiased methodology. For this purpose, the United Nations University World Institute for Development Economic Research (UNU/WIDER) created the World Income Inequality Database (WIID). This permitted the extension of the number of countries analysed to 77 (so as to include the transitional economies), updated the time series (so as to include information about the mid- to late 1990s), interpolated each country's inequality data with linear, quadratic, and hyperbolic functions (so as to capture possible trend reversals), and chose among these three estimates the best fit on the basis of a criterion combining the *t* and *R*<sup>2</sup> statistics.

The results of this exercise (Table 5.3)<sup>32</sup> sharply contrast with those of Li, Squire, and Zou. Inequality was found to have risen in 45 of the 77 countries analysed. In four countries (including India) inequality stopped declining over the long term and showed a mild trend upwards, while in seven no statistically significant trend was identified. Only in 16 – generally small and medium-sized economies – is there evidence of a decline in income concentration over the long term. If one weighs these results by population size and GDP-PPP, the conclusions are strengthened, as inequality was found to have risen or stopped declining in nations accounting for 79 per cent of the population and 77 per cent of the GDP-PPP of the sample countries. While inequality fell in 16 countries, these include mainly small and medium-sized nations whose total population and GDP-PPP comprise only 16 per cent and 20 per cent respectively of the total sample.

An analysis of the differences between the results in Table 5.3 and those of Li, Squire, and Zou<sup>33</sup> indicates that the choice of the functional forms used to interpolate the data explains almost 50 per cent of the difference (Table 5.4). Another 20–30 per cent is due to the weighing by population size or GDP-PPP, while the increase in country coverage (from 49 to 77) accounts for a smaller proportion, and differences in time-series coverage explain about 20 per cent of the overall difference.

In conclusion, while inequality declined in several (but not all) countries during the “golden age”, this trend has been reversed with increasing frequency over the last two decades. Out of the 45 countries with rising inequality, the reversal of the trend occurred in one case over the period 1960–1965, in four cases over the period 1966–1975, in six over the period 1975–1980, in eight cases over the period 1980–1985, in 10 cases over the period 1985–1990, and in 14 cases after 1990.<sup>34</sup> The rise was of less than five Gini points in six countries, of five to 10 points in 20 countries, of 10–20 points in 23 countries, and over 20 points in six

Table 5.3: Trends in the Gini coefficients of the distribution of income from the 1950s to the 1990s for 77 developed, developing, and transitional economies

	Sample countries in each group	Share of population of sample countries %	Share of world population %	Share of GDP-PPP of sample countries %	Share of world GDP-PPP %
Rising inequality, of which:	45	56.6	46.2	71.4	67.8
continuously rising	15	—	—	—	—
U shaped	23	—	—	—	—
accelerating inequality*	7	—	—	—	—
Slowdown in inequality*	4	22.1	18.0	5.7	5.4
Falling inequality, of which:	16	15.6	12.7	20.7	19.7
continuously falling	13	—	—	—	—
inverted U shape	3	—	—	—	—
No trend	12	5.7	4.7	2.2	2.1
Not included in sample	—	—	18.3	—	5.0
Total	77	100.0	100.0	100.0	100.0

## Notes:

1. The results of the analysis summarized above were obtained on the basis of 832 “reliable observations” concerning the national economy of 77 countries. National trends in the Gini coefficients were interpolated by means of linear, quadratic, and hyperbolic functional forms. The best results were chosen on the basis of the combination of the best “t” and “corrected R2” statistics. When the t statistics of the parameters of all functional forms were not significant at the 5 per cent level, the country was assigned to the group “no trend”.

2. In 54 cases out of 77, the income concept used refers to “per capita household disposable income”, in nine to “per capita consumption expenditure”, and in 14 to “gross earnings”.

3. Out of a total of 77 countries, 36 are developing, 19 are OECD, and 22 are transitional. Except for Africa, regional coverage is over 80 per cent for all regions.

\* A country is assigned to the group “accelerating inequality” or “slowdown in inequality” when the best fits are respectively obtained by hyperbolic and quadratic functions.

Source: G. A. Cornia and S. Kinski, *Trends in Income Distribution in the Post World War II Period: Evidence and Interpretation* (Helsinki: UNU/WIDER, 1999).

Table 5.4: Analysis of differences between the results of LSZ and the estimates presented in Table 5.3

	LSZ sample 49 countries, linear trends, LSZ period			LSZ sample 49 countries, best fit, LSZ period			WIID sample 73 countries, best fit, WIID period		
	% of countries	% of countries	% of population	% of countries	% of population	% of GDP- PPP	% of countries	% of population	% of GDP- PPP
Rising inequality, of which:	20	47	53	66	60	68	77	73	85
continuously									
rising	20	15	4	33	40	29	18	9	12
U-shaped									
pattern	–	24	43	15	13	34	40	58	70
stable-rising	–	6	2	17	7	5	16	6	3
rising-stable	–	2	4	1	0	0	3	0	0
Slowdown in									
inequality									
decline	–	4	23	3	21	5	7	22	6
Falling inequality	14	35	15	29	19	27	15	6	9
No trend/stable									
inequality	66	14	9	2	0	0	1	0	0

Notes:

1. LSZ = Li, Squire, and Zou
2. % of population = sample population as percentage of total world population in 1995 (data from World Bank).
3. % of GDP-PPP = sample GDP-PPP as percentage of total world GDP-PPP in 1995 (data from World Bank).
4. Best fit: functional form is selected on the basis of the best values of the t coefficients and the R2 of regressions on linear ( $Gini = \hat{a} + \hat{a}t$ ), quadratic ( $Gini = \hat{a} + \hat{a}t + \hat{a}t^2$ ), and hyperbolic ( $Gini = \hat{a} + \hat{a}/t$ ) trend models. Countries are assigned to categories subjectively on the basis of the functional form and the features of the observed Gini series.
5. LSZ results are reported in Li, Squire, and Zou (1998). Sample includes 573 observations over the period 1947–1994. Expenditure Ginis are adjusted upwards 6.6 points.
6. LSZ sample, best fit is reproduced from the LSZ sample using the DS database. Expenditure Ginis are adjusted upwards by 6.6 points.
7. The WIID sample includes 804 observations during the period 1939–1998. The WIID sample uses 269 common observations to LSZ; 28 additional countries, especially from the former Soviet Union and Eastern Europe, are included; and four countries of LSZ were dropped due to geographical changes or insufficient data. Sample observations were chosen from 3,500 overlapping national Gini observations in WIID to be conceptually compatible across time for each country only. Some series are level adjusted.

countries. The rise was universal in the former Soviet bloc, almost universal in Latin America, common in the OECD, and frequent in South, South-East, and East Asia.<sup>35</sup> This trend reversal is likely to reflect to an important extent the “one-off” (if gradual) policy shift towards the Washington Consensus which took place during the 1980s and 1990s. In countries where such a shift has been broadly completed, it is unlikely that inequality will continue rising in the future, while in countries where policy reform is still proceeding along the lines of an unchanged Washington Consensus paradigm, inequality might surge in the future.

## Causes of the recent rise in inequality

### *The limited impact of the traditional causes of inequality*

This chapter argues that the “traditional causes of inequality” – those responsible for high income concentration in the 1950s–1970s – scarcely explain the recent inequality rise discussed above.

#### *Land concentration*

Dispossession of the peasantry by colonial authorities and the ensuing high land concentration created considerable inequality in the rural areas of many developing countries. In the 1950s and 1960s, in Latin America, the Gini coefficient of land distribution ranged between 0.6 and 0.8 (as opposed to 0.3–0.5 in most of Asia). High land concentration leads to the appropriation of a large share of agricultural output in the form of land rents (which, in the 1950s, absorbed over half of the total agricultural income of Latin America), and depresses rural wages and, through this, minimum wages in urban areas. Over the long term, high land concentration leads to an agricultural growth slower than that achievable under smallholder agriculture.<sup>36</sup> Indeed, in economies with surplus labour, land yields decline with the increase in farm size owing to the greater absorption of family labour and lower supervision costs in the smallholder sector.

However, over the last 40 years, the weight of agriculture declined everywhere. In addition, during the first two post-war decades, at least 27 land reforms redistributing large private and state-run farms to the landless were carried out in Japan, the Republic of Korea, Taiwan, Kerala, Egypt, Iraq, China, and 14 Latin American countries. As a result, land rents declined sharply. In Latin America they fell from 20 per cent to 2–3 per cent of total household incomes.<sup>37</sup> Thus, while poverty and inequality in rural areas still crucially depend on access to land, the contribution of land concentration to the explanation of total income inequality has generally declined over time.

*Dominance of natural resources*

Countries well endowed with natural resources (particularly minerals, metals, and non-fuel primary exports) grow slower and have a higher income and asset inequality than other types of economies.<sup>38</sup> In rent economies, the production process is relatively simple, and requires a lot of capital, little unskilled labour, and few skilled workers. This compresses the demand for unskilled labour and the labour share. Second, the volatility of commodity prices reduces the incentives to invest in education and may – at times – force poor families to pull their children out of school. Third, ownership of mineral resources is usually highly concentrated so that the mineral rent can be easily “captured” by the élites. Yet the dominance of natural resources hardly explains the widespread surge in inequality observed over the last two decades. Indeed, even in most resource-rich economies, the rent/GDP ratio has generally fallen since 1980–1985, and in 1994 was always smaller than in 1970.<sup>39</sup> Second, changes in the rent/GDP ratio could not explain the rise in inequality in many resource-poor economies.

*Unequal access to education*

During the initial phases of development, educational expansion increases the number of skilled workers less rapidly than their demand, thus leading to a surge in scarcity rents and inequality (government policies can, however, moderate this effect). As the relative abundance of skilled workers grows, scarcity rents and the wage rate of skilled workers decline and earnings inequality drops. Empirically, “inequality in education” has been shown to rise until the average number of years of schooling reaches 6.3, and to decline thereafter. With the exception of East Asia and Eastern Europe, the average years of education of the new cohorts entering the labour force since 1980 remained below or around the critical threshold of 6.3 years. In other words, with slow progress (or outright deterioration) in enrolment and retention rates during the 1970s and 1980s, it is likely that the dispersion of the human capital stock rose further in the 1980s and 1990s, thus pushing upward earnings inequality. In several African countries, enrolments in primary education declined, while the opening up of education to private providers increased the number of privately financed enrolments at the secondary and higher level. A similar decline in pre-primary and secondary enrolments was observed in many transitional economies.<sup>40</sup> These developments are likely to have had, and continue to have, a disequalizing impact on the long-term distribution of human capital. A detailed study of 10 Latin American countries confirms that differences in educational achievements represented in 1989 the most important source of income inequality.<sup>41</sup>

*Urban bias*

During the immediate post-war period, overall inequality was typically influenced by the “urban bias” of exchange rate, pricing, and public expenditure policies. These policies generally penalized agriculture by overtaxing export crops, giving preference to the urban sector in the allocation of public expenditure and public investment, and draining rural savings for investment in urban areas. The adjustment programmes launched in the 1980s and 1990s were explicitly meant to correct such bias and raise farm incomes relative to urban incomes. Yet the impact of these measures has varied considerably from one country to another, depending on the extent of the “pass through” of the benefits of devaluation to the rural producers, the efficiency of private trading, the removal of input subsidies, and changes in international prices. In addition, under conditions of high land concentration and incomplete markets for credit and insurance, an improvement in agricultural terms of trade is likely to exacerbate rural inequality (as big and better-funded producers can benefit from these measures more than the small producers). All in all, there is some indication that as a result of these policy changes, poverty and inequality did not worsen in the 1980s in rural Latin America and that the urban-rural income gap may have narrowed in Africa.<sup>42</sup> In other cases (such as China and Thailand), the urban-rural gap and regional inequality rose markedly (Table 5.2). In contrast, in many countries policy reform has impacted negatively the urban poor engaged in the non-tradable sector through rises in the price of basic goods, the removal of subsidies, and the recession of the non-tradable sector.

In conclusion, it would appear that the “old causes of inequality” explain in the 1980s and 1990s a smaller proportion of the cross-country variance in inequality than in the 1950s, 1960s, and 1970s. A preliminary quantitative test of this hypothesis confirms that the total variance of income inequality (Incineq) explained by the “old causes of inequality” (Landineq, Ineqeduc, and Minrent) during the latter period declines, that their coefficients are smaller, and that they tend to be (but for Ineqeduc) less significant:

(1951–1977) Incineq = 14.85 (2.35) + 0.59 (4.60) Landineq

R<sup>2</sup> = 0.70, No. of obs = 11

(1978–1987) Incineq = 15.52 (1.23) + 0.55 (2.14) Landineq

R<sup>2</sup> = 0.48, No. of obs = 6

(1960–1975) Incineq = 34.84 (22.76) + 1.36 (2.59) Ineqeduc  
+ 64.04 (2.53) Minrent

R<sup>2</sup> = 0.16, No. of obs = 71

(1975–1998) Incineq = 36.22 (37.42) + 1.22 (3.21) Ineqeduc  
+ 21.07 (1.84) Minrent

R<sup>2</sup> = 0.10, No. of obs = 135

*“New” causes of inequality: Technological changes and the shift to the Washington Consensus*

With the exception of educational inequality, the old causes are thus unlikely to explain much of the widespread surge in inequality observed over the last 20 years. More recent changes, discussed hereafter, are likely to be more relevant.

*Technological change*

Rising wage inequality has often been ascribed to technological change. “New technologies”, it is said, generate a demand for skills and earnings distribution more skewed than those emanating from “old technologies”. Second, information technologies diminish the cost of monitoring unskilled workers and reduce the wage premia needed to ensure their efficient performance. Third, especially in the service sector, new technologies replace labour and affect the functional distribution of income. Yet much of the rise in earnings inequality can be controlled by policies facilitating the adjustment of labour supply to this new demand pattern. Comparisons between the Republic of Korea and Brazil in the 1960s–1970s and Canada and the USA in the 1980s–1990s show that inequality rose in Brazil and the USA, but not in Korea and Canada, because the latter two adopted vigorous policies to promote and subsidize secondary and higher education. Public expenditure and other measures in education – and the development of financial markets – can indeed contain the rise in technology-related earnings inequality. Fourth, advances in telecommunications and information technologies are turning formerly non-tradable services into international tradables – for example data processing and accounting. This creates a new comparative advantage for low-income countries with an educated workforce but negatively affects employment in other countries.

*Stabilization and structural adjustment*

The 1980s and 1990s have witnessed a sharp increase in the number of adjustment programmes introduced with the assistance of the IMF and World Bank. The impact of some of their components is discussed hereafter.

The first impacts are deflation, factor shares, and incidence of expenditure cuts. For many years, stabilization has been attained predominantly through demand management measures. Measures to stimulate supply were also introduced, but require more time and resources to produce results and have fewer chances to succeed in small, undiversified economies with weak institutions and infrastructure. Demand management (a reduction in aggregate demand) is achieved through a reduction in money supply, wage repression, cuts in public expenditure, and

revenue-raising measures. While generally yielding rapid results in terms of macroeconomic balance, this approach generates avoidable recessions of varying duration.<sup>43</sup> In addition, its impact is unlikely to be distributionally neutral. Unlike in the advanced countries, inequality in developing countries rises during recessions and adjustment and falls during recoveries.<sup>44</sup> In industrialized countries, slumps have a greater impact on profits than wages because of the stickiness of the latter, because social safety nets cushion losses of wage income, and because firms hoard labour during recessions to reduce the screening and training costs they face over the medium term. In contrast, in low- and middle-income countries, wages are downwardly flexible, social safety nets little developed, and labour stockpiling less frequent. Thus, unskilled wages decline faster than GDP per capita and profits, the wage share falls, and the inequality of the size distribution of income increases.

Another factor is inflation control. Countries affected by high inflation and incomplete stabilization (such as Bolivia in the 1980s and Ukraine in the 1990s) frequently experience a worsening of income distribution, as the poor are least able to index their incomes and maintain the real value of their assets, and unskilled labour is especially vulnerable to lay-offs in recessions caused by ill-designed stabilization efforts. Thus, under conditions of high inflation, stabilization policies are likely to generate favourable distributive effects. Yet the rate of inflation targeted by orthodox programmes is single digit, even though the literature shows that inflation is not costly<sup>45</sup> if it is kept below a threshold of 25–40 per cent a year. Second, these ambitious single-digit stabilization targets are sought by means of large rises in interest rates and budget cuts, which have negative distributive effects. Third, the monetary approach to the control of inflation can generate side-effects which require that austerity measures be kept in place for many years in order to push inflation below an acceptable threshold.<sup>46</sup>

#### *Trade liberalization*

Wood<sup>47</sup> and other authors argue that the expansion of world trade accounts for between a third and a half of the increase in inequality in the OECD countries since the 1970s, and for its supposed decline in the fast-growing exporters of manufactured goods, such as Taiwan, Korea, Hong Kong, and Singapore (as noted earlier, however, the decline in inequality in these countries has been reversed since the early 1980s). According to this theory, an expansion of manufactured exports in “poor” countries raises the demand for unskilled (but literate) labour relative to that for skilled and illiterate labour and thus reduces the wage differential between skilled and unskilled labour, though it widens that between unskilled and illiterate workers. In the developed countries, a rise in the

imports of labour-intensive goods (and in the supply of low-skilled immigrants) reduces the demand for unskilled labour. This is said to cause an increase in unemployment among these workers (and a relocation of labour-intensive industries to developing countries), and to depress the relative wage of unskilled workers. As noted above, there is evidence that in the 1980s the wages of workers with high education rose relative to those of workers with lower education.

The explanatory power of this “South-North trade story” is, however, partial. Indeed, it cannot explain the surge in inequality in the developing and transitional economies which did not increase manufactured exports towards the richer countries, nor the rise in inequality observed in the 1980s in the Asian fast-growing exporters of manufactures. While old trade theory predicts that inequality will fall in developing countries which liberalize, new theory and some new evidence suggest that income inequality now rises post-liberalization. One of the ways this increase occurs is through the imports of world-class technology – or the shift to high-tech exports requiring highly educated labour – which raise the returns to skilled labour and reduce the demand for the locally abundant unskilled (if literate) labour. Indeed, recent trade liberalization in Latin America has been associated with increased wage inequality, as the adoption of imported new technologies renders the tradable sector less intensive in unskilled or semi-skilled labour. As for the OECD countries, other factors – such as the liberalization of labour markets and cuts in social transfers – may have had a greater impact on inequality.

#### *The rise of the financial rent*

In 1982, US interest rates rose sharply and pushed up those of most other countries. This rise, the IMF policy of demanding large increases in interest rates in crisis countries, and domestic financial liberalization in the 1980s fuelled a worldwide rise in real interest rates. In developing countries paying high country-risk premia, real interest rates rose by 10–15 points and so did the cost of servicing the domestic and external debt. Interest payments on public debt reached in the early and mid-1990s levels close to 15 per cent of GDP in a number of middle-income countries and in industrialized countries with a large stock of debt. The net effect of all this was disequalizing. In developing countries tax incidence is regressive or proportional, while the ownership of financial assets is highly concentrated (in Turkey, in the late 1980s, the Gini coefficient of bank deposits was 0.7). Financial deregulation has thus led to a substantial increase in the rate of return to financial capital, a rapid accumulation of public debt, an increase in the share of GDP accruing to non-wage incomes, the emergence of a new class of rentiers, and the redistribution via the budget of labour income to holders of state bonds. Finally, recent

evidence also points to the close relation between financial crises (which have become more frequent with the advent of financial liberalization) and earnings inequality, particularly in countries with weak labour institutions. In Latin America and Asia, for instance, financial crises raised inequality in 73 per cent and 62 per cent of cases, while in Finland, Norway, and Spain they did not.<sup>48</sup> Diwan<sup>49</sup> arrives at similar conclusions: on the basis of international panel data he finds that the share of labour income in GDP usually contracts markedly in the wake of (and increasing numbers of) financial crises. The contraction in the labour share identified in his paper appears to be an important “adjustment mechanism” for the allocation of social losses and the resolution of the debt overhang.

#### *Changes in labour institutions*

Since the 1980s, there has been a widespread shift towards greater wage flexibility, reduced regulation, erosion of minimum wages, lower unionization, dilution of the wage-bargaining power of trade unions, and higher labour mobility. These changes were expected to generate fast employment growth and some increase in wage dispersion. The overall impact was to depend on whether the “wage inequality effect” or the “employment-creation effect” prevailed.

In the USA, the fall in unionization accounted for about 20 per cent of the total increase in earnings inequality.<sup>50</sup> In Eastern Europe, Latin America, and the USA, the fall of minimum wages relative to average wages seems to be closely associated with the rise in earnings inequality. In the USA, the erosion of the minimum wage is estimated to account for about 30 per cent of the rise in earnings concentration. In contrast, earnings concentration did not increase in countries with collective bargaining institutions, adequate minimum wages, and social protection systems. The rise in earnings inequality is also explained by a rapid rise in the highest wages (a fact possibly related to the expansion of the finance-insurance-Internet-real estate sector) and in the inter-industrial wage dispersion not justified by differential rises in labour productivity.

The inequality impact of the deregulation of the labour market is less clear in countries with segmented labour markets and social security systems covering only the formal sector and with already high wage inequality (such as Argentina, and Zimbabwe before the 1990 liberalization). In these countries, the overall employment effect due to the downsizing of the capital-intensive formal sector might be distributionally beneficial.

#### *Erosion of the redistributive role of the state*

Past studies of the net fiscal incidence of tax and transfer operations in developing countries showed that the state played a positive, though

generally limited, role in redistributing income from the upper to the lower strata.<sup>51</sup> This redistribution was the result of the broad proportionality or slight regressivity of taxation and the moderate progressivity of public expenditure. Redistribution was greater in middle-income economies following a pro-poor political economy: in 1990–1991, for instance, the Chilean government raised its revenue by two GDP points and utilized it for highly pro-poor transfers, with the result that the share of consumption of the poorest quintile rose from 3.3 per cent (before transfers) to 6.4 per cent (after transfers). Finally, in both industrialized and transitional countries redistribution has been shown to reduce inequality and poverty substantially.<sup>52</sup> In Finland, for instance, the Gini coefficient of the distribution of factor income rose from 39.0 to 46.6 between 1991 and 1993, but that of disposable income remained unchanged at around 21,<sup>53</sup> pointing to a marked increase in the redistributive role of the tax and transfer system during a crisis period.

Though no comprehensive analysis is available for the 1980s and the 1990s, tax systems appear to have evolved towards lower progressivity. In addition, changes in the level and composition of public expenditure have reduced its redistributiveness. For instance, the share of interest payments in total public expenditure rose everywhere (from 9 per cent to 19.3 per cent in Latin America between 1980–1981 and 1985–1987).<sup>54</sup> The move to “fine targeting” of cash transfers, moreover, often compounded the problem. While such an approach may reduce the leakage to the non-poor, it generally worsens income distribution because of the large number of poor who are excluded from the benefits, and because even poorly targeted transfers (such as generalized food subsidies) represent a greater share of the total income of the poor than of the rich.

### Inequality, growth, and poverty reduction

What was the impact on growth of the inequality changes observed over the past two decades? Elaboration of this point requires a brief discussion of distribution theories.

#### *Theories of the distribution-growth nexus*

“Old theories of distribution” suggest that inequality is pro-growth (and under certain conditions pro-poverty reduction), and that – for this reason – public policy should promote a skewed distribution of income. Keynesian theories<sup>55</sup> posited that profit earners have a higher propensity to save than wage earners, and that a distribution of factor income favouring profits leads to faster accumulation, growth, and employment than a more egalitarian one. In addition, as the marginal propensity to

save was assumed to rise with an increase in income per capita, a skewed wage distribution would further raise aggregate savings and growth. However, the empirical evidence in support of the alleged rise in marginal propensity to save is weak, and other factors – such as income type, access to productive assets, development of financial intermediation, and location – appear to play a greater impact on savings creation.<sup>56</sup> In turn, the monetarists argue that an increase in interest rates (which increases the return to capital and reduces the labour share) is associated with faster savings and growth. In this case, however, the empirical evidence is also contradictory.<sup>57</sup> Finally, Kuznets<sup>58</sup> showed that, in a dualistic economy, inequality rises during the first phase of development as the productivity and wages of the educated workers employed in the modern enclave rise relative to those of the illiterate ones employed in the traditional sector. With the gradual shift of the majority of workers to the formal sector, inequality tends then to fall. Also here, despite the resources dedicated to its refinement, empirical support for this model remains modest.<sup>59</sup>

The last decade has seen an explosion of “new theories of distribution” which have recast the inequality-growth nexus and arrived at radically different policy conclusions than the “old theories”. The first group of such new theories focuses on political economy considerations and imperfect capital markets. It argues that, *ceteris paribus*, high initial inequality in the distribution of assets (such as land) can be detrimental to growth.<sup>60</sup> As suggested by the “median voter theory”, under democratic rule a high degree of asset and income concentration leads to the election of governments which favour redistribution through high marginal tax rates, which, in turn, depress private investment and growth. In addition, high income inequality reduces progress in fertility control, education, and human capital accumulation, as financial markets are incomplete or missing and governments are unwilling or unable to tax the wealthy to expand public education.

From a policy perspective, these models recommend an initial asset redistribution and the enlargement of financial markets. Income redistribution, in contrast, is seen as having harmful effects on growth as private investment is assumed to have higher returns than public investment, so raising taxes to finance the latter reduces overall growth. This is not necessarily true, however. Well-designed public infrastructure has strong public goods characteristics, which facilitate private investment, and well-targeted social infrastructure and transfers raise labour productivity and growth. Much depends on how the additional tax revenue is spent. This approach also neglects the other mechanisms which have recently raised the inequality of the distribution of market incomes.

A second group of “new theories of distribution” focuses on the im-

pact of inequality on incentives, social conflicts, and transaction costs and property rights. In this model, incentive erosion occurs at both very low and very high inequality levels. At very low levels of inequality (as in some socialist economies in the 1980s), growth is affected negatively, as too compressed a wage distribution may not adequately reward different capabilities and efforts, erode work incentives, and increase labour shirking and free-riding. Loss of incentives can also occur if workers are subject to very high marginal tax rates, via either the state or within-community mechanisms. Similarly, when the gap between the rich and the poor widens excessively, including due to the erosion of labour institutions and the rise of the financial rent, rent-seeking and predatory activities rise, and the work incentives of the assetless poor wane. For instance, rural economies with very high land concentration and levels of landlessness face very high shirking and supervision costs and the erosion of ecologically fragile lands. For these reasons they tend to be less efficient than more equitable agrarian systems, even when account is taken of economies of scale in marketing, processing, and shipping. In industrialized societies, in several sectors economies of scale can offset the higher supervision costs faced by large firms. But in industries enjoying no economies of scale, large firms face higher shirking and supervision costs than small or medium-sized ones.

High levels of income inequality – both vertical and horizontal (that is among social groups) – can also create political instability and social tensions. For instance, the literature provides evidence of a fairly strong relation between inequality and unemployment on one side and the crime rate on the other. Likewise, UNU/WIDER research suggest that high horizontal inequality increases the risk of social tensions and conflicts. Social tensions, in turn, erode the security of property rights, augment the threat of expropriation, drive away domestic and foreign investment, and increase the cost of business security and contract enforcement.

Unlike in the political economic models which posit a monotonically declining relation between initial asset inequality and growth, in the distribution model focusing on incentive compatibility and transaction costs the relationship between inequality and growth is concave and asymmetric, taking the form described in Figure 5.3.<sup>61</sup> In this approach, “too low” and – especially – “too high” inequality reduce growth, which remains broadly invariant within a given “efficient inequality range”. Growth clearly suffers if inequality falls below  $I_1$  and a moderate surge in income dispersion from that level can improve incentives, accelerate growth, and reduce poverty (Figure 5.3). Conversely, as inequality rises there comes a point  $I^*$  at which the inequality-growth relationship turns negative. Beyond that point, the negative impact of inequality on growth dominates. And from inequality level  $I_2$  onwards, growth turns sharply negative.

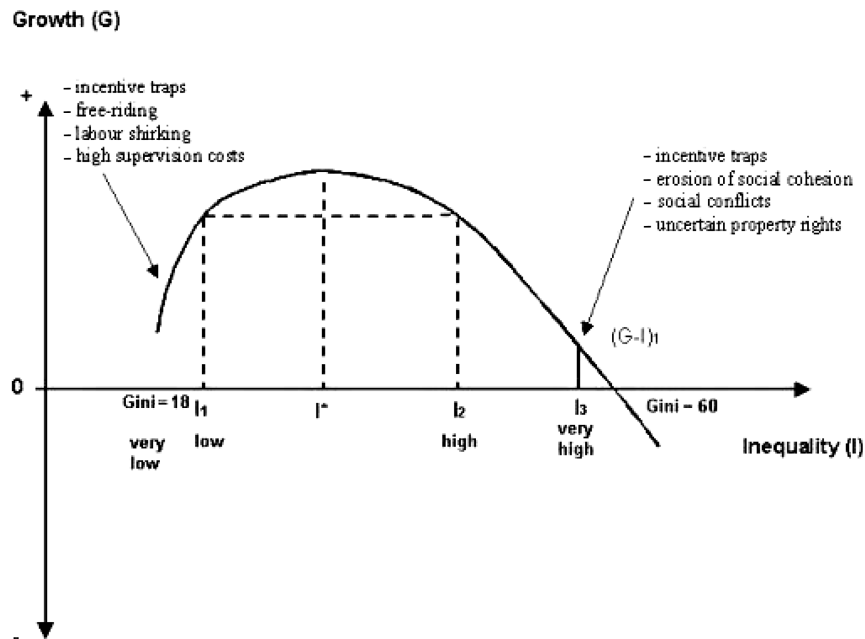


Figure 5.3: Non-linear relation between inequality and growth

The precise shape of the inequality-growth (I-G) relationship obviously varies across countries depending upon their resource endowment, history, past policies on the distribution of physical and human capital and other factors. But if the I-G curve is correctly represented, then – given the attainable growth rate of output compatible with macroeconomic and environmental constraints – any country that intends to maximize poverty reduction should choose the lowest level of inequality ( $I_1$ ) within the broadly invariant ( $I_1$ – $I_2$ ) range, as  $I_1$  is associated with a rate of poverty reduction which is greater than that of  $I_2$ .

This model arrives at policy conclusions which are fundamentally different from those of the “old” and the “new” political economic models discussed above: in this model, at high levels of inequality the rich have an incentive not only to reduce asset inequality and improve financial markets, but also to increase public spending on education, raise minimum wages, promote employment, and adopt other distributive and redistributive measures which lower transaction and monitoring costs and increase the security of property rights. These measures may indeed be less costly and more pro-growth than a *status quo* characterized by high supervision, transaction, security, and enforcement costs and uncertain property rights.

*Econometric test of the inequality-growth relation*

To test the I-G relation above, changes in national Gini coefficients between their lowest point (generally the 1970s or early 1980s) and their latest available year (generally around the mid-1990s) have been plotted for 73 countries against changes in GDP growth rates divided by the regional GDP growth average over the same period (Figure 5.4). Standardization by the regional average was necessary to control for regional shocks, such as the debt crisis in Latin America or the transitional recession in the former Soviet bloc, which systematically lowered the growth rates in these regions as compared to others.

The scatter in Figure 5.4 shows that the asymmetric concave relation discussed above is successfully identified. Countries of Western and Central Europe experiencing moderate surges in inequality from low levels had a much better growth performance than countries witnessing large increases in Gini coefficients from low levels (as in most of the former Soviet Union) or moderate increases from very high levels (as in several Latin American and African countries). Interpolation of the scatter diagram allows the identification of a statistically significant quadratic relation (superior to the linear one) which explains 57 per cent of the total variance in growth performance. Subsequent tests (on individual subregions or expressing the average growth rates in index numbers) confirm the robustness of the I-G curve, even if the degree of concavity is reduced and the goodness of the fit reduced.<sup>62</sup> However, further investigation of this point is necessary to establish more clearly the direction of causation of this relation.

*Rising inequality and poverty reduction*

The widespread increase in inequality discussed above has proved detrimental to the achievement of the poverty reduction objectives adopted by the international community in the late 1980s and early 1990s. This is because large rises in inequality have – as argued above – stifled growth, and because for any given growth rate of GDP poverty falls less rapidly in the case of a more unequal distribution than in the case of a more equitable one.

The *World Development Report 1990*<sup>63</sup> projected that the total number of poor (people surviving on less than PPP \$1 per day) would fall from 1.12 billion to 825 million between 1985 and 2000 (Table 5.5).<sup>64</sup> Yet recent assessments by the same institution for years both before and after the Asian crisis indicate that such target will be missed by a large margin. The number of poor worldwide was estimated at 1.21 billion in 1998, and is expected to approach almost the 1.3 billion mark by 2000.

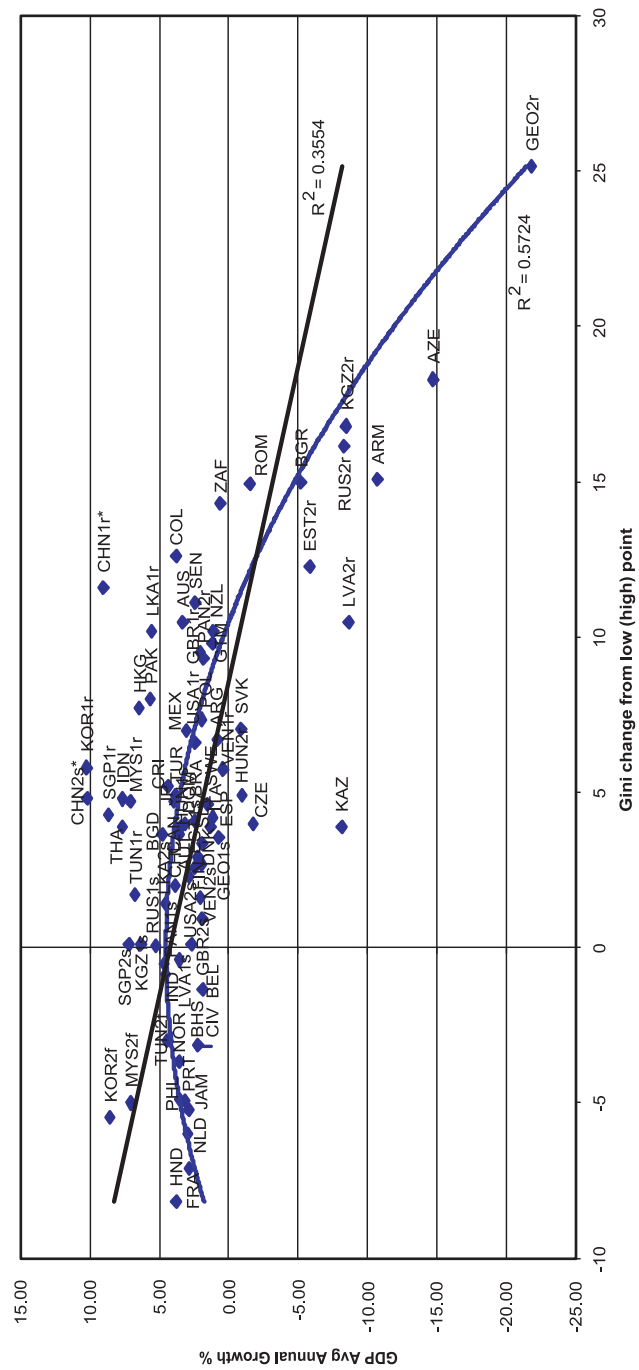


Figure 5.4: Relation between changes in Gini coefficients over time (during rising, stable, and falling periods for which data are available) and changes in growth performance over the same period

Table 5.5: Estimated poverty rates for 1985–1998, and 1990 projection for 2000

Regions	1985 (assessed in 1990) millions/%	1987 (assessed in 1999) millions/%	1990 (assessed in 1999) millions/%	1993 (assessed in 1999) millions/%	1996 (assessed in 1999) millions/%	1998 (estimated in 1999) millions/%	2000 (projected in 1990) millions/%
East Asia	280 (20.4)	415 (26.6)	452 (27.6)	432 (25.2)	265 (14.9)	278 (15.3)	70 (4.0)
Eastern Europe and former Soviet Union	5 (7.8)	1 (0.2)	7 (1.6)	18 (4.0)	23 (5.1)	24 (5.1)	5 (7.9)
Latin America	75 (19.1)	64 (15.3)	74 (16.8)	71 (15.3)	76 (15.6)	78 (15.6)	60 (11.4)
Middle East and North Africa	–	25 (11.5)	22 (9.3)	21 (8.4)	21 (7.8)	21 (7.3)	–
South Asia	525 (50.9)	474 (44.9)	495 (44.0)	505 (42.4)	505 (40.1)	522 (40.0)	365 (26.0)
Sub-Saharan Africa	180 (46.8)	217 (46.6)	242 (47.7)	273 (49.6)	289 (48.5)	291 (46.3)	265 (43.1)
Total	1,125 (32.7)	1,196 (28.7)	1,293 (29.3)	1,320 (28.5)	1,180 (24.3)	1,214 (24.3)	825 (18.0)
Total without China	–	891 (29.6)	916 (29.3)	955 (28.5)	960 (27.3)	991 (27.3)	–

Note: 1985 and 2000 figures are not entirely comparable with those for 1987–1998 due to some changes in country groupings and the definition of the poverty line, defined as \$370 a year in World Bank 1990 and \$365 a year in World Bank 1999.

Source: World Bank, *World Development Report 1990* (Washington, DC: World Bank, 1990); World Bank, *World Development Indicators* (Washington, DC: World Bank, 1999).

The extent of poverty reduction by region was clearly influenced by the observed changes in income distribution. Poverty rates rose faster than expected on the basis of output contraction in most the former Soviet bloc, where inequality escalated sharply. In Africa and Latin America the share of the poor remained broadly constant over 1987–1998, while the number of the poor rose respectively by 73 million and 15 million despite a moderate rise in output per capita. These results would appear even more dramatic considering that during this period growth in these two regions was faster than during the first seven years of the 1980s. Indeed, a comparison of the 1998 poverty estimates (Table 5.5) with those of 1980 would show for these two regions much greater rises in poverty. In China, until 1993 the number of the poor declined very sharply (despite a population increase of over 20 million people a year), thanks to very rapid growth and a modest rise in inequality. However, with the subsequent sharp increase in inequality, progress on the poverty front has stalled – in spite of still acceptable growth rates of output.

That successful poverty alleviation depends not only on favourable changes in average GDP per capita growth but also on favourable changes in income inequality is also borne out by country examples (Table 5.6). In Brazil, in spite of an increase in income per capita, poverty stagnated over the 1980s as a result of an increase in inequality from already high levels. In Cote d'Ivoire, in contrast, the recession-induced steep rise in poverty over the period 1985–1988 was partly compensated by an improvement in rural-urban income distribution. Finally, in Bulgaria, over the period 1991–1993, poverty increased much more than

Table 5.6: Decomposition of changes in poverty over time into changes in mean income and changes in the distribution of income

	Total change in poverty (%)	Poverty effect of changes in income (%)	Poverty effect of changes in distribution of income (%)	Residual (%)
Brazil 1981–1988	0.01	–4.49	4.46	0.04
Cote d'Ivoire 1985–1988	15.90	16.90	–6.00	5.00
Bulgaria 1991–1993	8.10	0.90	6.60	0.60

Notes:

1. Negative values denote reductions in poverty; positive values indicate increases.
2. The residual is due to the fact that the sum of the changes in mean incomes and in income distribution does not equal the change in poverty.

predicted by the average fall in per capita income because of a sharp rise in inequality.

Unless the Washington Consensus evolves in a distributionally favourable manner in the years ahead, current inequality trends are likely to depress growth, reduce the poverty alleviation elasticity of growth, and prevent the achievement of the DAC objective of reducing the incidence of poverty to 15 per cent by 2015. At the moment, the World Bank estimates that income per capita in the developing countries will grow at an average of 4 per cent a year until 2015. The impact of such growth on poverty depends very much on the pattern of such growth and the extent of its inequality during this period. The Overseas Development Institute (ODI) estimated that if the projected 4 per cent growth is accompanied by low inequality (Gini coefficients of less than 43), then the DAC target can be met easily. In contrast, if the projected 4 per cent growth is associated with high inequality, by 2015 poverty rates will still be in the vicinity of 20 per cent. In the high inequality scenario, the DAC poverty target would be met only if the growth rate of income per capita reaches a staggering 9 per cent, an assumption without historical precedent and unlikely to be sustainable from the environmental and social perspectives (in the Asian tigers, income per capita grew by 5.5 per cent per year over the period 1965–1997).

### Conclusions – Which policies for rapid poverty reduction?

This chapter has argued that traditional causes of inequality explain an important part of the variation in cross-country inequality, but much less of its increase over time observed recently in two-thirds of the countries analysed. Commitment to pro-poor growth therefore requires not only a firm commitment to the removal of the old causes of inequality but also that alternative structural, macroeconomic, distributive, and external policies with a more favourable distributive impact are designed and incorporated in a revised development approach, which we can term, together with Stiglitz,<sup>66</sup> “the Post-Washington Consensus”.

#### *Addressing the old sources of inequality*

Addressing the problem of high inequality in poor agrarian economies requires traditional measures of asset and income redistribution – well-designed land reforms. In Central and South America one-third of rural households remain landless,<sup>67</sup> and land reform in Southern Africa is urgent. Wage inequality is high in these countries as unskilled wages are driven down by the excess supply of landless labourers, a situation that is reversed by land reform.<sup>68</sup>

In several developing countries public spending on education, health, and transfers is insufficient and biased towards the non-poor.<sup>69</sup> Though socially desirable, the reallocation of public expenditure in periods of stagnant budgets – however it is apportioned – may face a difficult political economy. In several countries, pro-poor redistribution at the margin could also be achieved by raising moderately the tax/GDP ratio. At the moment, wealth and property taxes account for a mere 2.6 per cent of total tax revenue in developing countries as a whole. If the political power of the wealthy can be overcome, then taxation of land, urban property, capital gains, and financial rents can raise additional revenue to be allocated to educational expansion and other pro-poor activities. As shown by the case of Chile over the period 1990–1992, redistribution via the budget can indeed work.<sup>70</sup>

Regional and ethnic bias in public spending and employment exacerbate both horizontal and vertical inequality and contribute to violence and genocide (as in Rwanda). Large countries frequently combine a well-developed modern sector with remote and poor backward areas, often inhabited by people of a specific ethnic origin (as in Brazil's north-east or Xinjiang in China). In Mexico, 80 per cent of the indigenous population are poor, while only 18 per cent of Caucasians are poor.<sup>71</sup> Infrastructure and education investment in poor regions is generally more effective in reducing urban bias and regional inequality than welfare transfers or fiscal incentives.

### *Addressing the new sources of inequality*

With its rush to promote ill-designed privatization and premature liberalization of financial markets in the presence of weak regulatory capacity, the Washington Consensus has contributed to rising income and asset inequality. Thus, while important, especially for countries with a large number of rural poor, traditional measures such as those illustrated above will not be able to contain the poverty upswings caused by a rise in inequality. To accelerate poverty reduction, the Post-Washington Consensus must also explore alternative adjustment and structural reforms.

A first key element of a strategy focusing on poverty reduction consists of running a macroeconomic policy which minimizes output volatility and thus avoids sharp recession-induced rises in inequality. As noted earlier, in developing countries recessions depress the labour share, increase distress sales of assets by the poor, and reduce their human capital. In addition, a rise in horizontal inequality during recession may intensify social conflict as well – as shown by the Indonesian case. The benefits of reducing output volatility are considerable; in Latin America, a 3 per cent re-

duction in the volatility of GDP growth would reduce the Gini coefficient by 2 per cent.<sup>72</sup>

Smoothing consumption over time can be achieved by means of fiscal policy. However, low international credit ratings and thin domestic debt markets limit the ability of poor countries to use this option. Increased external budgetary support can expand their room for manoeuvre – implying a reversal in the decline of real aid flows and more official debt relief – together with international mechanisms to dampen the volatility of commodity prices and short-term portfolio flows.

Particularly in transition economies, the distributive impact of privatization needs to be addressed. In addition to leading to a highly regressive asset redistribution, insider privatization failed to raise economic efficiency. Greater attention to the institutional design of privatization, and greater caution in its use, are now part of the Post-Washington Consensus. Privatization is now a “done deal” in many countries, so regulation is often the key entry point for equity concerns. Privatized utilities illustrate the issues. Various regulatory mechanisms and subsidies to ensure service delivery to the poor can be deployed, though their relative effectiveness remains uncertain.

In emerging economies the main problem is to reduce the output volatility associated with financial contagion. Recent events have shown that exchange rate policy and financial regulation are the weak points in emerging economies. Yet there is no consensus in this area. Assigning monetary and fiscal policy to defend the exchange rate raises the cost of public debt service (via higher interest rates). To offset the impact on the overall fiscal deficit, countries are urged to raise their primary fiscal surplus – as Brazil was advised by the IMF in 1998. But this is not conducive to raising pro-poor social spending. A currency board ended hyperinflation in Argentina, but post-stabilization employment growth is disappointing and has not offset the rise in the concentration of wealth associated with recent privatizations.

International action to curb destabilizing short-term capital flows could reduce output volatility and would enhance the scope for avoiding sharp recession-induced increases in inequality and poverty. In the meantime, a reversion to capital controls seems inevitable if countries wish to assign monetary and fiscal policy to achieving growth. For instance, capital controls to support the currency have enabled China to reflate its economy to offset privatization’s social costs.

No doubt, more policy suggestions could be added to this list, in particular the need to ensure a healthy balance of power between capital and labour and the need to design appropriate labour market regulations. Discussion in each of these areas shows that equity is not neces-

sarily in conflict with efficiency – indeed, well-designed macroeconomic, structural, and redistributive policies may raise growth, thus shifting economies towards the optimal combination of inequality, poverty reduction, and growth discussed earlier.

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## The future of technology and the implications for society and the UN system

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### New technologies, new possibilities

Just 10 years ago, the term “Internet” was virtually unknown in business, to decision-makers, or among the general public. Yet it has become the fastest-spreading and possibly the most pervasive technological influence in history. Looking into the future, we can ask the question: what technologies could become major forces of social change in the next 10 years? Will we use stem cells from cows and fish to produce muscle tissue without growing the complete animal to produce protein foods, thus reducing the need for cattle and fishing industries? Will we reduce the use of woodpulp-based paper with digital reusable artificial paper? Over the next 25 or 50 years, will nanotechnology reduce pollution and raise the living standards of the poor by reducing input per unit of production and distribution? Will solar-power satellites supply much of the world’s electricity needs without producing greenhouse gases or nuclear waste? Will personalized food increase mental performance? Will we manufacture new forms of life by creating genes and putting them in unique sequences? Will rural micro-enterprises flourish in developing countries whose primary income is via e-commerce?

New technologies have the potential to help solve pressing issues and improve the lives of most people. Yet they also have dangers and hidden consequences, and raise profound ethical and moral issues. For example, if low-cost methods to determine the sex of a child are available in China

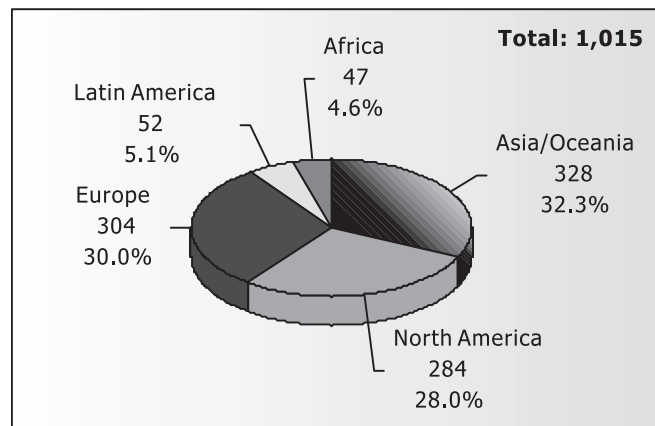


Figure 6.1: Regional demographics of Millennium Project participants

and India, which have 40 per cent of the world's population and where male children are preferred, the demographics of humanity could be drastically altered. Although biotechnology could feed the world, it might also eliminate livelihoods for vast numbers of people and create serious environmental problems. Animal cloning will improve quality and cut costs of animal products, but raises ethical questions about the potentials for human cloning. Genomic and stem cell research indicates that human life could be considerably extended, which could alter social and financial commitments significantly. Scientists who have determined the minimum number of genes to create life believe they can create new organisms from only chemical ingredients. Since some new life forms could be used as biological weapons while others could eat toxic wastes and produce fertilizer, there are naturally many calls for public assessment prior to creating new life forms.

Potential developments such as these have been identified and assessed by the Millennium Project of the American Council for the United Nations University. The project is a globally decentralized think-tank of over 1,000 futurists, business planners, scholars, scientists, policy advisers, and decision-makers who work for international organizations, governments, corporations, universities, and NGOs in over 50 countries (Figures 6.1 and 6.2). "Nodes" or groups of individuals and institutions in 11 locations around the world interconnect local and global perspectives via translated questionnaires and interviews.

Over the last three years, the Millennium Project has used this network to identify and study issues, opportunities, and actions.<sup>1</sup> These have been further synthesized into 15 global challenges humanity faces at the millennium.

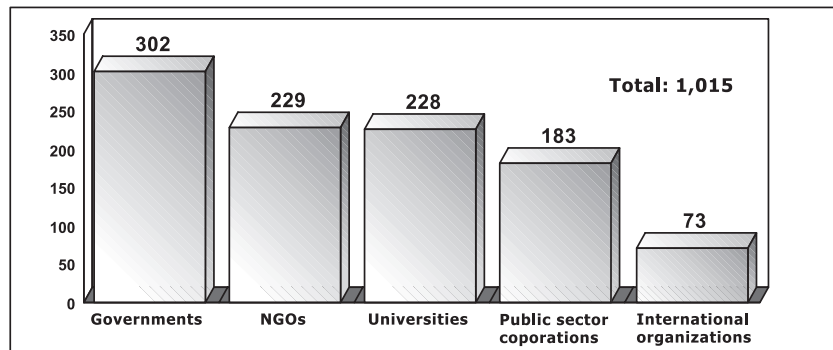


Figure 6.2: Sectoral demographics of Millennium Project participants

- How can sustainable development be achieved for all?
- How can everyone have sufficient clean water without conflict?
- How can population growth and resources be brought into balance?
- How can genuine democracy emerge from authoritarian regimes?
- How can policy-making be made more sensitive to global long-term perspectives?
- How can the globalization and convergence of information and communications technologies work for everyone?
- How can ethical market economies be encouraged to help reduce the gap between the rich and poor?
- How can the threat of new and re-emerging diseases and immune micro-organisms be reduced?
- How can the capacity to decide be improved while the nature of work and institutions is changing?
- How can shared values and new security strategies reduce ethnic conflict, terrorism, and the use of weapons of mass destruction?
- How can the changing status of women improve the human condition?
- How can organized crime be stopped from becoming more powerful and sophisticated global enterprises?
- How can the growing energy demand be safely and efficiently met?
- How can scientific and technological breakthroughs be accelerated to improve the human condition?
- How can ethical considerations become more routinely incorporated into global decisions?

All of these challenges involve social-technological dynamics. Most of the material in this chapter is drawn from a 1999 discussion<sup>2</sup> of Challenge 14 on science and technology; however, the other challenges are referred to where appropriate. The chapter initially highlights some trends and challenges regarding the globalization of science and technology. It

then looks at emerging issues in four key areas: information and communication technologies; biotechnology; nanotechnology; and space technology. The chapter concludes with some specific recommendations for the United Nations.

### The globalization of science and technology

A very visible trend affecting the world is the accelerating pace of scientific progress and technological applications. This trend shows no signs of slowing down.<sup>3</sup> The synergies among the sciences and confluence of technologies have been accelerated by the spread of communications and information technology. This spread has led to a dramatic increase in cross-disciplinary invention, geographically dispersed research collaboration, and rapid dissemination of information. The Genome Project, the Intergovernmental Panel on Climate Change (IPCC), and the International Space Station are examples of these new approaches to research.

During the Cold War, basic research was conducted in parallel in different countries at the same time. Today, basic scientific research is becoming more expensive and specialized, and, most important for this discussion, it is being conducted internationally. In particular, the spread of information and communications technologies is leading towards the globalization of science and technology. There has been a dramatic increase in international research collaboration, discussion of research findings, and information on new technologies and techniques. International cooperation has linked individual laboratories into collaboratories, which can be thought of as research facilities “without walls in cyberspace” connected via video, voice, graphics, databases, and shared software.

The increasingly global nature of basic research gives rise to the need for international principles of specialization and collaboration and yet, at the same time, leads to major challenges. The key first principle of international collaboration should be that the results of such collaboration are available to all. When inventions are proprietary, technology dissemination may be slowed. Yet, on the other hand, few would argue that companies performing research deserve to get a return for their efforts. Recent interviews conducted by the Millennium Project provide an example of the challenge here: multinational corporations would like to produce technology through more environmentally friendly means, but they want global rules applied equally with internationally and scientifically defined measures of “environmentally friendly means” before they commit to significant changes.

A second principle relates to funding. Since much basic research is becoming international, it can be argued that it should be financed

internationally. One proposal is that national contributions could be proportional to GDP and should not depend on the research location. There remain major obstacles in operationalizing this principle, but it is worthwhile highlighting it here for further reflection.

A third set of principles relates to international support for unique research centres. Selection of unique facilities, such as particle accelerators and space stations, should be done so as to prevent unnecessary redundancy. These facilities would be supported not only by governments, but also by corporations and patrons of the arts and sciences. Yet what happens when one country within a large-scale international project – such as the super-collider – does not meet its responsibilities? For some research topics such international collaboration may be possible, but for many other initiatives it must be accepted that countries are unlikely to support unique centres.

A major challenge, however, is that many in developing countries think that the developed countries' objective in international collaboration is to exploit their resources (particularly biological resources) or even to suppress the economic success of poorer countries. This is an understandable situation when, for example, major corporations patent products or minor modifications of traditional plants that have been used for centuries by indigenous peoples. Even where there is potential for international collaboration, in many cases it is difficult to see how technological advances can be translated into better lives for all. For this reason, many argue that UN organizations are the best mechanisms to develop, monitor, and help implement collaboration on such issues. Some potential roles for the United Nations are taken up further in the concluding section. Next, however, the chapter focuses on outlining some of these broader challenges with respect to some of the key areas of technological advance that will shape the twenty-first century.

## Information technology

Other contributors to this volume also highlight the importance of new information and communication technologies (ICTs) for human development (Chapters 4 and 14). Indeed, of all the new technologies available, the rapid advances in ICTs have attracted the most attention. They perhaps offer the greatest opportunities for global integration and development. ICTs have helped create new alliances unknown in traditional power relations. They offer the potential of equal access to rich and poor. But the nature of the spread of ICTs also raises many serious issues of equity and access.

The Internet is probably the greatest technological phenomenon in

history and has operationalized the term “global”. With continued improvements in software, lowered costs of hardware, and the spread of the Internet, cyberspace could become an unprecedented medium for civilization. As a result, it is important to monitor and forecast the numbers of those online throughout the world. Surveys abound, using all sorts of measurement parameters, so the estimate is an inexact one at best. According to the Nua surveys, at the end of November 2000 there were 407.1 million Internet users: 167.12 million in Canada and the USA, 113.14 million in Europe, 104.88 million in Asia Pacific; 16.45 million in Latin America; 3.11 million in Africa; and 2.4 million in the Middle East.<sup>4</sup>

According to Forrester Research<sup>5</sup> the total e-commerce market should grow to nearly US\$7 trillion by 2004, from \$2.9 trillion estimated by Computer Economics for total e-commerce in 2000.<sup>6</sup> Forrester Research expects Internet advertising to grow to \$15 billion by the year 2003.<sup>7</sup>

Durlacher Research estimates that EU business-to-business (b2b) e-commerce will grow to \$1.27 trillion by 2004.<sup>8</sup> The Asia Pacific region will continue to be dominated by Japan, with \$880 billion in sales by 2004, while Australia, the Republic of Korea, and Taiwan will each have about 16 per cent of the region’s e-business.<sup>9</sup> Chinese e-commerce revenues are expected to increase from \$97 million in 2001 to \$1.2 billion over the next two years.<sup>10</sup> Increasing numbers of schools are connected to the Internet. As of September 2000, over 98 per cent of schools in the USA are connected to the Internet, according to the National Center for Education Statistics.<sup>11</sup> Mart Laar, Prime Minister of the Republic of Estonia, told the UN Millennium Summit:

The high-level panel on Information and Communication Technology called on all of the world’s population to have access to Internet by the end of 2004. This is an ambitious goal and certainly not an easy task, but it is doable.

Given these figures and goals, information technology is seen as potentially a powerful mechanism of change. It may help to accelerate economic development, augment hospital services by tele-medicine, provide better access to the world’s knowledge, and facilitate self-education and employment. E-commerce is helping to destroy the theory that economic growth is inextricably linked to high energy consumption. One-way media (radio, newspapers, television) held an audience by the drama of conflict, while the new interactive media holds users by connecting needs and resources.

Memory chips will probably soon reach above one gigabyte capacity, reducing costs further, making them even more popular, and continuing

to change communication patterns. Soon we will see a complete computer on one chip. Increasingly, streaming video, voice and video e-mail, and radio mobile access will make us “always on”. Speed, capacity, miniaturization, speech recognition, and synthesis continue to improve, leading to new uses and further speculation about the potential of the medium becoming a global “conscious technology”.<sup>12</sup> Some speculate that the future interplay of hardware, software, and communications may create cyber-consciousness and artificial “life forms” within 25 to 50 years. Meanwhile, it is important to assess the near-term potential of ICTs in general and the Internet in particular.

Our increasing dependence creates new vulnerabilities, such as fraud, cyber-terrorism, information warfare, cultural threats, and widening knowledge gaps. Efficiencies can lead to growth without employment increases, loss of privacy and property rights, and totally new problems with authenticity of information. Previous automation replaced physical strength and labour; now automation is replacing knowledge and judgement – the social consequences of which are not well understood.

There is also a need to assess realistically the likely implications for people in lower-income countries. The cost of transceivers is falling and radio links from these transceivers to local computer terminals with radio modems could create low-cost access. Developing countries could have both a workforce and a “thinking force” at reasonable prices. A Computer Economics survey<sup>13</sup> expects China to become the second largest Internet user by 2005, behind the USA. India already has a massive software industry, with exports continuing to grow rapidly.

But according to the same Computer Economics survey, only 6 per cent of e-commerce was transacted in Africa, South America, and parts of Asia in 2000, and this figure will rise by only 1 per cent by 2003. The “digital divide” is already entrenched in the international development vocabulary.

Some suggestions of the Millennium Project participants to improve the use of these new information technologies included:

find incentives for the private sector to provide education and training, accelerate international development organizations’ efforts in training and applications, create low-cost hand-held computers with direct satellite access for low income regions to access educational software, provide free Internet access and training to the public at public libraries and schools ... strengthen intellectual property rights.<sup>14</sup>

## Biotechnology

Many have called the twenty-first century the “biological century”. Gene technology and clone technology can create new biological species,

potentially help reduce starvation around the globe, and improve livelihoods in developing countries. Between 1987 and 1996 there were 45,085 biotechnology patents registered in the USA. While the benefits may be remarkable, there remain many worrying questions about the implications for human health and the environment as well as on issues of ethics and equity (see Chapter 16).

The use of transgenic crops is increasing. The amount of land planted with such crops has increased from 3 million hectares in 1996 to 30 million hectares in 1998. There are eight major food sources that have been genetically engineered: soya, corn, canola, potatoes, tomatoes, squash, papaya, and RBGH dairy products. From these come all sorts of processed derivatives (such as soya oil, corn starch, corn syrup, canola oil, lecithin, and vitamin E). In addition to making plants more productive on diminishing agricultural land, agricultural genetics is also redefining what land is productive. As new plant strains are developed that allow marginal lands to accommodate agriculture, the land area in the world that is engaged in farming may grow.

In addition to sources of food, biotechnology in animal husbandry could also provide animals that serve as production factories for human pharmaceuticals. In such a situation, cows would be seen as bio-reactors, making valuable products. The human gene for insulin or the clotting factor, for example, would be inserted into the germ plasma of cattle and sheep at a genetic location that leads to easy harvesting of the desired human chemical in urine, blood, or milk. Cloning these animals could then make available large quantities of drugs of great value to millions of people around the world.

Human health is another area where biotechnology appears to offer much hope. The mapping of human and plant genomes may provide the means to eliminate diseases that have genetic origins or which result from malfunctioning of genetic material in the body.<sup>15</sup> A new approach to drug development called “combinatorial chemistry” is also seen to have great potential. It uses combinations of chemicals (1, 2, 3 ... n – say a million) placed on a microchip in all permutations (1 alone, 1+2, 2+3, 3+4, etc.). The chip is exposed to a disease marker and the top sets of combinations of molecules that are likely to be effective against the disease are identified. This screening approach speeds the development of more effective medicines and is used for cancer research: software given to volunteers around the world uses idle computer resources via the Internet to conduct the calculations.<sup>16</sup>

Unfortunately, there are major concerns about the implications of biotechnology for human health. The EU has proposed that genetically modified (GM) foods receive a special label. This will certainly be difficult, as foods are increasingly composed of ingredients that in turn have many sources, making it increasingly hard to know if there are no GM

sources in the final food product. Because none of them is currently labelled, GM and non-GM crops are mixed together and the entire batch is thus affected. The cost implications for segregation and labelling are enormous. However, given the public anxiety there may well be a premium for companies that prove the absence of GM sources in their food products.

There are also major concerns about the effects on biotechnology on the environment. Genetically engineered traits from one crop can move to its relatives, creating “super-weeds” that are more difficult to kill. There are likely to be as yet unknown risks to ecosystems (such as alien species). Given these concerns, 130 nations and public interest groups have adopted the Biosafety Protocol as the first protocol to the Convention on Biological Diversity, which would tighten regulations on genetically engineered seeds, grains, and foods, and create an important information clearing-house. For example, if a party to the protocol approves a genetically modified corn for planting, it would be required to post that information with the clearing-house within 15 days. However, one must be realistic about the many economic and political forces pushing biotechnology interests. It is difficult to see how the protocol can be effective given that the USA, Canada, Australia, Argentina, Uruguay, and Chile – some of the world’s major producers of GM commodities – remain opposed.

Cloning is perhaps the most controversial of biotechnology issues. The process of cloning was most publicly demonstrated in 1997 when a sheep, Dolly, was successfully cloned in Scotland. Since then, mice have been cloned in Japan, calves in New Zealand, and other organisms elsewhere. The possibility of human cloning has been seriously discussed, and the production of organs from one’s own genetic material seems at least plausible. Not surprisingly, there is increasing evidence of problems with cloned organisms. For examples, it has been noted that Dolly’s telomeres – the material at the ends of chromosomes which are associated with ageing – are shorter than one would expect, leading some scientists to think that the sheep inherited some of its age as well as its genetic make-up from its six-year-old mother’s cells.

Nevertheless, it is possible that cloning could be used for growing spare parts for people, and as an alternative procreational technique. There is a technique now coming into use in which a baby’s umbilical cord cells are stored so that these cells can be stimulated into development later on if replacement cells are needed by the adult, say for a bone marrow transplant or brain repair. With this approach a person’s umbilical cells, stored years earlier, could be the source of new cells. In addition to using stem cells to produce human organ replacements, stem cells from cows and fish could be used to grow muscle tissue in protein factories, reducing the need for cattle and fishing industries.

The ethical dilemmas with stem cell research and development are significant. There is a range of stem cells from embryonic to adult stem cells for each of the tissue categories. There seems to be no moral argument against the use of adult stem cells in research and medical procedures. The controversy is about the use of embryonic cells. Unfortunately, adult cells are less flexible than embryonic cells. They are specific to only one type of tissue, are not so plentiful, do not live as long, and are more difficult to collect. Theoretically, embryonic stem cells can be stimulated to become any tissue.

A July 2001 US National Academy of Science review<sup>17</sup> of stem cell research estimated there were 250,000 unused embryos in the USA left over from couples seeking fertility assistance. Some believe it is immoral to take stem cells from these embryos, because it prevents them ever growing up to be a human being. Others say the unused embryos will be flushed down the toilet since the successful parents no longer want the unused embryos. Better to save lives with the cells than to destroy them. Others counter that this will lead to businesses that will create embryos just to kill them for their stem cells. This is refuted by those who are willing to donate eggs and sperm without cost specifically to create embryos for stem cell research. Although there may be new ways of creating stem cells without the need to form the embryo, questions of when life begins, and who owns it, are only now being addressed.

## Nanotechnology

One of the most important trends for the future is likely to be the continuing micro-miniaturization of technology, increasingly being referred to as microtechnology and nanotechnology. Green leaves of plants can be thought of nature's nanotechnology for food production. As scientists learn more about molecular chemistry, they will be able to create similar nano-scale production processes for manufacturing a vast array of products. President Clinton's science and technology adviser, Neal Lane, stated that nano-scale science and engineering is the "most likely area of science and engineering to produce the breakthroughs of tomorrow".<sup>18</sup> Nano-tubes could be used as miniature probes for imaging in chemistry and biology or cables in miniaturized electronic devices. Self-organizing machines could be assembled using forces such as molecular recognition, hydrophobicity, and hydrogen bonding.

"The ultimate fantasy," says Jim Von Her, president of Zybox, "is to have a machine the size of a sugar cube that has a solar panel that sucks carbon dioxide out of the air, strips the oxygen away and starts building", atom by atom and molecule by molecule, machines and other structures to give all the basics of life and comfort."<sup>19</sup> Bill Spence, editor

of *NanoTechnology* magazine, predicts micro-manufacturing sites in private homes, where people build their own wristwatches and computers as easily as they would print out an article. Spence suggests that one day nanotechnology could prolong life by modifying human genetic and cellular structure.<sup>20</sup>

Dr Richard Smalley (Nobel laureate in chemistry, 1996) testified on 12 May 1999 before the US Congress that nanotechnology could make cables strong enough to make an elevator from the surface of the earth to orbital space possible, and thus revolutionize space transportation. It would work by the same physics as a water well with a bucket at one end of the rope and a counterweight at the other. As the counterweight goes down, the bucket comes up.

Although the list of potential benefits of nanotechnology is quite extraordinary, the dangers require serious attention. There is a concern that nanotechnology will evolve beyond human control through self-organization and self-replication. If so, new kinds of artificial life might emerge, rapidly expand, and destroy the natural environment.

This warning was given by Eric Drexler in his classic book on nanotechnology, *Engines of Creation*.<sup>21</sup> The Millennium Project has also cautioned that if nanotech weapons were created, that knowledge might be applied by terrorists and transnational organized crime networks to target individuals and groups. If nanotech weapons were used in warfare, their environmental impacts might go undiscovered until long-term and irreversible damage had occurred.

Such warnings are important to stimulate the development of software, regulations, and other control procedures to prevent such disasters. Since these kinds of technologies are at least 10 to 20 years away, there is time to develop countermeasures and “off switches”. Nevertheless, Bill Joy, co-founder of Sun Microsystems, argues that these potential problems are so serious that we should stop development of nanotechnology, just as we stopped development of nuclear weapons.<sup>22</sup>

Since the potential benefits for humanity are very significant, yet disagreement about the dangers and control measures is very broad, nanotechnology should be a priority for international technology forecasting and assessment efforts on a continuing basis.

## Space technology

The synergies of advanced research in biology and physics necessary for human space flight have generated an extraordinary number and range of inventions; stimulated thought about the meaning of life, history, and our common future; and created many opportunities for peaceful interna-

tional cooperation. Space-related inventions have created new industries and tax sources for social programmes, improved living standards, expanded access to tools by miniaturization, and produced processes that have lowered the costs of many technologies, from satellite communications to medical diagnostic techniques. Some argue that migration from earth is inevitable; it is in the myths of many cultures; it is an exciting goal; and it could provide alternative habitats as an insurance for the human species should a catastrophe destroy life on earth. For example, if the trajectory of the comet that crashed into Jupiter in 1994 had been slightly different, it would have destroyed life on earth.

New space projects could continue to improve our understanding of the nature of the solar system and the universe; develop completely novel technologies that could contribute to alleviation of some of the world's most vexing problems (food, shelter, health, etc.); lower costs and increase efficiencies in production processes; accelerate peaceful international collaboration; provide virtually instant, ubiquitous multi-communications among both fixed and mobile users; and possibly confirm extraterrestrial intelligence or microbial life (a development that could revolutionize our sciences, values, philosophies, and views of the universe). Public interest is high. For example, the coverage of the 4 July 1997 Mars rover landing and surveying was one of the biggest Internet events in history, with 700 million hits on NASA's website over a period of two to three months.

By the year 2050, the energy demand of a larger and wealthier third world will require enormous amounts of energy. One potential source is from solar-power satellites, whereby energy can be delivered from without generating either greenhouse gases or nuclear wastes. The testing of a solar-power satellite in orbit may be a major goal after the International Space Station (ISS). Indeed, the USA has allocated \$25 million to update the previous research on solar-power satellites.

Concerns about global warming will help put space on the political agenda by drawing attention to the role of monitoring earth from space. As we realize the fragility of life on earth, the need to have communities off earth as insurance for the future of humanity will become more apparent. NASA is leading an international effort, now called Earth Science, to use satellites and ground sources to provide data to create an integrated computer model of the earth, from cloud tops to under the oceans, within four years.

Developing space technology should be seen by all nations as a shared project. Seventeen nations are involved in the construction of the ISS.<sup>23</sup> However, one key trend that makes this unlikely is that the financing of space technology is changing. 1996 was the first year that private sector revenues from space activities exceeded general government expenses

for space activities. The NASA space shuttle is semi-private now. As government budgets reduce, privatization will continue. Governments still lead with the ISS, though it too is likely to move towards privatization.

The Millennium Project argues that the single most important way for society to receive more benefits from space programmes is to lower the cost of transportation to earth orbit. This has been a priority for the past 30 years, but the political decisions have not matched this goal. It is seen as infrastructure, and not politically exciting technology. It might an area that the UN General Assembly could take up. However, given the high costs involved and perceived lack of direct impact on issues of poverty and basic needs, as well as the long time lag before benefits are felt, it is unlikely that such a technology will be taken up in a major way. This will certainly leave much of the investment in the private sector and the richer countries.

## Conclusions

Throughout this chapter, a range of future technologies have been briefly discussed in the context of their capacity to alter society and some of the challenges regarding their development, application, and global access. Although only 7 per cent of the Millennium Project participants work for the United Nations or related international organizations, the participants concluded that much of the leadership necessary to address the challenges we face at the millennium should come from multilateral institutions.<sup>24</sup> They agreed that the 15 challenges identified by the Millennium Project cannot be addressed by nation-states acting alone. This concluding section, therefore, highlights how the United Nations and its related international organizations might affect their application.

A first key conclusion is that bridging the science and technology gap should be a central role of the United Nations. One suggestion made by participants in the Millennium Project was that the United Nations should establish an international technology bank. Its role would be to acquire the rights to the most valuable technologies and make them available to less-advantaged countries. A serious focus on “green” technologies should be part of the mandate. There would need to be some leadership by governments, and it could be funded by country pledges. It would also be important that such a bank would have direct links to private companies. Perhaps the technology bank could be best achieved through a Global Science and Technology Facility (GSTF) similar to the Global Environment Facility.

Similarly, the United Nations should seriously consider establishing an

international agency to anticipate and assess, to the extent possible, the potential consequences of new scientific breakthroughs and technological applications. It might disseminate information on the key technologies and their potential impacts of technology for human security and development (as well as the challenges involved) in the form of an annual World Technology Report.

Another related area the United Nations could usefully invest in concerns technological forecasting. In addition to change and accident, the exploration of new and sometimes counterintuitive ideas has been the source of previous breakthroughs. Sailing around the world, machine flight, electricity, germs causing disease, landing on the moon, and many other important ideas were ridiculed prior to their success. Today ideas like interstellar travel, increasing human capacities by self-control of inherent human healing power, cognition-enhancing drugs, beneficial uses of low-level radiation, artificial reality, extraterrestrial contact, and new sources of energy face the same scepticism and receive little support. However, increasing affluence and global communications systems allow for new ideas to be rapidly assessed via widely different disciplines and epistemologies.

In identifying new ideas that can contribute to the goals of the United Nations, it would be important to look for linkages between areas. A way to generate new ideas is to try to answer how future trends in one area could affect the future of another area. For instance, how is the globalization of science and technology likely to affect the development of space technology? How will changes in nanotechnology affect the future of biotechnology?

Given the increasingly international nature of research, there is likely to be an increasing need for principles of international scientific collaboration. These would probably be best established under a UN treaty. UNEP, UNESCO, the UNU, ICSU, and possibly the IPCC and WTO should create international scientific boards to define terms, standards, and measurements so that it might be possible commonly to apply measures such as tax incentives, labels, full-cost accounting, trade, and other policies to help achieve sustainable development. In parallel, ECOSOC should lead the policy discussion for binding sanctions and enforcement mechanisms for any agreements that flow from this work.

The United Nations itself should make better use of new technology, particularly ICTs. The United Nations and its related organizations should evolve rapidly towards a cyber- or tele-UN. Cyber-discussions and collaboratories could become the principal mediums of work. The United Nations should also create a super-website of all the information from the UN family of organizations and make it more easily available through UNU information kiosks in libraries and universities around the world.

Similarly, all UN organizations that conduct research should encourage global collaboratories as one of the most important ways to advance science, consider technological applications, and assess impacts on society. Collaboratories can have global, regional, and/or local foci. Collaboratories are not simply e-mail exchanges, but allow for the full exchange and interactivity as if one were in a common lab while actually being in different places. They can be augmented by expert systems that could prompt the users to see potential synergies of their work with research in other fields that they might not have otherwise considered. New forms of smart group software could notify users when new items of interest are entered in global discussions.

However, understanding about many issues regarding science and technology remains limited. The UNU in particular could help by carrying out further research on the most pressing issues. As well as work to collect, discuss, and disseminate all the good arguments for basic research, there remains need for a study focusing on the link between applied and basic research. So, too, there is great need for study and discussion of ethical issues in biotechnology, covering topics such as patents, royalties, and advanced informed consent. These issues have to be debated further among biologists, legal scholars, politicians, and citizens, and the UNU could play an extremely useful role by providing a neutral and objective forum.

## Notes

1. In 1996–1997, the Millennium Project participants identified and rated 182 developments that could have major impacts in the next 25 years. These were grouped into 15 global issues, and 131 actions were judged by policy advisers and decision-makers. In 1997–1998, the participants identified 180 positive developments that could improve the human condition over the next 25 years. These were grouped into 15 global opportunities with 213 actions, and were judged by policy advisers and decision-makers. The issues, opportunities, and actions were updated and merged into 15 global challenges with 237 actions with a range of views on each action.
2. J. C. Glenn, and T. J. Gordon, *1999 State of the Future: Challenges We Face at the Millennium* (Washington, DC: American Council for the United Nations University, 1999).
3. However, the future trajectory of this trend is uncertain. Basic research provides the growing pool of knowledge from which applied sciences draw insights. Since basic research (as a percentage of the global economy) is falling, the future of technology is perhaps threatened.
4. See <http://www.nua.ie>.
5. See <http://www.forrester.com>.
6. See <http://www.computereconomics.com>.
7. See <http://www.forrester.com>.
8. See <http://www.nua.ie>, from <http://www.durlacher.com>.
9. See <http://www.forrester.com>, by research from <http://www.nua.ie>.

10. See <http://www.nua.ie>.
11. See <http://www.nces.ed.gov>.
12. J. C. Glenn, *Future Mind: Artificial Intelligence: Merging the Mystical and the Technological in the 21st Century* (Washington, DC: Acropolis Books, 1989 and Tokyo: TBS Britannica, 1994).
13. For more information see <http://www.computereconomics.com>.
14. Glenn and Gordon, note 2 above: 45–46.
15. However, there are challenges here too. For example, companies have already started to use genome mapping to screen potential employees (companies are doing the same for health insurance purposes).
16. See <http://www.ud.com>.
17. Committee on the Biological and Biomedical Applications of Stem Cell Research, *Stem Cells and the Future of Regenerative Medicine* (Washington, DC: National Academy Press, 2001).
18. N. Lane, Testimony before the House Appropriations Subcommittee on VA/HUD and Independent Agencies, Washington, DC, 1 April 1998, see <http://www.nsf.gov/od/lpa/congress/nlane498.htm>.
19. Quoted in article by C. Stamper for ABC News at <http://abcnews.go.com/sections/tech/CuttingEdge/nanotech9981231.html>.
20. *Ibid.*
21. E. Drexler, *Engines of Creation: The Coming Era of Nanotechnology* (New York: Anchor Press/Doubleday Garden City, 1986).
22. See <http://www.aaas.org>; B. Joy, A. H. Teich, S. D. Nelson, C. McEnaney, and S. J. Lita (eds), *AAAS Science and Technology Policy Year Book 2001* (Washington, DC: American Association for the Advancement of Science, 2001).
23. On a similar note, it has been suggested that the moon should be made a UN trusteeship.
24. J. C. Glenn and T. J. Gordon, *1997 State of the Future: Implications for Actions Today* (Washington, DC: American Council for the United Nations University, 1997). Appendix A contains the Millennium Project participants' ratings on who should provide the leadership for every action suggested to address the global issues. Governments received 2,830, the United Nations, 1,541, NGOs 1,197, and corporations 804. See [www.acunu.org/millennium/actions.html](http://www.acunu.org/millennium/actions.html).

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## Population – A global challenge for the twenty-first century

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*Wolfgang Lutz*

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### The population variable

The role of population as a variable in the political economy of nations, in economic growth, and in sustainable development has been controversially debated among scholars for centuries. Since population deals with birth and death, sex and marriage, with gender roles, with intergenerational relations and interregional migration, it tends to be a very emotional topic, touching upon the foundations of culture, religion, and national identity. Population size, structure, and spatial distribution matters a great deal at the local and national levels. Moreover, the increasing globalization of human migration and financial flows (such as pension funds), as well as of population-dependent consumption and emissions, makes it increasingly important to look at the population variable from a global perspective. This chapter will focus on the global dimension of demographic change, and will also include reference to the relationship between population and climate change, presumably one of the biggest global issues in the twenty-first century.<sup>1</sup>

Dramatic changes in demographic patterns have taken place over the past several decades, particularly in the least developed countries (LDCs). First mortality and then fertility fell at rates much faster than those experienced by more developed, industrialized countries (MDCs). The demographic transition from high to low fertility and mortality is not

yet complete in many LDCs, as it is in MDCs, although its progress is reflected in declining growth rates of global population.

Three things appear highly likely to occur in the coming decades. First, world population will rise significantly from its present level of around 6 billion, although it may start to decline during the second half of the twenty-first century. Second, population distribution will continue to tilt from MDCs to LDCs. Third, the global shift to an ageing society will continue. Probabilistic projections from the International Institute for Applied Systems Analysis (IIASA) indicate that global population is unlikely to double from its present size.<sup>2</sup> However, a severalfold increase in the size of the population above age 60 is virtually assured. The 60+ age group, measured as a proportion of total population, will almost certainly double and probably triple over the next century.

In this context, it is relatively easy to understand why global population dynamics have been the topic of a series of decennial international population conferences, the most recent in 1994 in Cairo. The outcome of the Cairo Conference represented a clear shift away from emphasis on population control to reproductive rights and reproductive health. Although these are undoubtedly very important and timely topics, macro-level considerations such as the consequences of population ageing and population-environment interactions must also receive appropriate attention. Within the framework of the UN system it would be desirable to explore further the interconnected themes in these population and environmental conferences. Also, in the context of increasing globalization, international migration requires more attention.

### Long-term population trends

The most important source of uncertainty with regards to population projections is the future path of fertility, although the impacts of alternative trends in mortality and migration are significant as well. In this section, the assumptions for each of these three demographic components that underlie the IIASA's projections are discussed. Variations in the paths of these variables can give rise to large differences in future population size and age structure. For example, in 2100, the 95 per cent confidence interval for global population is 5.7–17.3 billion. Although this level of uncertainty might be considered high, relative to other components driving global environmental change population can be considered as one of the more robust factors. At the same time, this range has the potential to change significantly the outlook for future greenhouse gas emissions and climate change.

The history of global population growth is by now familiar for most

readers. At the dawn of the agricultural revolution, 8,000 years ago, total world population was about 250,000.<sup>3</sup> It took all of human history, until 1800, for the population to reach 1 billion (roughly today's population of Europe and North America combined). It took 130 years, until 1930, to add the second billion. It took only 30 years, until 1960, to add the third billion. The fourth billion was added between 1960 and 1975, and the 5 billion mark was passed in 1987. The sixth billion was reached in 1999.

As shown in Table 7.1, the total fertility rate (TFR)<sup>4</sup> declined modestly in most parts of the world during the 1950–1955 to 1970–1975 period, then declined over the following 20 years with a rapidity which was unimaginable in the 1960s. This second period of decline was especially pronounced in Asia, where TFR fell by more than two children per woman (a statistic that is, however, heavily influenced by a dramatic fertility decline in China during the 1970s). One exception has been Africa, where fertility rates remained well above six children on average per woman through the late 1980s; since then, the beginnings of a fertility decline have become apparent. Meanwhile, regions like Europe and North America, that had already achieved very low fertility by 1970–1975, saw these rates persist or fall further.

During the 1950s and 1960s, reductions in mortality resulting from the spread of modern hygiene and medicine were even more significant than the decline in fertility rates. During the period 1950–1955 (the first period for which systematic estimates are available), life expectancy<sup>5</sup> was lowest in Africa (38 years) and Asia (41 years), while it had already improved significantly in Latin America (51 years). Over the following 20 years life expectancy increased impressively in all parts of the world. In Asia, by far the most populous continent of the world, it increased by 15 years over this short period. In Africa it improved by eight years, although this increase was below the world average. Improvements continued in Asia, Latin America, and Africa over the next 20 years to 1990–1995 but at a somewhat slower speed.

These rapid increases in life expectancy were mostly due to falling child mortality rates. This factor, combined with fertility rates that remained high (or even increased somewhat due to better maternal health), led to soaring population growth rates in the 1950s and 1960s. As shown in Table 7.1, growth rates in 1950–1955 were highest in Latin America because high fertility in the region was associated with low child mortality. By 1970–1975, however, the population growth rate in Africa surpassed that of Latin America as Africa's mortality rates fell and fertility rates hovered at about 6.5 children on average per woman. Since fertility rates have remained relatively high in this region, population growth accelerated to 2.7 per cent in 1990–1995. Were this growth rate to remain constant, the population in Africa would double in 26 years.

Table 7.1: Demographic trends in the world since 1950

	Total population size (millions)			Growth rate (%)			Life expectancy in years (both sexes)			Total fertility rate		
	1950	1970	1995	1950– 1955	1970– 1975	1990– 1995	1950– 1955	1970– 1975	1990– 1995	1950– 1955	1970– 1975	1990– 1995
World	2,524	3,702	5,687	1.78	1.95	1.48	46.5	57.9	64.3	5.00	4.48	2.96
More developed	813	1,008	1,171	1.21	0.79	0.40	66.5	71.2	74.2	2.77	2.11	1.68
Less developed	1,711	2,694	4,516	2.05	2.37	1.77	40.9	54.7	62.1	6.17	5.42	3.30
Africa	224	364	719	2.23	2.56	2.68	37.8	46.0	51.8	6.64	6.57	5.71
Asia	1,402	2,147	3,438	1.91	2.27	1.53	41.3	56.3	64.5	5.90	5.09	2.84
Europe	547	656	728	1.00	0.60	0.16	66.1	70.8	72.7	2.56	2.14	1.57
Latin America and Caribbean	166	284	477	2.65	2.43	1.70	51.4	61.1	68.5	5.88	5.01	2.93
North America	172	232	297	1.70	1.01	1.01	69.0	71.5	76.2	3.47	2.01	2.02
Oceania	13	19	28	2.21	2.09	1.37	60.9	66.6	72.9	3.84	3.21	2.51

Source: United Nations, *World Population Prospects: The 1996 Revision* (New York: United Nations, 1997).

These trends in fertility and mortality resulted in different patterns of population growth in different parts of the world. In fact, the dominant feature of the global demographic landscape has been the contrast between the well-off populations of Europe, North America, and Japan and the poorer populations of Asia, Africa, the Middle East, and Latin America. As Table 7.1 shows, the population of MDCs is relatively small (about 1.2 billion in 1995) and expanding very slowly (0.4 per cent per year), following a 44 per cent increase since 1950. That of LDCs is large (about 4.5 billion in 1995) and expanding rapidly (1.8 per cent per year), after increasing by a factor of 2.6 since 1950. As a consequence, the share of today's industrialized countries in the world population decreased from 32 per cent in 1950 to 21 per cent in 1995, and is likely to decrease much more in the future. In addition, despite the rapid changes in most LDCs, inhabitants of MDCs on average live significantly longer (life expectancy at birth for both sexes combined is about 74, versus 62 in LDCs) and have fewer children (TFR is 1.7, versus 3.3 in LDCs).

### Population ageing

The widely varying historical experience in different regions of the world has left a strong imprint on population age structures. Figure 7.1 shows age pyramids for the two most extreme cases, sub-Saharan Africa and Western Europe. In Africa the pyramid is typical of a rapidly growing population, showing larger and larger cohorts at the bottom in the young age groups. There are more than twice as many children under age five than adults aged 20–25, four times more than those aged 40–45, and 10 times more than elderly people aged 65–70. In Western Europe the pattern is completely different. For instance, the number of women aged 60–65 approximately equals the number of children under age five, while the largest age groups are those between 20 and 30. The pyramid is narrower at the bottom due to the very low levels of fertility since the 1970s. At the same time, declining mortality rates have increased the size of older age cohorts.

The narrowing of population pyramids at the bottom (from low fertility) and widening at the top (due to extended longevity) is called “population ageing”. The two components are referred to as ageing “from the bottom” and “from the top”. Population ageing is an enormously important social phenomenon, especially in relation to the uncertain future of pension and health care systems. Ageing will continue in MDCs and has already started in LDCs. Just as the speed of mortality improvements accentuated the implications of demographic transition for population growth rates, the speed of LDC fertility decline will accentuate the ageing phenomenon.

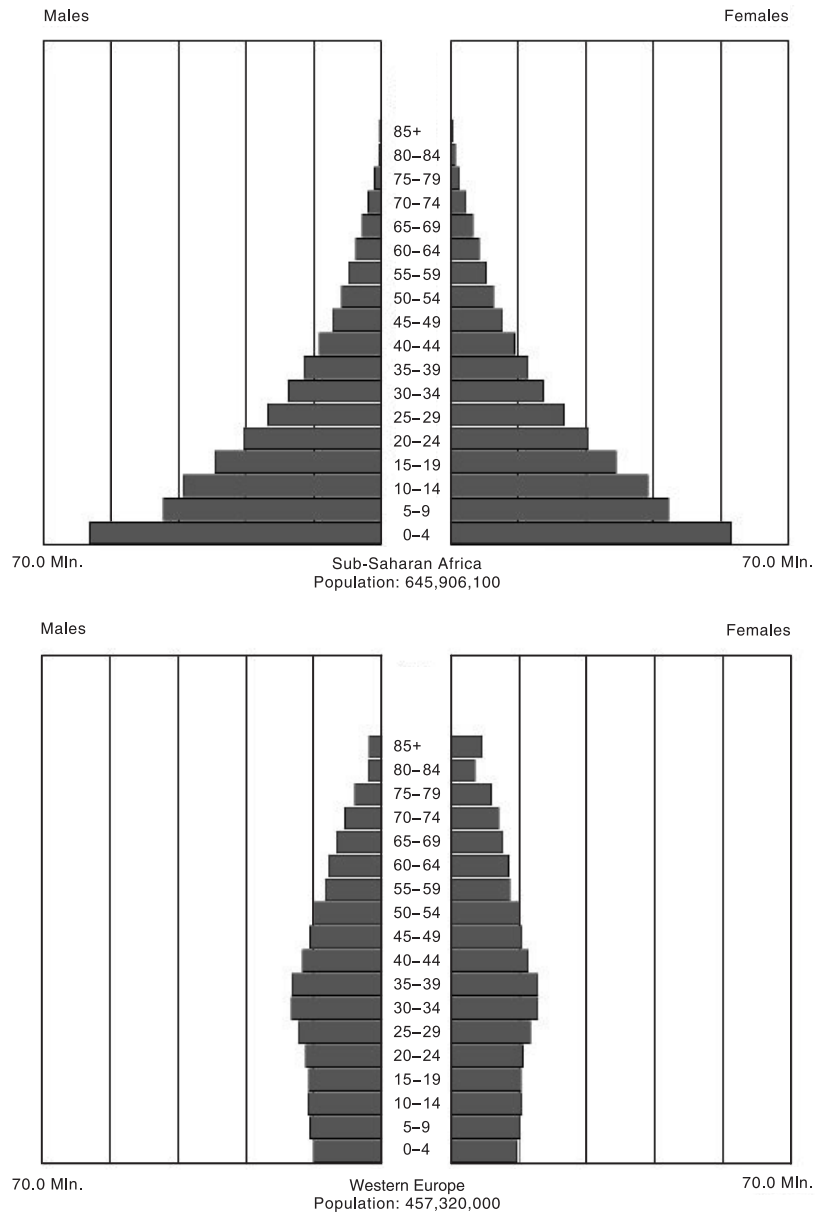


Figure 7.1: Age pyramids of sub-Saharan Africa and Western Europe in 2000  
Source: United Nations, *World Population Prospects: The 1996 Revision* (New York: United Nations, 1997).

Population ageing is likely to become a dominant feature of social change around the world. This poses a number of serious challenges, ranging from social security and health care for the elderly to changing consumer behaviour and possibly changes in productivity. It also has implications for intergenerational equity, which is likely to get increased attention, in addition to the already more prevalent concerns about social equity and gender equity. These ageing-related issues are likely to gain importance in today's low-fertility countries and in an increasing number of developing countries as they proceed in the process of demographic transition.

### The concept of demographic transition

Demographic transition began in MDCs in the late eighteenth century and spread to LDCs in the last half of the twentieth century.<sup>6-9</sup> The conventional theory of demographic transition predicts that, as living standards rise and health conditions improve, first mortality rates decline and then, somewhat later, fertility rates decline. Demographic transition "theory" has evolved as a generalization of the typical sequence of events in what are now MDCs, where mortality rates declined gradually beginning in the late 1700s and then more rapidly in the late 1800s and where, after a lag of 75 to 100 years, fertility rates declined as well. Different societies experienced transition in different ways, and various regions of the world today are following distinctive paths.<sup>10</sup> Nonetheless, the broad result is a gradual transition from a small, slowly growing population with high mortality and high fertility to a large, slowly growing population with low mortality and fertility rates. During the transition itself, population growth accelerates because the decline in death rates precedes the decline in birth rates.

At the theoretical level there are two different ways to explain demographic transition. One explanation views fertility rate decline as a direct response to the drop in the mortality rate. This so-called homeostasis argument stresses that societies tend to seek equilibrium between births and deaths. When death rates decline due to progress in medicine and better living conditions, the equilibrium is disturbed and the population grows unless birth rates adjust to the new mortality conditions and also start to decline. The fact that fertility tends to decline many years after mortality may be explained by a perception lag. The other view assumes that modernization of society acts as a joint driving force for declining mortality and fertility. Fertility decline lags behind mortality decline, according to this view, because fertility is more strongly embedded in the system of cultural norms and therefore changes more slowly than

mortality-relevant behaviour. The historical record of Europe – where fertility sometimes declined simultaneously with mortality, and population growth was generally much lower than in today's high-fertility countries – gives more support to the second explanation. But the two arguments are not necessarily mutually exclusive.

Figure 7.2 highlights experience with demographic transition in Mauritius, a developing country that has good records for birth and death rates for more than a century. Up to around the Second World War, birth and death rates show a pattern of strong annual fluctuations, due mostly to disease and changing weather conditions, which are typical for “pre-modern” societies. Whenever birth rates are consistently above death rates, the population grows, as was the case in Mauritius during the late nineteenth century. After the Second World War death rates in Mauritius declined precipitously due to malaria eradication and the introduction of European medical technology. Birth rates, on the other hand, remained high or even increased somewhat due to the better health status of women (a typical phenomenon in the early phase of demographic transition). By 1950 this had resulted in a population growth rate of more than 3 per cent per year, one of the highest at that time. Later, birth rates declined, with the bulk of the transition occurring during the late 1960s and early 1970s when TFR declined from more than six to less than three

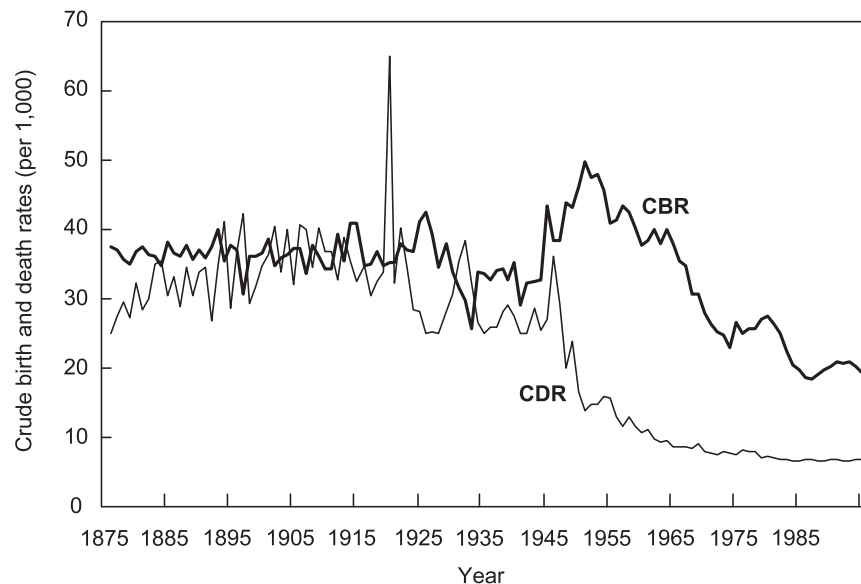


Figure 7.2: Birth and death rates in Mauritius, 1871–1991  
Source: Mauritius Central Statistical Office.

within only seven years, probably the world's most rapid national fertility decline. This happened on a strictly voluntary basis, and was a result of high female educational status together with successful family planning programmes.<sup>11</sup> Because of the still very young age structure of the Mauritian population, current birth rates are still higher than death rates and the population is growing by about 1 per cent per year despite fertility around replacement level.<sup>12</sup>

Empirically observed trends in all parts of the world have overwhelmingly confirmed the relevance of the concept of demographic transition to LDCs. With the exception of pockets where religious or cultural beliefs are strongly pro-natalist, fertility decline is well advanced in all regions except sub-Saharan Africa, and even in that region many signs of a fertility transition can be perceived. In South-East Asia and many countries in Latin America, fertility rates are on par with those in MDCs only a few decades ago, and in several countries such as China, Taiwan, and the Republic of Korea, fertility is at sub-replacement levels.

The biggest difference between the demographic transition processes in MDCs and LDCs has been the speed of mortality decline. Mortality decline in Europe, North America, and Japan came about over the course of two centuries as a result of reduced variability in the food supply, better housing, improved sanitation, and, finally, progress in preventive and curative medicine. Mortality decline in LDCs, by contrast, occurred very quickly as a result of the application of Western medical and public health technology to infectious, parasitic, and diarrhoeal diseases since the Second World War. Life expectancy in Europe rose gradually from about 35 years in 1800 to about 50 in 1900, 66.5 at the end of the Second World War, and 74.4 years in 1995. In LDCs, it shot up from 41 years at the end of the Second World War to 62 years in 1995. The increase that took MDCs about one-and-a-half centuries to achieve came to pass in LDCs in less than half a century. As a result of the speed of the mortality decline,<sup>13</sup> together with higher pre-transition fertility due to early and almost universal marriage, populations in LDCs are growing three times faster today than did the populations of the present MDCs at the comparable stage of their own demographic transition.

Studies of the factors influencing changes in fertility must begin with the proximate determinants of fertility: age at marriage (or beginning of sexual activity); prevalence and effectiveness of contraception; prevalence of induced abortion; and duration of postpartum infecundability,<sup>14</sup> especially due to breast feeding.<sup>15</sup> Fertility decline must come through changes in one or more of the four proximate determinants.

The adoption of contraception has been the principal source of fertility rate decline in LDCs. However, how couples adopt contraceptive practices is a function of many influences. The spread of contraceptive practice

is a diffusion process consisting of stages of awareness, information, evaluation, trial, and adoption. All of these stages consist of actions undertaken in social networks, leading to path dependence and the persistence of heterogeneity between subpopulations.<sup>16</sup> Coale lists three “preconditions” required for fertility decline.<sup>17</sup> First, fertility must be regarded as being within the realm of conscious choice. Often, this marks a fundamental change in the way individuals view their life and family.<sup>18,19</sup> For example, people may change from having a fatalistic attitude towards fertility to making procreation an object of their life-course planning. Yet in most demographic transitions, some fertility regulation was already practised during the pre-transition phase, albeit more for spacing than for limiting the final number of children.<sup>20</sup> Second, there must be objective advantages to lower fertility. Third, acceptable means of fertility reduction must be at hand. These three preconditions for a lasting fertility decline suggest three parallel strategies to foster the transition from high to low fertility.

- Emphasize universal basic education to bring fertility increasingly into the realm of conscious choice. Modern mass media may also exert an important influence. These strategies are also likely to bring about attitudinal and cultural change.
- Pursue changes in socio-economic variables, mostly neoclassical economic costs and benefits arising from variables such as child labour, female participation in the modern sector labour force, support in old age, etc. Changes in the “value” of children also impact on couples’ desired family size.
- Invest in reproductive health and the availability of family planning services, including maternal and child health programmes which reduce infant mortality. Help women match their desired and actual number of children by focusing on the unmet need for family planning.

This framework suggests that if two of the three preconditions are already met, the introduction of the third may trigger a rapid fertility rate decline. In the previously described case of the rapid Mauritian fertility decline, the young female population was already literate and large families were increasingly perceived as an economic burden. The strong and strictly voluntary family planning campaign that strengthened the negative perception of high fertility and provided efficient family planning services (and was even supported by the influential Roman Catholic Church – although supporting only the “natural” methods) then triggered a precipitous fertility decline. In some other countries huge investments in family planning were virtually without effect because one of the other two preconditions was not met.

This view of the three necessary preconditions offers a solution to the fundamental “chicken-and-egg” ambiguity regarding causation: does

provision of family planning through national programmes lead to lower fertility via increased adoption of contraception, or do parents' declining fertility desires, translated into demand for contraception, induce a supply response in the form of a national family planning programme? The difference between the positions was reflected in the rallying cries of MDC and LDC delegates at the 1974 Population Conference held in Bucharest: "contraception is the best contraceptive", on the one hand, and "development is the best contraceptive", on the other. A new position, which emerged forcefully at the 1994 International Conference on Population and Development in Cairo, might be expressed as "empowerment of women is the best contraceptive". The first point of view was supported, generally speaking, by members of the international family planning community. The second point of view is supported by neoclassical economists, and the third point of view by women's advocates. Each perspective, the first emphasizing the role of national family planning programmes, the second emphasizing costs and benefits of childbearing, and the third emphasizing the status of women, has insights to offer. Putting emphasis on basic education, especially for women, may offer a synthesis of these views because it positively affects all three factors.

What is clear is that there is a synergism between the various factors; that national family planning programmes, combined with socio-economic development and empowerment of women, result in fertility decline. Investing in female basic education has positive effects on all three factors on top of its strong direct links to lower fertility. Moreover, it is hard to see any negative effect of more education. It is a win-win strategy in this context, and it is the best candidate for priority action.

One question that is still completely unresolved in the context of the demographic transition concept is when and at what level fertility stops declining. Previously, scholars have assumed that fertility will reach replacement levels<sup>21</sup> and then fluctuate around this level. But empirical data show that in most countries fertility declines have not stopped at replacement level. Especially in Europe, several countries have been significantly below replacement level for more than two decades, and there is no indication that fertility levels will increase to replacement level in the foreseeable future. In modern society, especially in the European and Asian context, many social forces tend to keep fertility at very low levels.

The question of post-transition fertility levels also makes a big difference for the world population outlook as described in the following section. It has recently been demonstrated that, in the case of assumed long-term fertility below replacement level, the speed of the fertility decline over the coming years will have a greater impact on the population size in 2050–2100 than previously thought.<sup>22</sup> The following proba-

bilistic world population projections already take possible long-term sub-replacement fertility rates into account.

### World population outlook

The conventional way of making population projections, as practised by the UN Population Division and many national statistical offices, is to produce a medium set of projections based on fertility, mortality, and migration assumptions which are considered most likely at the time, plus high and low variants based on certain high and low fertility assumptions combined with medium mortality and migration assumptions. This standard practice is useful for getting information about the most likely future population path, but it is not appropriate for assessing the uncertainty in future population trends and for considering the impact of possible future surprises, such as possible mortality crises or international migration streams. These issues can only be captured by fully probabilistic world population projections, first published by the IIASA in 1996.<sup>23</sup>

There is no simple way to apply probabilistic methods to population projections.<sup>24</sup> Assumptions about the future variance in the distributions of the three components have traditionally been based on time-series analysis or ex-post analysis of projection errors. Both approaches have methodological problems, but the most important flaw for a global projection is the lack of appropriate time-series data for large parts of the world population. For this reason the IIASA projections chose an approach that is more intensively based on expert judgement. The procedure fits a normal distribution to the three values (high, central, and low) that resulted from the expert discussions and the evaluation of alternative arguments, with 90 per cent of the cases lying between the high and low values.<sup>25</sup> Results were derived through a set of 4,000 simulations that randomly combined fertility, mortality, and migration paths from the three normal distributions for the 13 world regions. These simulations also considered the possibility that fertility and mortality trends may be correlated within regions (for example, high fertility in sub-Saharan Africa is more likely to go hand in hand with high mortality than low mortality), and that regional trends may be either independent of each other (for example, fertility in sub-Saharan Africa is uncorrelated with fertility in Latin America) or correlated.

The assumptions made for future fertility, mortality, and migration trends in all 13 world regions are extensively described and substantively justified in a 500-page book,<sup>26</sup> and cannot be described here. It should only be mentioned that the greatest sources of uncertainty in future trends are related to the future course of AIDS mortality in Africa and

South Asia, the question of an upper limit to the human life span, the speed of fertility decline in countries that are still in the midst of demographic transition, the long-term level of post-transition fertility, and the future volume of international migration. This study also considered possible impacts of future environmental change on human health and migration.

Figure 7.3 shows the distribution of future population sizes derived from the full set of 4,000 projections at five-year intervals to the year 2100. The two lines on the outside give the range into which 95 per cent of all cases fall. The upper line indicates that there is an unlikely possibility of almost linear population growth between 1995 and 2100. The lower line shows that there is also an equally unlikely possibility that the world's population would peak in the middle of the twenty-first century and fall thereafter to below 6 billion by 2100. The much more probable range of future paths (between the 0.2 and 0.8 fractiles, covering 60 per cent of all cases) is remarkably small. By 2050 this uncertainty range is less than 1.5 billion people, and by 2100 it doubles to about 3 billion people.

Figure 7.3 also shows that in more than 60 per cent of all cases the growth of the total world population levels off during the second half of

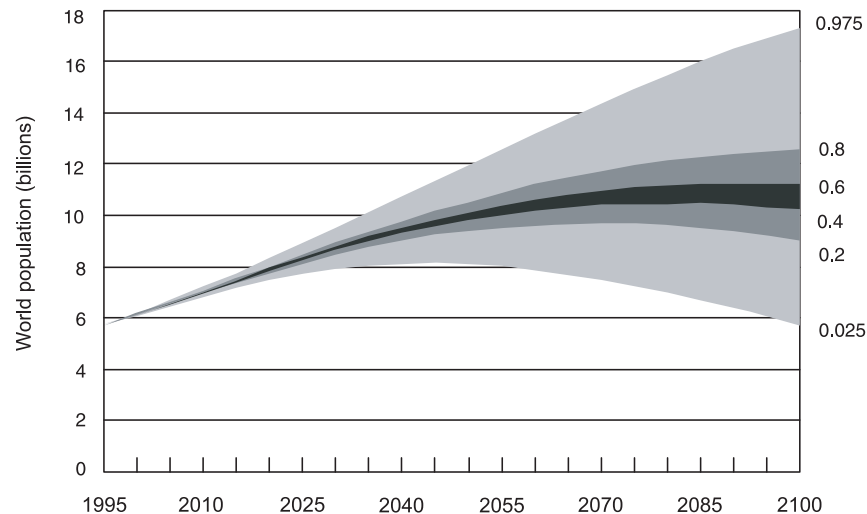


Figure 7.3: Uncertainty distribution of the size of the world's population, 1995–2100

Note: Numbers on the right give the fractiles of the distribution.

Source: W. Lutz, W. Sanderson, and S. Scherbov, "Probabilistic Population Projections Based on Expert Opinion", in W. Lutz (ed.), *The Future Population of the World. What Can We Assume Today?* (London: Earthscan, 1996): 397–428.

the twenty-first century or even starts to decline. Given that the world population in mid-1996 was estimated at 5.8 billion, the probability of a doubling (reaching or surpassing the 11.6 billion mark) at any point during the next century is only 33 per cent<sup>27</sup> – that is, there is a two-thirds probability that world population will not double during the twenty-first century.<sup>28</sup>

Regional results for the case of uncorrelated fertility and mortality trends are summarized in Table 7.2. Sub-Saharan Africa displays the largest range of uncertainty in future population size, with a 95 per cent confidence interval in 2100 ranging from 578 million to 4.345 billion around a mean of 1.9 billion. This large range results from the unusually large uncertainty surrounding trends in fertility and mortality in the region, in addition to the assumption that the two trends will be uncorrelated. On the other hand, if fertility and mortality are positively correlated within the region, then the range of uncertainty becomes significantly smaller.<sup>29</sup>

The distribution of the percentage of the global population above age 60 is shown in Figure 7.4. All the lines are rising, indicating confidence that the percentage of older people in the population will rise over time. In 2050, the mean is 20 per cent, compared with 9.5 per cent in 1995, with

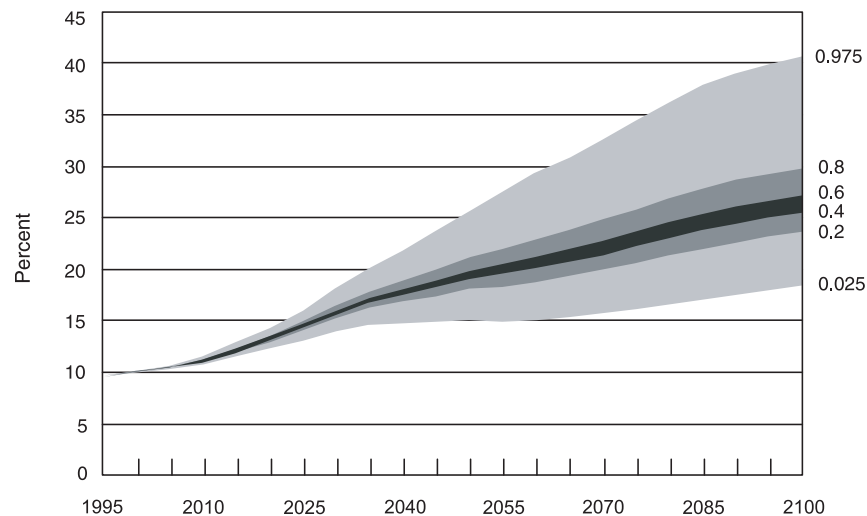


Figure 7.4: Uncertainty distribution of the population of the world in the 60+ age group

Note: Numbers on the right give the fractiles of the distribution.

Source: W. Lutz, W. Sanderson, and S. Scherbov, "Probabilistic Population Projections Based on Expert Opinion", in W. Lutz (ed.), *The Future Population of the World. What Can We Assume Today?* (London: Earthscan, 1996): 397–428.

Table 7.2: Population (in millions) by region for probabilistic projections assuming uncorrelated fertility and mortality

Region	2020					2050					2100						
	1995	Mean <sup>b</sup>	Median <sup>c</sup>	2.5% <sup>d</sup>	97.5% <sup>d</sup>	Mean <sup>b</sup>	Median <sup>c</sup>	2.5% <sup>d</sup>	97.5% <sup>d</sup>	Mean <sup>b</sup>	Median <sup>c</sup>	2.5% <sup>d</sup>	97.5% <sup>d</sup>	Mean <sup>b</sup>	Median <sup>c</sup>	2.5% <sup>d</sup>	97.5% <sup>d</sup>
North Africa	162	277	277	254	300	440	439	309	583	630	598	228	1,202				
Sub-Saharan Africa	558	1,059	1,058	965	1,159	1,625	1,605	1,085	2,316	1,909	1,738	578	4,345				
China and Centrally Planned Asia	1,362	1,670	1,670	1,526	1,826	1,888	1,865	1,351	2,574	2,051	1,873	709	4,428				
Pacific Asia	447	629	629	576	678	802	796	579	1,047	876	829	322	1,696				
Pacific OECD	147	155	155	145	167	146	146	117	182	125	120	59	221				
Central Asia	54	87	87	76	100	139	137	88	206	212	194	65	477				
Middle East	151	300	300	279	324	520	515	380	692	786	738	320	1,516				
South Asia	1,240	1,845	1,845	1,737	1,949	2,380	2,368	1,833	2,970	2,365	2,246	1,014	4,327				
Eastern Europe	122	124	124	116	133	111	110	86	141	83	78	31	168				
European FSU <sup>a</sup>	238	224	224	209	240	189	188	144	241	147	138	53	290				
Western Europe	447	479	479	446	512	472	471	370	584	430	416	196	769				
Latin America	477	697	696	646	746	930	925	707	1,177	1,163	1,106	489	2,142				
North America	297	356	356	320	400	405	403	303	534	482	467	229	865				

## Notes:

<sup>a</sup>European part of the former Soviet Union.<sup>b</sup>Columns labelled Mean give data on the mean population size.<sup>c</sup>Columns labelled Median give data on the median population size.<sup>d</sup>Columns labelled 2.5% and 97.5% provide data on the lower and upper bounds, respectively, of the 95 per cent confidence interval; 2.5 per cent of all observations lie below the lower bound and 97.5 per cent of all observations lie below the upper bound. All figures are based on 1,000 simulations and were produced using DIALOG, the multi-state population projection model. Fertility and mortality are assumed to be uncorrelated within regions.Source: W. Lutz, W. Sanderson, and S. Scherbov, "Probabilistic Population Projections Based on Expert Opinion", in W. Lutz (ed.), *The Future Population of the World. What Can We Assume Today?* (London: Earthscan, 1996): 397–428.

a 95 per cent certainty interval between 15 per cent and 26 per cent. By 2100, the mean increases to 27 per cent, with a 95 per cent certainty interval between 19 per cent and 41 per cent. In other words, there is a 95 per cent chance that the proportion of elderly will at least double over the next century. In the most likely case it will almost triple, and it may even more than quadruple. The uncertainty in the percentage above age 60 grows significantly during the second half of the twenty-first century, due mainly to the uncertainty in future old-age mortality when combined with uncertainty in fertility.

Three near certainties emerge from the range of scenarios and the probabilistic projections.

- World population will increase substantially from its current level. Even in the extreme lowest growth scenario, the population increases by close to 2 billion before commencing its decline. However, a further doubling of world population has become unlikely.
- The distribution of world population will continue to shift towards LDCs. Even assuming rapid fertility decline and little improvement in mortality, LDCs still account for a rising share of world population.
- The world population will continue to age. Probabilistic projections show that a doubling of the proportion above age 60 is a near certainty.

## Population and climate change

Climate change and population growth are among a select group of issues that will have global implications for generations to come. Yet while recent international agreements on population and on global environmental issues have recognized relationships between the two, none has made specific recommendations based on analyses of particular linkages. On the environment side, Agenda 21, signed at the Earth Summit in 1992 and intended as a blueprint for sustainable development, recommends only that nations take demographic factors into account in the policy-making process. On the population side, the programme of action agreed at the International Conference on Population and Development in Cairo in 1994 also discusses population-environment links, but does little more than repeat the language of Agenda 21.

One logical arena for analysis of relationships between population and climate change is the Intergovernmental Panel on Climate Change (IPCC), which is charged with assessing the science of climate change and its potential impacts, as well as formulating response strategies. Yet it has paid little attention to population. For example, the IPCC's most recent reports on mitigation<sup>30</sup> and adaptation options<sup>31</sup> evaluate a wide

array of strategies, but not policies to slow population growth. There are probably a number of reasons for this omission,<sup>32</sup> not least the tension between North and South over the relative roles of population and consumption in environmental degradation. Yet the fact remains that it leaves unexamined a potentially important link between two of what are likely to be overarching themes of the present century.

Human beings exploit natural resources through their consumption of goods and services. Pollution, including emissions of CO<sub>2</sub> and other greenhouse gases, resulting from the production of goods and services (and often their consumption as well) gives rise to residuals. Production of goods and services depends ultimately on consumer demand; even government and military expenditure, for example, ultimately depend on households' demand for public services and security. Some goods, such as fresh fruits and vegetables, are consumed directly; others are intermediate goods used for the production of goods and services which are subsequently consumed directly (steel used to produce cars, for example, or electricity used to light office buildings); others are investment goods used to build up the capital stock necessary to produce consumption and intermediate goods.

The point is that, at the end of the line, there has to be human consumption of goods and services and hence a human choice; if not, no production and therefore no utilization of natural resources or emission of pollution would take place. The role of consumption as prime mover, sometimes called the assumption of "consumer sovereignty", is crucial to the neoclassical economic model of the environment, because it permits economists to argue that consumers make intelligent trade-offs between consumption of goods and the quality of the environment.

Of course, production is driven not only by the kinds of choices made by consumers, but also by the scale of consumer demand, determined in part by population size. If fertility is also subject to human choice, and if there is an inverse relationship between the number of people and the quality of the environment and between the number of people and the material standard of living, then an implicit neoclassical population-environment-consumption trade-off is defined. Even if the methodologically individualistic neoclassical model of human choice is rejected in favour of a more complex model (based more closely on cultural values, say), and despite the fact that social scientists, philosophers, and humanists may differ on how choices are defined and made, the crucial element of choice remains.

When confronted with a complex reality, a normal scientific response is to search for simple models which broadly summarize the impact of population on availability of natural resources and the quality of the environment. A logical first step in this direction is an assessment of the scale

effect of population – the impact of population independent of possible feedback effects on other relevant variables. Keyfitz<sup>33</sup> called this the “direct” effect of population growth on the environment and, citing ambiguities and disputes regarding the nature of indirect effects, argued that it should be the focus of attention. The tool of choice in estimating the direct effects of population growth has been the demographic impact identity. Downplaying the direct linear scale effects of population while stressing its less understood indirect non-linear effects, Keyfitz argues, can result in defining “the population problem” out of existence. This direct effect was the prime concern of Malthus, and underlies the concerns which are expressed by ecologists<sup>34</sup> and ecological economists.<sup>35</sup>

Indeed, the literature on indirect effects has failed to arrive at particularly strong conclusions. An encapsulation of research findings is useful here.

- The relationship between population and the level of per capita income is ambiguous, or, more accurately, depends on a broad range of contextual variables. Two opposing views, one that demographic growth mires populations in poverty and the second that demographic growth stimulates improvements in technology and organization, can be traced back as far as the eighteenth-century debate between Malthus and Condorcet. A large post-war literature on population and development has failed to reach strong conclusions one way or the other.
- Population growth increases the share of production accounted for by agriculture and the proportion of the land base devoted to food production. In this sense, demographic increase has the effect of concentrating output into a heavily polluting sector. The theme of virtuous and vicious adjustments to population pressure against the natural resource base was derived for the most part from research on population and food. Frustratingly, we find no strong grounds for either optimism or pessimism regarding the role of population.
- Most deforestation in mid-latitude tropical forests occurs in a limited number of “hot spots” and can be traced ultimately to expansion of agriculture. Largely because of the link to agriculture, it has long been recognized that rapid population growth is correlated with rapid loss of forest cover. The correlation says nothing about the more complex underlying causal relationship. For example, commercial logging is a significant factor because it leads the way for shifting cultivators and is often closely tied to government policies in the area of export subsidies. Also, while there is abundant micro-level evidence that the combination of rapid population growth, poverty, and inadequate access to good land (and renewable resources of all kinds) leads to deterioration

of the renewable resource base, evidence tends to be anecdotal. Overall, however, the important link between population growth leading to land-cover change (deforestation associated with agriculture and commercial logging) cannot be underestimated, particularly in relation to the associated decrease in the available carbon sinks.

In addition to direct and indirect effects, there is a family of impacts which might be called “induced effects”: changes in the way social institutions cope with ecological stress, including changes in the institutions themselves, as a result of shifts in demographic regimes. Where social science research on indirect effects is abundant and equivocal, research on induced effects is sparse<sup>36</sup> and, with some notable exceptions,<sup>37</sup> speculative. Under some circumstances, it appears, rapid population growth gives rise to social and institutional changes that promote environmentally sound adaptation; under others, it gives rise to institutional and social gridlock, with ensuing environmental degradation. Since institutions, hence social solidarities, are at the heart of induced effects, it is not surprising that these may be highly non-linear and discontinuous.

Since slowing population growth is likely to reduce greenhouse gas emissions in the long run, as well as improve the resiliency of vulnerable populations to climate-related impacts, climate change strengthens the case for voluntary family planning programmes by increasing the returns to investments. It also strengthens the case for indirect population policies, particularly investments in female education, that are appealing because they increase individual welfare but also tend to lower fertility. Both types of programmes qualify as no-regrets climate change policies.

Climate change, through a greenhouse externality to childbearing, also adds to the costs side in the weighing of external costs and benefits to fertility. Economic costs and, even more so, benefits of childbearing are inherently difficult to estimate comprehensively. Perhaps more important, there is a practically innate reluctance to view fertility decisions as purely economic in nature. As a result, while externality studies are useful for shedding light on the consequences of childbearing, and while they can serve as a guide to policy-making, they have never been accepted as a principal basis for policy decisions. However, the fairly conclusive results on externalities through greenhouse gas emissions provide quantitative support for the general notion that population growth imposes external environmental costs on society, and suggest that it may be just one of a class of largely unmeasured environmental externalities. This strengthens the case for programmes that result in lower fertility.

The threat of climate change may strengthen equity-based reasoning for population policies, in that its consequences will probably fall most heavily on the least well off. The issue is not straightforward, however, because the increased resiliency of populations will pay off against the

impacts of climate change in the long run, while the least well-off generation is likely to be the current one. Nor is the question of the fairness of putting future generations at risk of environmental degradation clear cut; if sustainability is interpreted as requiring a climate little altered from the present, then the case for slowing population growth becomes stronger. If other goods are to some degree substitutable for climate, the case is largely unaffected.

Finally, it is in one sense difficult to assess how climate change relates to justifications for population policy, since currently the dominant thinking in population policy matters gives little weight to demographic consequences, while it is precisely those consequences that provide the main link to the climate change issue. The empowerment of women and the securing of reproductive rights and health are the principle justifications for programmes called for by the Cairo programme of action. Nonetheless, the kinds of population policies most in favour are probably “win-win” from the point of view of climate change. Providing reproductive health services (including family planning), investing in education (especially for women), reducing infant and child mortality, and equalizing gender relations will probably also have the effect of lowering fertility. Therefore, not only will such policies increase the welfare of individuals directly, but they are also likely to reduce future environmental stress through lower fertility.

## Conclusions

The above remarks need not seem suspiciously optimistic. Given that fertility is generally understood to be embedded in a web of bi-directional links to poverty, low status of women, and environmental degradation, improvement in any of these factors is likely to lead to lower fertility. Therefore, any policy producing such an improvement will be justifiable most directly through its effect on welfare and secondarily through its effect on fertility.<sup>38</sup> On the other hand, it must be tempered by the realization that vicious-circle reasoning of this sort applies only to the roughly 40 per cent of the world population living in poverty. While this is also the fraction with the highest fertility, its ultimate effect on global population growth would be less than one might otherwise expect.

The limitations of slowing population growth as a means of addressing climate change must also be kept clearly in sight. Population is subject to considerable inertia, so that fertility reductions occurring over the next few decades will not lead to significantly smaller population size until the second half of the twenty-first century. Therefore, emissions reductions in the short term can only be achieved through reductions in per capita

emissions (although in order to realize long-term reductions in population size, fertility must also be reduced in the short term). And even in the long term, although it can certainly make stabilizing greenhouse gas concentrations easier and displace more expensive energy-related emissions reductions, slower population growth is no panacea. Furthermore, while it is likely to make societies more resilient to climate change impacts, slowing population growth is a less efficient means to do so than many other more direct policies.

By itself, slowing population growth will not by any means solve the climate problem. However, population policies, including direct programmes such as provision of family planning services as well as indirect measures such as investments in female education, should be considered as potential elements of a portfolio of options for mitigating and adapting to climate change – something the climate community has yet to do.

## Notes

1. This chapter draws heavily on B. C. O'Neill, F. L. MacKellar, and W. Lutz, *Population and Climate Change* (Cambridge: Cambridge University Press, 2001).
2. W. Lutz (ed.) *The Future Population of the World. What Can We Assume Today?*, revised edn (London: Earthscan, 1996).
3. R. C. Cook, "How Many People Have Ever Lived on Earth?", *Population Bulletin* 18 (1962).
4. Total fertility rate (TFR) is defined as the number of children a woman would give birth to if, through her lifetime, she experienced the set of age-specific fertility rates currently observed. Since age-specific rates generally change over time, TFR does not in general give the actual number of births a woman born, or alive, today can be expected to have. Rather, it is a synthetic index meant to capture age-specific birth rates in a given year.
5. Life expectancy at birth is the average lifespan implied by the observed age-specific mortality rates in a given year. Like TFR, it is useful as a snapshot of prevailing conditions; however, because it is not specific to a particular cohort, it does not in general indicate the lifespan expected for a newborn.
6. F. W. Notestein, "Population – The Long View", in T. W. Schultz (ed.), *Food for the World* (Chicago: University of Chicago Press, 1945): 36–57.
7. K. Davis, "The World Demographic Transition", *Annals of the American Academy of Political and Social Science* 237 (1954): 1–11.
8. K. Davis, "Population and Resources: Fact and Interpretation", in K. Davis and M. S. Bernstam (eds), *Resources, Environment and Population: Present Knowledge* (Oxford: Oxford University Press, 1991): 1–21.
9. A. J. Coale, "The Demographic Transition", in *Proceedings of the International Population Conference 1* (Liege: International Union for the Scientific Study of Population, 1973).
10. L. Tabah, "From One Demographic Transition to Another", *Population Bulletin of the United Nations* 28 (1989): 1–24.
11. W. Lutz (ed.), *Population-Development-Environment: Understanding their Interactions in Mauritius* (Berlin: Springer-Verlag, 1994).

12. Replacement-level fertility is the TFR that, if maintained over the long term, would result in an equilibrium in which each generation precisely replaced itself. The replacement-level TFR depends on the sex ratio at birth (which varies slightly from population to population) and the toll taken by mortality between infancy and the end of the reproductive lifespan. In countries which have undergone the initial mortality decline stage of the demographic transition, the replacement-level TFR is roughly 2.1.
13. Differences in pre-transition fertility rates also contributed to differences in population growth rates between MDCs and LDCs. Due to typical European marriage patterns (high age at marriage and high proportion remaining unmarried), MDC fertility began the transition at a lower level than did fertility in LDCs.
14. J. Bongaarts and R. Potter, *Fertility, Biology, and Behavior* (New York: Academic Press, 1983).
15. "Marriage" is a culturally defined word, but the proximate determinants framework has proven sufficiently flexible to become the standard model in accounting for changes in fertility rates. Variables such as incidence of spousal separation, frequency of sexual intercourse, and natural fecundability have not been found to vary sufficiently to be of much concern.
16. H. P. Kohler, "Learning in Social Networks and Contraceptive Choice", *Demography* 34, No. 3 (1997): 369–383.
17. Tabah, note 10 above.
18. M. Lockwood, "Sons of the Soil? Population Growth, Environmental Change and Men's Reproductive Intentions in Northern Nigeria", *International Journal of Population Geography* 3 (1997): 305–322.
19. E. van de Walle, "Fertility Transition, Conscious Choice and Numeracy", *Demography* 29, No. 4 (1992): 487–502.
20. K. O. Mason, "Explaining Fertility Transitions", *Demography* 34, No. 4 (1997): 443–454.
21. Two surviving children per woman or a TFR of slightly above 2.0; see note 12.
22. W. Lutz, W. C. Sanderson, and S. Scherbov, "Expert-Based Probabilistic Population Projections", in W. Lutz, J. W. Vaupel, and D. A. Ahlburg (eds), *Frontiers of Population Forecasting* (New York: Population Council, 1998), a supplement to *Population and Development Review* 24 (1998): 139–155.
23. W. Lutz, W. C. Sanderson, and S. Scherbov, "Probabilistic Population Projections Based on Expert Opinion", in Lutz, note 1 above: 397–428.
24. W. Lutz, J. R. Goldstein, and C. Prinz, "Alternative Approaches to Population Projection", in Lutz, *ibid.*: 14–44; R. D. Lee, "Probabilistic Approaches to Population Forecasting", in Lutz, Vaupel, and Ahlburg, note 22 above: 156–190.
25. Sensitivity analyses, which assumed that the high and low values covered 85 per cent and 95 per cent instead of 90 per cent of all cases, showed that the results are relatively insensitive to this parameter. Thus, the high-low range may be thought to cover 85–95 per cent of all cases.
26. Lutz, note 2 above.
27. Lutz, Goldstein, and Prinz, note 24 above.
28. W. Lutz, W. Sanderson, and S. Scherbov, "Doubling of World Population Unlikely", *Nature* 387 (1997): 803–805.
29. Lutz, Goldstein, and Prinz, note 24 above.
30. R. T. Watson, M. C. Zinyowera, and R. H. Moss (eds), *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses* (Cambridge: Cambridge University Press, 1996).
31. J. P. Bruce, H. Lee, and E. F. Haites (eds), *Climate Change 1995: Economic and Social Dimensions of Climate Change* (Cambridge: Cambridge University Press, 1996).
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33. N. Keyfitz, "Seven Ways of Making the Less Developed Countries' Population Problem Disappear – In Theory", *European Journal of Population* 8 (1992): 149–167.
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35. H. E. Daly, "Elements of Environmental Macroeconomics", in R. Costanza (ed.), *Ecological Economics: The Science and Management of Sustainability* (New York: Columbia University Press, 1991): 32–46.
36. G. McNicoll, "Social Organization and Ecological Stability under Demographic Stress", in G. McNicoll and M. Cain (eds), *Rural Development and Population: Institutions and Policy* (New York: Oxford University Press, 1990): 147–160.
37. M. Tiffen and M. Mortimore, "Environment, Population Growth and Productivity in Kenya", *Development Policy Review* 10, No. 4 (1992): 359–387.
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## Institutions, corruption, and development and their ramifications for international cooperation

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*Beatrice Weder*

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### International cooperation – A tale of success and failure<sup>1</sup>

The last decades have been marked by a unique experiment in international cooperation. Resources have been transferred in unprecedented amounts from richer to poorer countries with the aim of fostering development and alleviating poverty. Over the past 50 years about \$1 trillion has been given in foreign aid. The anecdotal evidence suggests that this aid has at times been highly effective and at other times a spectacular failure. Also, over the past 50 years development theory and policy have changed dramatically. The initial post-war period was characterized by a strong belief in the possibility of state-led development, which involved large-scale investments in physical infrastructure, a concerted effort to build up a local industry base, and a deep scepticism of the market, in particular of international trade.

Following the surfacing of problems with import substitution policies, as manifested in the debt crisis, a new consensus (often called the Washington Consensus) emerged which brought about a reversal in the relative roles of state and market. According to this consensus a successful development strategy should rely on opening and liberalizing markets, privatizing, and in general “getting prices right” while maintaining macroeconomic discipline. During the 1990s it was increasingly recognized that functioning markets require a functioning state, and that the poor institutional infrastructure of many developing countries represents an

important obstacle for development. Therefore, the “Post-Washington Consensus” or “Washington Consensus Plus” adds on a further element, namely “getting institutions right”, in particular through the control of corruption.

This chapter isolates seven lessons from the experience with development policies, focusing on the “Washington Consensus Plus” – that is, on the role of institutions and of corruption in economic development. It draws on a number of recent studies on aid effectiveness, the role of institutions in development, the role of corruption, and the role of donor countries.

### The institutional infrastructure is key to successful development

Until about 10 years ago “governance”, “institutions”, and “corruption” had no place in the international development discourse. There was a general perception that these issues were not central to the explanation of development, or, at any rate, were outside the sphere of the international development community. Today, there is hardly a development strategy paper that does not strongly emphasize the importance of institutions, and hardly a speech by the World Bank president that does not mention corruption.

In the 1970s and 1980s the academic development debate on institutions and development revolved around the form of the political system. The controversy was whether a democratic or an authoritarian political system would be more beneficial for development. Citing the case of Chile, one influential school of thought argued that an authoritarian system could better promote economic development, and produced some empirical evidence that this relationship held more broadly.<sup>2</sup> Other studies showed the contrary, namely that more democracy improved economic growth.<sup>3</sup> More recent empirical studies, however, have established that there is no significant relationship between democracy, authoritarianism, and growth when a large sample of countries is considered. In other words, in terms of economic growth there have been authoritarian failures as well as successes, and the same is true for countries that have regularly held elections.<sup>4</sup>

In the 1990s the debate turned away from the purely political dimension to focus more on the institutional infrastructure of countries. This was in part due to the repeated failure of stabilization and structural adjustment programmes, which meant that attention turned to the underlying “rules of the game”. There was growing recognition that the institutional infrastructure – the formal and informal rules that govern the

interaction between the private sector and the public sector and the incentive structure within the public sector – is as important, if not even more important, for development as the physical infrastructure. The new consensus was supported by strong empirical evidence that showed the detrimental effects of a dysfunctional institutional infrastructure (poor rule of law, lack of credibility, and corruption) on investment and growth.<sup>5</sup>

### Corruption is one of the most important obstacles to development

An important element of the new consensus is that “corruption is sand in the wheels of the political and bureaucratic machine”. Nevertheless, this metaphor underestimates the negative effects of corruption, because sand may only slow down a machine or bring it to a halt. Corruption, on the other hand, acts to multiply the wheels by creating incentives for public officials to increase bureaucratic loads and the rents they can collect from them. Again, these aspects of corruption were not always recognized by researchers or policy-makers.

For a long time the discussion, both at the policy level and at the academic level, postulated that there may be positive, lubricating effects of corruption. It was suggested that corruption could have a positive effect on economic activity since it may grease the wheels of the government machine. Since this machinery is inefficient, it was argued that corruption payments might lead to more efficient outcomes. For instance, instead of waiting for her turn in the line, the person with the highest time preference may offer the highest bribe and would be helped first. This is a more efficient outcome than queuing. There is, however, a serious flaw in this argument. The problem is that the efficiency of the government machine is not God-given and exogenously determined. The rules and their interpretations are made by the same government agents who are most likely to profit from bribe payments. If they make the rules cumbersome and lacking transparency, this will give them more discretionary powers to create longer queues and collect higher payments from their more impatient clients. If one takes into consideration that rule-making, or at least the level of enforcement, is endogenous to the level of potential corrupt payments, then the lubrication argument no longer holds true and only the negative incentive effects of corruption remain.

After long being a taboo topic, in the 1990s corruption became one of the focal points of the international development debate. One of the reasons for this surge in interest was that the detrimental effects of corruption on economic performance were clearly established in empirical studies. Case-study evidence suggested, long before more systematic data became available, that corruption is harmful for growth. For example, De

Table 8.1: The economic effects of corruption

Independent i variables	Dependent variables		
	Growth per capita	Investment/GDP	Size of informal sector
Constant	0.012 (2.38)	11.32 (6.34)	48.35 (10.30)
Initial income	-5.14 E-6 (-4.78)	-0.0002 (-0.62)	-0.0008 (-1.09)
Schooling	0.030 (1.87)	9.52 (1.77)	-15.82 (-1.38)
Corruption (TI)	-0.004 (-2.81)	-1.21 (-2.42)	2.39 (2.10)
Number of observations	49	48	26
Adjusted R2	0.31	0.44	0.63

Notes:

1. Growth and investment data from World Penn Tables Mark V, averages 1970–1992 (see <http://pwt.econ.upenn.edu>).
2. Informal sector data from J. Johnson, D. Kaufmann, and P. Zoido-Lobaton, “Regulatory Discretion and the Unofficial Economy”, *American Economic Review Papers and Proceedings* 88, No. 2 (1998): 387–392.
3. Initial income and schooling refer to 1972.
4. Corruption data from Transparency International, *Corruption Perceptions Index* (Berlin: Transparency International, 1998).
5. Ordinary least squares are estimates, t-statistics in parentheses.

Soto conducted an experiment to quantify the indirect costs of red tape and corruption for a small entrepreneur in Peru and showed that they were enormous.<sup>6</sup> Klitgaard’s *Tropical Gangsters* (1988) is a vivid account of the inefficiencies due to corruption in Equatorial Guinea.<sup>7</sup> Such studies promoted the general acceptance of the notion that corruption has negative effects.

Finally, new empirical research in the last decade has settled this question and has established that corruption is highly detrimental to development.<sup>8</sup> Table 8.1 shows estimates of growth, investment, and the size of the informal sector. The results illustrate that the more corrupt countries have lower investment, lower growth, and larger informal sectors.

## Corruption undermines development in a number of ways

There are several ways in which corruption can affect economic performance: by leading to misallocation of resources as well as by lowering the return on the accumulation of capital. The most straightforward effect of

corruption relates to the way in which it functions as a tax on investment. In this case, the public official collects the tax and instead of passing it on to the treasury she keeps the proceeds. There may even be an implicit understanding that such payments are in lieu of higher wages. In fact, Zaire's former President, Mobuto Sese Seko, reportedly publicly encouraged public servants to steal – but only a little. From the point of view of the private sector, such a “corruption tax” has the same effects that a fee on transactions would have. It increases costs of doing business and raises the break-even point for investment projects, thereby lowering economic activity. It also creates incentives to avoid the tax by moving into the informal sector and not complying with the rules. It may lead to distortions if the fee varies and not all competitors pay the same fee.

How high is the corruption fee likely to be? This depends among other things on the organization of the rent extraction. A monopolist corruption collector will never set too high a fee because he would destroy his own tax basis. This is the familiar tax Laffer curve: if the tax rate is too high the disincentives to produce outweigh the further gains in revenues and total tax revenues fall.<sup>9</sup> A bureaucracy which acts like a monopolist takes these disincentive effects into account and will set the optimal corruption rate – that is, the rate at which the total income from corruption is maximized. In this view, corruption reduces investment and production up to a certain point, namely the optimal point as far as the government is concerned. But this view is characteristic of the situation of a monopolist government that extracts the maximal amount from the tax base rather than a situation where independent government officials all sell favours in exchange for bribes.

Shleifer and Vishny have provided a theory of the industrial organization of corruption in which they show that the level of corruption depends on the level of competition among government officials.<sup>10</sup> The corruption described above is that of a monopolist, which is most appropriate for understanding corruption in monarchies or old-time communist regimes or in regions dominated by a single mafia. In such a highly organized regime, the bribe income is shared and the relevant officials agree not to demand further bribes. Once the bribe is paid, the firm thus has full property rights over the government good it bought. The other extreme is a system in which the individual government agents do not coordinate their demands at all. This may cause negative externalities among bribe takers because the agencies ignore the effects of their bribe demands on the each other. Thus the individual agency sets a higher bribe demand that results in lower output and a lower aggregate level of bribe income.

There is one important aspect in which bribes differ from taxes. Corruption is illegal and must be kept secret. There can be no clear proce-

dures for corrupt payments, no official tables which indicate how much the bribe is supposed to be in every specific occasion. From the point of view of the private sector, having to pay bribes instead of taxes involves much more uncertainty. The government official can use her discretionary power to set the level of the bribe arbitrarily and keep demanding additional bribes instead of delivering the service. The firm will be hostage to new demands as soon as it has agreed to a first bribe. Whether corruption creates important uncertainties depends in part again on the internal organization of the bureaucracy. The less well organized the bribe-collecting process, the larger the arbitrariness. A theoretical case can be made that the kind of corruption which creates large uncertainties is more damaging than the well-organized corruption which acts more like a transaction cost. In fact this is one of the reasons the corruption in East Asia was claimed to be less harmful than, for instance, that in the former Soviet Union.<sup>11</sup>

### Overall foreign aid has been ineffective

Studies on aid effectiveness confirm what other academic studies have found and what practitioners have long suspected.<sup>12</sup> Overall, one cannot demonstrate that foreign aid has helped economic development, nor significantly improved indicators of quality of life. This is not to say that foreign aid has not been effective under certain circumstances, an issue that is discussed further in the next section. Simply, it is not possible to show a positive effect of aid when one looks at the full sample of countries over several decades. Or in other words, there have been as many failures as successes.

Figure 8.1 illustrates that there has been a negative relationship between the amount of aid received and the level of economic growth. Of course, this negative relationship does not say anything about the direction of causality. In other words, the negative relationship could equally be a consequence of the failure of aid to improve growth as it could be the consequence of donors' explicit choice to help poor and poorly performing countries more. Studies that take into account this problem of causality have found that aid has not improved growth, even after taking into account donors' allocation decisions.

### Foreign aid does work in countries with a good institutional infrastructure and policy framework

When one moves from looking at the broad sample of less developed countries to a more diversified view, one finds that development policies

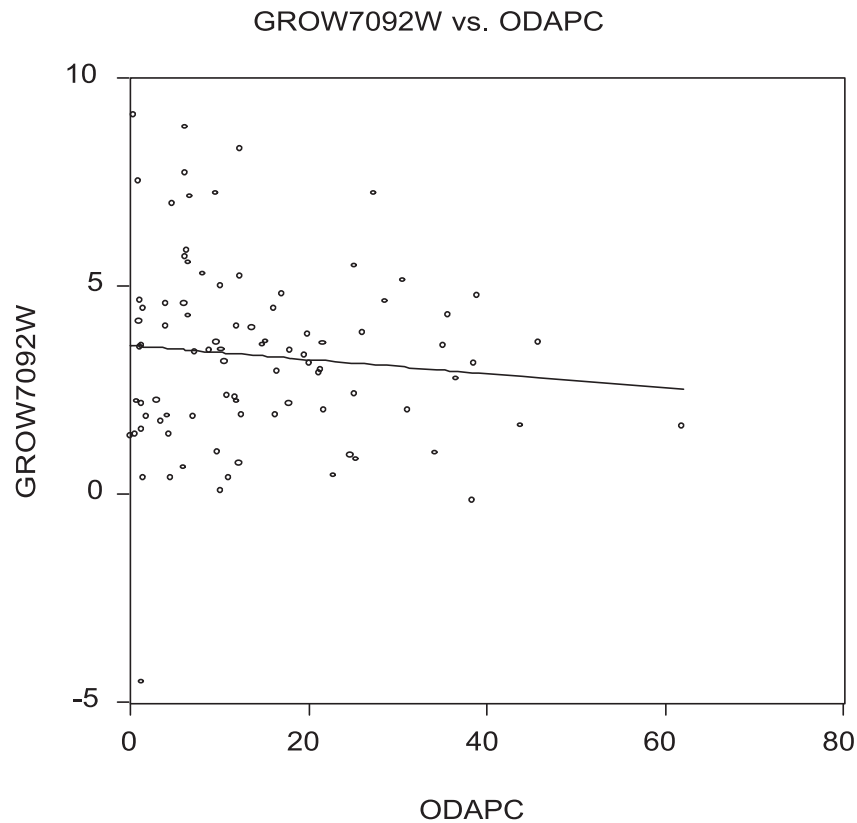


Figure 8.1: Relationship between ODA per capita and economic growth

*have* worked and foreign aid *has* been highly effective in a subgroup of countries. In countries with sound economic policies and a functioning institutional infrastructure, foreign aid has measurably had positive effects on development. A stable macroeconomic environment, open trade regimes, and protected property rights as well as efficient bureaucracies can deliver education, health, and ultimately higher growth. In countries with this kind of sound management, financial aid has had a significant effect on growth and poverty reduction, improving social indicators over and above what good management itself induced. In such countries a 1 per cent increase in foreign aid translates into a sustained increase in growth of 0.5 per cent of GDP, an increase in private investment of 1.9 per cent of GDP, and a reduction in poverty by 1 per cent.<sup>13</sup>

Table 8.2 shows two estimates which show the effect of aid and “economic management” on growth.<sup>14</sup> Economic management is a weighted

Table 8.2: The effects of aid

	Dependent variable	
	Real growth of GDP, four-year averages, 1970–1993	
GDP per capita (initial year)	–0.76 (–1.00)	–0.95 (1.09)
Financial market development	0.02 (1.68)	0.02 (1.62)
Government consumption	–4.38 (–0.68)	–1.73 (–0.25)
Political instability	–0.39 (–1.43)	–0.34 (–1.19)
Economic management	1.03 (7.01)	0.70 (3.42)
Aid/GNP	–0.08 (–0.28)	–0.37 (–0.89)
(Management $\times$ aid/GNP)	..	0.24 (2.38)
Adjusted R2	0.39	0.39
Number of observations	272	268

Note: Two-stage least-squares estimates.

Source: C. Burnside and D. Dollar, “Aid, Policies and Growth”, World Bank Policy Research Paper No. 1777 (Washington, DC: World Bank, 1997).

sum of the inflation rate, the budget surplus, trade openness, and institutional quality. In other words, it captures both macroeconomic policies and the institutional framework. The first estimate shows that there is no significant relationship between the level of aid and growth. In the second estimate aid/GDP is interacted with the indicator of economic management and there is a significant positive association with growth. Thus, aid has a significant positive effect on growth in an environment where economic policies and the institutional framework are sound.

### Fungibility of aid undermines project targeting

One way that donors have tried to ensure the effectiveness of their aid programmes is by carefully selecting projects and monitoring their implementation. Fungibility undermines this strategy. Fungibility essentially means that “a dollar is a dollar”, and that governments may adjust their own expenditures to take into account the foreign aid inflow. For example, if a donor sponsors a schooling programme, the government may reduce the planned allocations for education and increase some other position – to take an extreme example, say, the government might in-

crease military expenditures. Thus, the effect of this schooling aid should not be measured only in terms of the educational benefit, but should also include the effect on other expenditures that it has “crowded in”.

Research conducted at the World Bank shows that project aid is in fact often highly fungible. Feyzioglu, Swaroop, and Zhu use the sectoral composition of concessionary loans to 14 countries (from 1971 to 1990).<sup>15</sup> They first show that a dollar increase in foreign aid leads to an increase of 0.95 cents in total government spending – that is, there is no tax relief effect. More importantly, they show that higher concessionary loans to a particular sector do *not* necessarily increase spending in that sector. This is true for education, health, and agriculture. In other words, aid to these sectors has been highly fungible. On the other hand, aid has been less fungible in the energy, transport, and communication sectors. This could be due to the fact that such projects tend to be so large that they would not be realized without foreign assistance.

Of course, fungibility does not say anything about the quality of projects. An education project sponsored and monitored by a foreign donor might be more or less efficient than one carried out by the initiative of the local authorities. The finding of fungibility does imply, however, that it may be futile to try to isolate projects and target specific sectors. In a country where the overall government policy is not favourable to development, targeting will not improve the effectiveness of aid.

### Foreign aid has not been allocated to the countries where it is effective

Donor countries and international organizations argue that their aid policies are meant to be selective and favour government reform. The World Bank, for instance, has recently discussed more often and more openly the issue of how to enhance “good governance”, where the latter means, in particular, low levels of corruption of the bureaucracy and of the officials of the receiving countries.<sup>16</sup> The critics of these programmes argue instead that, contrary to the more or less sincere intentions of the donors, corrupt governments receive just as much aid as less corrupt ones. Furthermore, often financial assistance does not reach the really needy in the developing country, but, instead, is wasted in inefficient public consumption. Many critics make an even stronger argument, namely that not only are corrupt governments not discriminated against in the flow of international assistance, but in fact foreign aid fosters corruption by increasing the size of resources fought over by interest groups and factions.

Unfortunately, in practice aid has mostly *not* been allocated to those countries where it would have been effective. Studies of aid allocation

have show that political considerations loom large in the distribution of aid, and that this is true for almost all major donors.<sup>17</sup> Donors tend to give most to political allies: ex-colonies and countries that support the donor in UN votes receive more aid, democracies receive more, and strategically important countries receive most. What is even more worrying is that counties with high corruption levels have often received more aid than countries with low corruption. Adding this fact to the issues raised in the first two sections of this chapter illustrates why foreign aid has often been rather distortive. By comparison, the allocations of multinational lenders have been less driven by political considerations, as national interests are somewhat neutralized in these organizations. Again, combining this factor with previous lessons implies that development assistance through multilateral channels has been more effective than that from bilateral donors.

## Conclusions

The main conclusion that can be drawn from these lessons is quite straightforward. The international community *can* be more effective in fostering development provided that foreign aid helps in the process of institution building, and foreign aid is targeted to those countries that are willing to implement good policies and institutions. In these circumstances, development assistance has been shown to be highly effective.

There seems to be a certain paradox in these conclusions. Lesson one implies that a sound institutional infrastructure is key to development and lesson six says that foreign aid will only work in a country with a sound institutional infrastructure, and that therefore aid should mostly be allocated to such countries. This seems to imply that there are some countries in an “institutional development trap”. These countries have a poor institutional infrastructure, and as such they would receive no assistance to improve it (since it would be wasted). A possible solution to this conundrum is aid that comes in the form of knowledge and explicit institution building rather than money. In fact this is one of the lessons that the World Bank draws after its comprehensive aid assessment exercise: namely, in countries with sound management put money in, and in countries with poor management disseminate knowledge and information.<sup>18</sup>

Unfortunately bilateral donors have proven to be rather poor at allocating aid to the most effective use, since their decisions are mostly dictated by self-interest. This is unlikely to change dramatically, since it is natural that domestic pressure groups have an influence on all government policies. It follows that multilateral organizations may be in a better

positions to steer the development agenda in the direction described above. Ideally, a multilateral body would channel most aid resources, or at least coordinate most donors' efforts to make sure that aid is allocated to countries where it is effective. This might be a formidable task for the United Nations. But one well worth taking on.

## Notes

1. A previous version of this chapter was published under the title of "Foreign Aid, Institutions and Development: Lessons from Four Decades of International Development Cooperation", *Aussenwirtschaft* 55 (2000): 291–303.
2. For instance, S. Huntington and J. Dominguez, "Political Development", in *Handbook of Political Science* (3), *Marcopolitical Theory* (Reading, MA: Addison-Wesley, 1975).
3. See e.g. G. Scully, "The Institutional Framework and Economic Development", *Journal of Political Economy* 96 (1988): 652–662.
4. For an overview of these empirical studies see A. Brunetti and B. Weder, "Political Sources of Growth: A Critical Note on Measurement", *Public Choice* 82, Nos 1–2 (1995): 125–134.
5. See for instance S. Knack and P. Keefer, "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures", *Economics and Politics* 7 (1995): 207–227; A. Brunetti, G. Kisunko, and B. Weder, "Credibility of Rules and Economic Growth: Evidence from a Worldwide Survey of the Private Sector", *World Bank Economic Review* 12, No. 3 (1998): 353–384.
6. H. De Soto, *The Other Path* (New York: Harper & Row, 1989).
7. R. Klitgaard, *Tropical Gangsters* (Berkeley: University of California Press, 1988).
8. See for instance P. Mauro, "Corruption and Growth", *Quarterly Journal of Economics* 110 (1995): 681–712; A. Shleifer and R. Vishny, "Corruption", *Quarterly Journal of Economics* 108 (1993): 599–617; S. Johnson, D. Kaufmann, and P. Zoido-Lobaton, "Regulatory Discretion and the Unofficial Economy", *American Economic Review Papers and Proceedings* 88, No. 2 (1998): 387–392; P. Bardhan, "Corruption and Development: A Review of Issues", *Journal of Economic Literature* 35 (1997): 1320–1346.
9. The Laffer curve is named after Professor Laffer, an adviser to President Reagan. He suggested that, as taxes rates increased from fairly low levels, tax revenue received by the government would also increase. However, as tax rates rose there would come a point where people would not regard it as worth working so hard. This lack of incentives would lead to a fall in income and therefore a fall in tax revenue.
10. Shleifer and Vishny, note 8 above.
11. In addition to general theories of corruption, it is also important to look at historical and cultural factors when explaining individual cases. For example, in Chapter 3 Karel von Wolferen highlights that in East Asia "informal relations between government and business have been part and parcel of a formula for success" that would not be captured through analysing the situation from a Western perspective.
12. P. Boone, "Politics and the Effectiveness of Foreign Aid", *European Economic Review* 40 (1996): 289–329.
13. See World Bank, *Assessing Aid: What Works, What Doesn't, and Why* (Washington, DC: World Bank and Oxford University Press, 1988): 14.
14. C. Burnside and D. Dollar, "Aid, Policies and Growth", World Bank Policy Research Paper No. 1777 (Washington, DC: World Bank, 1997).

15. T. Feyzioglu, V. Swaroop, and M. Zhu, "A Panel Data Analysis of the Fungibility of Foreign Aid", *World Bank Economic Review* 12, No. 1 (1998): 29–58.
16. See for instance World Bank, "The State in a Changing World", in *World Development Report 1997* (Washington, DC: World Bank and Oxford University Press, 1997).
17. See A. Alesina and D. Dollar, "Who gives Foreign Aid to Whom and Why?", NBER Working Paper No. 6612 (1998); A. Alesina and B. Weder, *Do Corrupt Governments Receive Less Foreign Aid?* (Cambridge, MA: National Bureau of Economic Research, Working Paper No. W7108, May 1999).
18. World Bank, note 13 above: 27.

## Future of global economic governance

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*Walden Bello*

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### Crisis for the IMF and WTO

The erosion of the UN system has become a familiar theme in recent years. But who could have anticipated that, at the end of the century, the Bretton Woods system of multilateral agencies would also be mired in a very serious crisis. The legitimacy of the International Monetary Fund (IMF) is today at an all-time low, with many influential voices even in the North calling for its abolition. Moreover, after the collapse of the third ministerial in Seattle, the future of the World Trade Organization (WTO) is uncertain. Calls for reform of both institutions are now increasingly heard from all quarters. However, before addressing the question of reform or transformation of these very influential institutions, it might be useful to analyse the evolution of their relations with the Southern project of development as well as their relations with the United Nations.

### Looking back – Emergence of the Southern agenda

During the period of decolonization in the 1950s and 1960s, scores of newly independent states emerged in the politically charged atmosphere of the Cold War. Although often split between East and West in their political alliances, third world countries gravitated towards an economic agenda that had two underlying thrusts: rapid development, and a global

redistribution of wealth. While the more radical expression of this agenda in the shape of the Leninist theory of imperialism drew much attention and, in some quarters, condemnation, it was the more moderate version that was most influential in drawing otherwise politically diverse third world governments into a common front. This was the vision, analysis, and programme of action forged by Raul Prebisch, an Argentine economist who, from his base at the UN Economic Commission for Latin America (ECLAC), won a global following with his numerous writings.

Prebisch's theory centred on the worsening terms of trade between industrialized and non-industrialized countries, an equation which posited that more and more of the South's raw materials and agricultural products were needed to purchase fewer and fewer of the North's manufactured products. Moreover, the trading relationship was likely to get worse, since Northern producers were developing substitutes for raw materials from the South, and Northern consumers, according to Engels's law, would spend a decreasing proportion of their income on agricultural products from the South.<sup>1</sup> Known in development circles as "structuralism", Prebisch's theory of "bloodless but inexorable exploitation"<sup>2</sup> served as the inspiration for third world organizations such as the Non-Aligned Movement, the Group of 77 (G77), and the Organization of Petroleum Exporting Countries (OPEC), and the new international economic order (NIEO). It was also central to the establishment of the UN Conference on Trade and Development (UNCTAD) in 1964, which became over the next decade the principal vehicle used by the third world countries in their effort to restructure the world economy.

With Prebisch as its first Secretary-General, UNCTAD advanced a global reform strategy with three main prongs. The first was commodity price stabilization through the negotiation of price floors below which commodity prices would not be allowed to fall. The second was a scheme of preferential tariffs, or allowing third world exports of manufactures, in the name of development, to enter first world markets at lower tariff rates than those applied to exports from other industrialized countries. The third was an expansion and acceleration of foreign assistance, which, in UNCTAD's view, was not charity but "compensation, a rebate to the Third World for the years of declining commodity purchasing power".<sup>3</sup> UNCTAD also sought to gain legitimacy for the Southern countries' use of protectionist trade policy as a mechanism for industrialization, and demanded accelerated transfer of technology to the South. To a greater or lesser degree, the structuralist critique came to be reflected in the approaches of other key economic agencies of the UN Secretariat, such as the Economic and Social Council (ECOSOC) and the United Nations Development Programme (UNDP). It also became the dominant viewpoint among the majority at the General Assembly.

### Bretton Woods institutions focus on the South

The response of the leading countries of the North to the challenge of economic decolonization was conditioned by several developments. Most important of these was the Cold War. The priority of the political enterprise of containing the Soviet Union and communism pushed the North, particularly the US government, to a less hard-line stance when it came to the question of whether the economic structures of its client countries conformed to free-market principles. While the USA upheld private enterprise and demanded access for its corporations, it was more tolerant when it came to protectionism, investment controls, and a strong role for government in managing the economy. It also promoted at least the image of supporting limited global redistribution of wealth, this being accomplished mainly through foreign aid.

As the emerging countries gravitated towards the UN system, the leading governments increasingly relied on the IMF and the International Bank for Reconstruction and Development (IBRD) to push their agenda. The Bretton Woods institutions, founded in 1944, began with missions quite distinct from their latter-day involvement with North-South relations. The IMF was conceived by John Maynard Keynes and Harry Dexter White, the two pillars of the Bretton Woods meeting, as the guardian of global liquidity, a function that it was supposed to fulfil by monitoring member countries' maintenance of stable exchange rates and providing facilities on which they could periodically draw to overcome cyclical balance of payments difficulties. The IBRD was set up to assist in the reconstruction of the war-torn economies, particularly those of Western Europe, by lending to them at manageable rates of interest. By the early 1970s, however, a new era of floating exchange rates made the IMF's original mission superfluous. Instead, it became deeply involved in stabilizing third world economies with balance of payments difficulties. As for the World Bank, it had evolved into the prime multilateral development agency for aid and development.

A turning point for the World Bank was the debate triggered by the 1951 report of a group of experts entitled "Measures for the Economic Development of Under-Developed Countries", which proposed making grant aid available to third world countries.<sup>4</sup> Using this as a springboard, third world countries at the General Assembly tried to push through resolutions that would establish SUNFED, the Special UN Fund for Economic Development, which would be controlled by the United Nations and whose criterion for providing loans would not be narrow banking rules but development need. The North, led by the USA, strenuously resisted these efforts.<sup>5</sup> But when diversion and delay failed to derail the South's drive to set up SUNFED, the North came out with an alternative:

an institution for making soft loans for development from capital subscribed by the North, but one controlled by the North rather than the third world majority in the United Nations. Thus came into being the International Development Association (IDA), which was attached to the World Bank as the latter's soft-loan window. The IDA was part of a compromise package that effectively killed the idea of a UN-controlled development fund. The other part of the package was the establishment of the UN Special Fund, later renamed the UNDP, which served as the channel for much smaller quantities of mainly technical aid to third world countries.<sup>6</sup> This compromise, however, did not stop the escalation of third world demands for a redistribution of global economic power.

### Southern challenge in the 1970s

In the 1970s, the World Bank was to be the centrepiece of liberal Washington's response, and Robert McNamara was appointed its president in 1968. The McNamara approach had several elements. First, there was a massive escalation in the bank's resources, with lending climbing from \$2.7 billion a year in 1968 to \$12 billion in 1981. Second, there was a global programme aimed at ending poverty by focusing aid on improving the "productivity of the poor", but which sidestepped the essential need for social reform. Third, there was an effort to split the Southern nations by picking a few as "countries of concentration" to which the flow of bank assistance would be higher than average for countries of similar size and income.

The rise of OPEC, however, made World Bank aid and foreign aid less critical to many of the leading countries in UNCTAD and the G77, since they could gain access to massive quantities of loans that the commercial banks were only too happy to make available in their effort to turn a profit on the billions of dollars of deposits made to them by the OPEC countries. Consequently, instead of aid, UNCTAD focused on changing the rules of international trade, and in this enterprise it registered some successes. During the fourth conference of UNCTAD held in Nairobi in 1976, agreement was reached, without dissent from the developed countries, on the Integrated Programme for Commodities (IPC). The IPC stipulated that agreements for 18 specified commodities would be negotiated in order to avoid excessive price fluctuations and stabilize commodity prices at levels remunerative to the producers and equitable to consumers. It was also agreed that a common fund would be set up to regulate prices when they either fell below or climbed too far above the negotiated price targets.

UNCTAD and G77 pressure was also central to the IMF's establish-

ment of a new window, the compensatory financing facility (CFF), which was meant to assist third world countries in managing foreign exchange crises created by sharp falls in the prices of their primary commodities exports. Another UNCTAD achievement was getting the industrialized countries to accept the principle of preferential tariffs for developing countries. Some 26 developed countries were involved in 16 separate “general system of preferences” schemes by the early 1980s. These concessions were, of course, marginal. In the case of commodity price stabilization, it soon became apparent that the rich countries had replaced a strategy of confrontation with an evasive strategy of frustrating concrete agreements. A decade later, only one new commodity stabilization agreement, for natural rubber, had been negotiated. An existing agreement on cocoa was not operative and agreements on tin and sugar had collapsed.<sup>7</sup>

### Right-wing reaction – Demonization of the South and targeting the United Nations

By the late 1970s, however, even such small concessions were viewed with alarm by increasingly influential sectors of the US establishment. Within the UN system these concessions were viewed as indicative of the fact that the strategy of liberal containment spearheaded by the World Bank in the area of economic relations had not produced what it promised to deliver: security for Western interests in the South through cooptation of third world élites. These élites, which were the backbone of the UNCTAD system, gave in to popular pressure, abetted by local industrial interests, to tighten up on foreign investment. Nowhere did this trend spark more apprehension among American business people than in two countries, Brazil and Mexico, which were considered enormously strategic by US multinational firms. In Brazil, where foreign-owned firms accounted for half of total manufacturing sales,<sup>8</sup> measures were implemented to reserve the strategic information sector to local industries, provoking bitter denunciation from the USA.<sup>9</sup> In Mexico,<sup>10</sup> legal actions and threats of disinvestment by the powerful US drug industry followed the government’s programme for the pharmaceutical industry, which proposed no-patent policies, promotion of generic medicines, local development of raw materials, price controls, discriminatory incentives for local firms, and controls on foreign investment.<sup>11</sup>

Disturbing though these actions were they could not compare in their impact with OPEC’s second “oil shock” in 1979. To many Americans OPEC became the symbol of the South: an irresponsible gang that was bent on using its near monopoly over a key resource in order to bring the West to its knees. Although OPEC was dominated by US allies such as

Saudi Arabia, Kuwait, and Venezuela, its “oil weapon” evoked more apprehension that the nuclear arms of the Soviet Union. Indeed, the oil cartel was feared as the precursor of a unified Southern bloc controlling most strategic commodities, and right-wing propagandists would point to the Algiers Declaration of the Non-Aligned Movement in 1973 in their efforts to fan fear in the North.<sup>12</sup>

Moreover, in the late 1970s and early 1980s, in the view of right-wing circles, the United Nations had become the main vehicle for the South’s strategy to bring about the new international economic order. According to one right-wing think-tank, the governments of the South devoted “enormous time and resources to spreading the NIEO ideology throughout the UN system and beyond. Virtually no UN agencies and bureaus have been spared.”<sup>13</sup> Especially threatening was the effort by the third world to “redistribute natural resources” by bringing the seabed, space, and Antarctica under their control through Law of the Sea Treaty, the Agreement Governing Activities of States on the Moon and Other Celestial Bodies (called the “Moon Treaty”), and an ongoing UN study and debate over Antarctica.<sup>14</sup>

### Resubordinating the South: Structural adjustment

When the Reagan administration came to power in 1981, it was riding on what it considered a mandate not only to roll back communism but also to discipline the third world. What unfolded over the next four years was a two-pronged strategy aimed at dismantling the system of “state-assisted capitalism” and drastically weakening the UN system as a forum and instrument for the South’s economic agenda. The opportunity came none too soon in the form of the global debt crisis that erupted in the summer of 1982 and drastically weakened the capabilities of Southern governments in dealing with Northern states, corporations, and multilateral agencies. The instruments chosen for rolling back the South were the World Bank and the IMF. This was an interesting transformation for the World Bank, and the liberal McNamara was replaced by a more pliable successor.

“Structural adjustment” referred to a new lending approach that had been formulated during McNamara’s last years at the bank. Unlike the traditional project loans, a structural adjustment loan was intended to push “reforms” that would cut across the whole economy or a whole sector of the economy. In the mid-1980s, structural adjustment became the vehicle for a programme of free-market liberalization that was applied across the board to third world economies suffering major debt problems. Almost invariably, structural adjustment programmes (SAPs) had the following elements:

- radical reduction of government spending;
- import liberalization and removal of restrictions on foreign investment;
- privatization of state enterprises and radical deregulation;
- currency devaluation;
- wage constraint.

By the late 1980s, over 70 countries were subject to these SAPs. While justified as necessary to create the conditions that would enable third world countries to repay their debts, structural adjustment also had a strategic objective: to dismantle the system of state-assisted capitalism. In 1988, a survey of SAPs carried out by the UN Commission for Africa concluded that the main goal was “reduction/removal of direct state intervention in the productive and redistributive sectors of the economy”.<sup>15</sup> As for Latin America, one analyst noted that the USA took advantage of “this period of financial strain to insist that debtor countries remove the government from the economy as the price of getting credit”.<sup>16</sup> Similarly, a retrospective look at the decade of adjustment in a book published by the Inter-American Development Bank in 1992 identified the removal of the state from economic activity as the centrepiece of the ideological perspective that guided the structural reforms of the 1980s.<sup>17</sup> By 1992, it was clear that the South had been transformed: state participation in the economy had been drastically curtailed; government enterprises were passing into private hands in the name of efficiency; protectionist barriers were being radically reduced; and, through export-first policies, the internal economy was more tightly integrated into world markets.

### Bringing the newly industrializing countries to heel

East and South-East Asia were one area that was relatively untouched during this first phase. Here practically all the economic systems displayed the same features of state-assisted capitalism found elsewhere in the South: an activist government intervening in key areas of the economy, a focus on industrialization in order to escape the fate of being simply agricultural or raw material producers, protection of the domestic market from foreign competition, and tight controls on foreign investment. Where the key East and South-East Asian economies appeared to differ from other economies in the South was mainly in the presence of a fairly strong state that was able to discipline local élites, the greater internalization of a developmentalist direction by the state élite, and the pursuit of aggressive mercantilist policies aimed at gaining markets in first world countries. The front-line status in Asia of many of these newly industrializing countries (NICs) during the Cold War ensured that Wash-

ington would turn a blind eye to their deviations from the free-market ideal. But as the Cold War wound down from the mid-1980s, the USA began to redefine its economic policy toward East Asia as the creation of a “level playing field” for its corporations via liberalization, deregulation, and more extensive privatization of Asian economies.

It was a goal that Washington pursued by various means in the late 1980s and early 1990s. However, access to Japanese capital, which was relocating many of its industrial operations to East and South-East Asia to offset the loss of competitiveness in Japan owing to the rapid appreciation of the yen triggered by the Plaza Accord in 1985,<sup>18</sup> allowed countries like the Republic of Korea, Thailand, and Indonesia to ignore the requirements of formal SAPs that were foisted on them by the World Bank and IMF in the early 1980s when they were temporarily destabilized by the debt crisis. This left unilateralism in trade and financial diplomacy as the principal mechanism employed by the USA to deal with the increasingly successful Asian “tigers”. Washington’s mood was aptly captured by a senior US official who told a capital markets conference in San Francisco: “Although the NICs may be regarded as tigers because they are strong, ferocious traders, the analogy has a darker side. Tigers live in the jungle, and by the law of the jungle. They are a shrinking population.”<sup>19</sup>

Unilateral pressure, with some assistance from the IMF and the World Bank, succeeded in getting key Asian countries to liberalize their capital accounts and move to greater liberalization of their financial sectors. When it came to trade liberalization, however, the results were meagre, except perhaps in the case of Korea, whose trade surplus with the USA had been turned into a trade deficit by the early 1980s. But even this development did not change the US trade representative’s assessment of Korea as “one of the toughest places in the world to do business”.<sup>20</sup> As for the South-East Asian countries, Washington’s assessment was that while they might have liberalized their capital accounts and financial sectors, they remained highly protected when it came to trade and were dangerously flirting with “trade-distorting” exercises in industrial policy.

The indiscriminate financial liberalization demanded by Washington and the Bretton Woods institutions coupled with the high interest rate and fixed currency regime favoured by local financial authorities brought massive amounts of foreign capital into the region. But the same factors also served as the wide highway through which \$100 billion exited in 1997 in a massive stampede in response to dislocations caused by overinvestment and unrestricted capital inflows, like the collapse of the real estate market and widening current account deficits. A golden opportunity to push the US agenda opened up with the financial crisis, and Washington did not hesitate to exploit it to the hilt, advancing its interests behind the

banner of free-market reform. The rollback of protectionism and state intervention was incorporated into stabilization programmes imposed by the IMF on the key crisis countries of Indonesia, Thailand, and Korea. Summing up Washington's strategic goal, Jeff Garten, Under-Secretary of Commerce during President Bill Clinton's first term, said: "Most of these countries are going through a dark and deep tunnel . . . But at the other end there is going to be a significantly different Asia in which American firms have achieved a much deeper market penetration, much greater access."<sup>21</sup> By 1998, US financial firms and transnationals were buying up Asian assets from Seoul to Bangkok at fire-sale prices.

### Dismantling the UN development system

This assault on the NICs via the IMF stabilization programmes and on the broader South via structural adjustment imposed by the Bretton Woods institutions was accompanied by a major effort to emasculate the United Nations as a vehicle for the Southern agenda. Wielding the power of the purse, the USA, whose contribution funds some 20–25 per cent of the UN budget, moved to silence NIEO rhetoric in all the key UN institutions dealing with the North-South divide: ECOSOC, the UNDP, and the General Assembly. US pressure also resulted in the effective dismantling of the UN Centre on Transnational Corporations and the abolition of the post of Director-General for International Economic Cooperation and Development, which "had been one of the few concrete outcomes, and certainly the most noteworthy, of the efforts of the developing countries during the NIEO negotiations to secure a stronger UN presence in support of international economic cooperation and development".<sup>22</sup>

But the focus of the Northern counteroffensive was the defanging, if not dismantling, of UNCTAD. After giving in to the South during the UNCTAD IV negotiations in Nairobi in 1976 by agreeing to the creation of the commodity stabilization scheme known as the Integrated Programme for Commodities, the North, during UNCTAD V in Belgrade, rejected the South's programme of debt forgiveness and other measures intended to revive third world economies and thus contribute to global recovery at a time of worldwide recession.<sup>23</sup> The Northern offensive escalated during UNCTAD VIII, held in Cartagena in 1992. At this watershed meeting, the North successfully opposed all linkages of UNCTAD discussions with the Uruguay Round negotiations of the GATT and managed to erode UNCTAD's negotiation functions, thus calling its existence into question.<sup>24</sup> UNCTAD's main function would henceforth be limited to "analysis, consensus building on some trade-related issues, and tech-

nical assistance".<sup>25</sup> This drastic curtailing of UNCTAD's scope was apparently not enough for certain Northern interests. For instance, the Geneva-based Independent Commission on Global Governance identified UNCTAD as one of the agencies that could be abolished in order to streamline the UN system.<sup>26</sup>

### World Trade Organization: Sealing the defeat of the South

UNCTAD has been rendered impotent by the WTO, which came into being following the signing of the Marrakesh Accord in April 1994 and which put in force the agreements concluded during the eight-year Uruguay Round of the General Agreement on Tariffs and Trade (GATT). The WTO was 46 years late in coming into being, though it had initially been regarded by liberal internationalists in the USA and Britain as the third pillar of the Bretton Woods system, doing for trade what the IMF did for finance and the World Bank for economic reconstruction. A global trading organization had initially been scheduled to come into existence as the International Trade Organization (ITO) in 1948, but the threat of non-ratification by unilateralist forces in the US Senate, owing to their perception that American interests would be compromised, led to its being shelved in favour of the much weaker GATT. By the mid-1980s, trade rivalries with Europe and Japan, rising import penetration of the US market by third world countries, frustration at the inability of US goods to enter Southern markets, and the rise of new competitors in the shape of the East Asian NICs made the USA the leading advocate of a much-expanded GATT with real coercive teeth. Central to the founding of the WTO were the twin drives of managing the trade rivalry among the leading industrial countries while containing the threat posed by the South to the prevailing global economic structure. In this sense, the WTO must be seen as a continuation or extension of the same Northern reaction that drove structural adjustment.

Indeed, the WTO, with its enshrinement of free trade as the organizing principle of the global trading system, represents the defeat of everything that the South fought for in UNCTAD (getting fair prices via commodity price agreements, the institutionalization of trade preferences for Southern goods owing to their underdeveloped status, etc.). Instead, the WTO institutionalized free trade, the most-favoured nation principle,<sup>27</sup> and national treatment<sup>28</sup> as the pillars of the new world trading order. National treatment, which was institutionalized in the General Agreement on Trade in Services (GATS) of the Uruguay Round, was perhaps the most revolutionary of these principles and the most threatening to the South, since it gives foreign service providers, from telecommunications

companies to lawyers to educational agencies, the same rights and privileges as their domestic counterparts. Although the Uruguay Round Accord made reference to the “special and differential status” of the developing countries, it did not see this as a case of structurally determined differences but as one of gaps that can be surmounted by giving developing countries a longer adjustment period than the developed countries.

Northern environmental organizations were critical of the WTO, owing to their fears that environmental standards in the North would be subordinated to free trade according to the principle of “free trade *uber alles*”, as Ralph Nader put it. Moreover, we have seen the emergence of an unholy alliance in the North (conservative protectionists working with labour unions, indigenous peoples, and activists) with diverse reasons and philosophical objectives but sharing a common opposition to the WTO. At the same time, the Southern countries articulated their concerns about the GATT-WTO’s anti-developmental thrust. In their view, the GATT-WTO was inherently unsympathetic to industrialization and eroded the agricultural base of the developing societies. Yet triumphalism was the order of the day. The birth of the WTO in 1995 was widely acclaimed as the resumption of the process of rapid globalization of economies after the long pause triggered by the Great Depression in the 1930s.

### The IMF in the eye of the storm

That note of triumphalism was absent over five years later when the IMF, in a surprise announcement at the World Bank-IMF annual meeting at the end of September 1999, indicated that henceforth it would put “poverty reduction” at the centre of its development strategy. The IMF and its sister institution, in other words, were abandoning the model and strategy for development that had reigned since the early 1980s: structural adjustment. What brought about the 180-degree turn from the Washington Consensus in the last years of the decade? The answer is “spectacular failure” that could no longer be denied, at the pain of totally losing institutional credibility. The World Bank was the first to recognize that something was amiss. With over 100 countries under adjustment for over a decade, it was strange that the World Bank and the IMF found it hard to point to even a handful of success stories. In most cases, as Rudiger Dornbusch of the Massachusetts Institute of Technology put it, structural adjustment caused economies to “fall into a hole”<sup>29</sup> wherein low investment, reduced social spending, reduced consumption, and low output interacted to create a vicious cycle of decline and stagnation rather than a virtuous circle of growth, rising employment, and rising investment, as

originally envisaged by World Bank-IMF theory. With much resistance from the bank's entrenched bureaucracy, James Wolfensohn, then its president, moved to distance the World Bank slowly from hard-line adjustment policies and even got some of his staff to work (grudgingly) with civil society groups to assess SAPs in the so-called Structural Adjustment Programme Review Initiative (SAPRI). While acknowledging that within the World Bank there are many professionals with long field experience and good intentions, the problems with civil society engagement may reflect the internal incentive structures within the bank that reward pushing through large loans to member countries. As a result, it can be argued that the change of attitude referred to above did not translate to changes at the operational level owing to the strong internalization of the structural adjustment approach among World Bank operatives.

While self-doubt began to engulf the World Bank, the IMF, in contrast, ploughed confidently on, and the lack of evidence of success was interpreted to mean simply that a government lacked political will to push adjustment through. Through the establishment of the extended structural adjustment facility (ESAF), the IMF sought to fund countries over a longer period in order to institutionalize more fully the desired free-market reforms and make them permanent. It was the Asian financial crisis that finally forced the IMF to confront reality. In 1997–1998 the IMF moved with grand assurance into Thailand, Indonesia, and Korea, with its classic formula of short-term fiscal and monetary policy cum structural reform in the direction of liberalization, deregulation, and privatization. This was the price exacted from their governments for IMF financial rescue packages that would allow them to repay the massive debt incurred by their private sectors. But the result was to turn a conjunctural crisis into a deep recession, as governments' capacity to counteract the drop in private sector activity was destroyed by budgetary and monetary repression.<sup>30</sup> For a world that had long been resentful of the IMF's arrogance, this was the last straw. In 1998–1999, criticism of the IMF rose to a crescendo, and went beyond its stubborn adherence to structural adjustment and its serving as a bail-out mechanism for international finance capital to encompass accusations of its being non-transparent and non-accountable. Its vulnerable position was exposed during a debate in the US Congress over a G7 initiative to provide debt relief to 40 poor countries. Legislators depicted the IMF as the agency that caused the debt crisis of the poor countries in the first place, and some called for its abolition within three years. Said Representative Maxine Walters: "Do we have to have the IMF involved at all? Because, as we have painfully discovered, the way the IMF works causes children to starve."<sup>31</sup> In the face of such criticism from legislators in the IMF's most powerful member, US Treasury Secretary Larry Summers claimed that the IMF-centred process would be replaced

by “a new, more open and inclusive process that would involve multiple international organizations and give national policymakers and civil society groups a more central role”.<sup>32</sup>

### Radical reform or decommissioning?

The fact is, in the case of the IMF as well as that of the World Bank, jettisoning the paradigm of structural adjustment has left them adrift in the view of many critics, with the rhetoric and broad goals of reducing poverty but without an innovative macroeconomic approach. Wolfensohn and his ex-chief economist Joseph Stiglitz talk about “bringing together” the “macroeconomic” and “social” aspects of development, but World Bank officials cannot point to a larger strategy beyond increasing lending for health, population, nutrition, education, and social protection to 25 per cent of the bank’s total lending. It is not surprising that, in these circumstances, the old framework would reassert itself, with, for example, the IMF telling the Thai government, already its most obedient pupil, to cut its fiscal deficit despite a very fragile recovery; and pushing Indonesia to open its retail trade to foreign investors despite the consequences in terms of higher unemployment. Then there is the issue of accountability. The World Bank and the IMF have been responsible for tremendous economic and social damage wrought on third world economies for over two decades. Shouldn’t they be held to account for that?

Moreover, what would a real process of transformation of the IMF look like? It would be something that would include more than the open selection process for the new managing director – one that would open the recruitment process to non-Europeans – endorsed by Jeffrey Sachs.<sup>33</sup> For the problem lies in the very structure and culture of the IMF: a lack of accountability except to the US Treasury Department; a belief in non-transparency as a condition for effectiveness; and a deeply ingrained élitism that renders the bureaucracy incapable of learning from outsiders.

If this is the heart of the matter, then surgery must be more radical. The following measures could be proposed.

- First, a clean break with the past can only take place with the immediate dismantling of all SAPs in the third world and the ex-socialist world and the IMF adjustment programmes imposed on Indonesia, Thailand, and Korea following the Asian financial crisis.
- Second, an immediate reduction of the IMF professional staff from over 1,000 to 200, and major cuts in both capital expenditures and operational expenses of the agency. Most of the IMF’s economists are today employed in micro-managing adjustment programmes and would definitely cease to be necessary if, as the G7 finance ministers and

central bank governors suggest, developing countries be given more authority in formulating and implementing their own poverty reduction programmes.<sup>34</sup>

- Third and most important is the creation of a global commission on the future of the IMF to decide if it is to be reformed along the lines suggested by Sachs and others or, to borrow a phrase applied to ageing nuclear plants, it is to be decommissioned. Half of the members of such a body should come from civil society organizations, since it is these groups that were instrumental in bringing to light the destructive impact of adjustment programmes and are now engaged in many of the most innovative experiments in grassroots social development. Energy from below and decentralized operations are the trademarks of so many successful organizations that the top-down, centralized IMF looks positively Jurassic.

With its credibility and legitimacy in tatters, the IMF is in severe crisis. Unless international civil society intervenes, the powers that be will wait for the storm to blow over while talking about reform.

### Crisis of the WTO and the future of the global trade regime

The collapse of the third WTO ministerial in Seattle in early December 1999 stemmed from the fatal combination of massive street protests, an in-house revolt against non-transparent decision-making by the developing countries, and the inability of the WTO's two greatest powers, the USA and the European Union, to come to an agreement on key trade issues. Seattle was, in short, the culminating point of resentments and conflicts that had been building up ever since the Uruguay Round and that had been papered over by a superficial triumphalism about the WTO's being the vanguard of an inevitable globalization. In the wake of the collapse of the Seattle ministerial, there has emerged the opinion that reform of the WTO is now the programme that NGOs, governments, and citizens must embrace. It provides a unique window of opportunity for a reform agenda designed to increase the WTO's internal transparency and inclusion to accommodate a larger and more diverse membership.<sup>35</sup> However, what civil society, North and South, should be doing at this point is radically cutting down the power of the institution and reducing it to simply another institution in a pluralistic world trading system with multiple schemes of governance.

World trade did not need the WTO to expand enormously between 1948 and 1997, from \$124 billion to \$10,772 billion.<sup>36</sup> This expansion took place under the flexible GATT trade regime. The WTO's founding in 1995 did not respond to a collapse or crisis of world trade such as hap-

pened in the 1930s. It was not necessary for global peace, since no world war or trade-related war had taken place during that period. In the six interstate wars that took place in that period – the Korean War of 1950–1953, the Vietnam War of 1945–1975, the 1967 Arab-Israeli War, the 1973 Arab-Israeli War, the 1982 Falklands War, and the Gulf War of 1990 – trade conflict did not figure even remotely as a cause. GATT was, in fact, functioning reasonably well as a framework for liberalizing world trade. Its dispute settlement system was flexible, and with its recognition of the “special and differential status” of developing countries it provided the space in a global economy for third world countries to use trade policy for development and industrialization.

Why was the WTO established following the Uruguay Round of 1986–1994? Of the major trading powers, Japan was very ambivalent, concerned as it was to protect its agriculture as well as its particular system of industrial production that, through formal and informal mechanisms, gave its local producers primary rights to exploit the domestic market. The EU, well on the way to becoming a self-sufficient trading bloc, was likewise ambivalent, knowing that its highly subsidized system in agriculture would come under attack. Though demanding greater access to their manufactured and agricultural products in the Northern economies, the developing countries did not see this as being accomplished through a comprehensive agreement enforced by a powerful trade bureaucracy, but through discrete negotiations and agreements in the model of the Integrated Programme for Commodities and Commodity Stabilization Fund agreed upon under the aegis of UNCTAD in the late 1970s.

The founding of the WTO served primarily the interests of the USA. Just as it was the USA which blocked the founding of the International Trade Organization in 1948, when it felt that this would not serve its position of overwhelming economic dominance in the post-war world, so it was the USA which became the dominant lobbyist for the comprehensive Uruguay Round and the founding of the WTO in the late 1980s and early 1990s, when it felt that more competitive global conditions had created a situation where its corporate interests now demanded an opposite stance.

Just as it was the USA’s threat in the 1950s to leave GATT if it was not allowed to maintain protective mechanisms for milk and other agricultural products – leading to agricultural trade’s exemption from GATT rules – so was it US pressure that brought agriculture into the GATT-WTO system in 1995. And the reason for Washington’s change of mind was articulated quite candidly by then US Agriculture Secretary John Block at the start of the Uruguay Round negotiations in 1986: “[The] idea that developing countries should feed themselves is an anachronism from a bygone era. They could better ensure their food security by relying on US agricultural products, which are available, in most cases at

much lower cost.”<sup>37</sup> Washington, of course, did not just have developing country markets in mind, but also Japan, the Republic of Korea, and the European Union.

It was the USA that mainly pushed to bring services under WTO coverage, with its assessment that in the new burgeoning area of international services, and particularly in financial services, its corporations had a lead that needed to be preserved. It was also the USA that pushed to expand WTO jurisdiction to the so-called trade-related investment measures (TRIMs) and trade-related intellectual property rights (TRIPs). The first sought to eliminate barriers to the system of internal cross-border trade of product components between TNC (transnational corporation) subsidiaries that had been imposed by developing countries in order to develop their industries. The second sought to consolidate the US advantage in the cutting-edge knowledge-intensive industries.

It was the USA that pushed for the creation of the WTO’s formidable dispute resolution and enforcement mechanism after being frustrated with what US trade officials considered weak GATT efforts to enforce rulings favourable to the USA. As Washington’s academic point man on trade, C. Fred Bergsten, head of the Institute of International Economics, told the US Senate, the strong WTO dispute settlement mechanism served US interests because “we can now use the full weight of the international machinery to go after those trade barriers, reduce them, get them eliminated”.<sup>38</sup>

In sum, it has been Washington’s changing perception of the needs of its economic interest groups that have shaped and reshaped the international trading regime. It was not global necessity that gave birth to the WTO in 1995. It was the USA’s assessment that the interests of its corporations were no longer served by a loose and flexible GATT, but needed an all-powerful and wide-ranging WTO. From the free-market paradigm that underpins it, to the rules and regulations set forth in the different agreements that make up the Uruguay Round, to its system of decision-making and accountability, the WTO is a blueprint for the global hegemony of corporate America. It seeks to institutionalize the accumulated advantages of US corporations. Is the WTO necessary? Yes, to the USA. But not to the rest of the world.

### Can the WTO serve the interests of the developing countries?

Is the WTO a necessary structure – one that, whatever its flaws, brings more benefits than costs, and would therefore merit efforts at reform?

When the Uruguay Round was being negotiated, there was a consid-

erable lack of enthusiasm for the process among the developing countries. After all, these countries had formed the backbone of UNCTAD, which, with its system of one-country/one-vote and majority voting, they felt was an international arena more congenial to their interests. They entered the Uruguay Round greatly resenting the large trading powers' policy of weakening and marginalizing UNCTAD in the late 1970s and early 1980s.

Largely passive spectators, with a great number not even represented during the negotiations owing to resource constraints, the developing countries were dragged into unenthusiastic endorsement of the Marrakesh Accord of 1994 that sealed the Uruguay Round and established the WTO. To try to sell the WTO to the South, US propagandists evoked the fear that staying out of the WTO would result in a country's isolation from world trade ('like North Korea') and stoked the promise that a "rules-based system" of world trade would protect the weak countries from unilateral acts by the big trading powers.

With their economies dominated by the IMF and the World Bank, with the SAPs pushed by these agencies having as a central element radical trade liberalization, and much weaker as a bloc owing to the debt crisis compared to the 1970s, most developing country delegations felt they had no choice but to sign on the dotted line. Over the next few years, however, these countries realized that they had signed away their right to employ a variety of critical trade measures for development purposes.

In contrast to the loose GATT framework, which had allowed some space for development initiatives, the comprehensive and tightened Uruguay Round was fundamentally anti-development in its thrust.

### Oligarchic decision-making as a central, defining process

Is the system of WTO decision-making reformable? While much more flexible than the WTO, the GATT was, of course, far from perfect. One of the bad traits that the WTO took over from it was the system of decision-making. GATT functioned through a process called "consensus". Now consensus responded to the same problem that faced the IMF and the World Bank's developed country members: how to assure control at a time when the numbers gave the edge to the new countries of the South. In the IMF and the World Bank, the system of decision-making that evolved had the weight of a country's vote determined by the size of its capital subscriptions, which gave the USA and the other rich countries effective control over the two organizations.

In the GATT, a one-country/one-vote system was initially tried, but the big trading powers saw this as inimical to their interests. Thus, the

last time a vote was taken in the GATT was in 1959.<sup>39</sup> The system that finally emerged was described by US economist Bergsten as one that “does not work by voting. It works by a consensus arrangement which, to tell the truth, is managed by four – the Quads: the United States, Japan, European Union, and Canada.”<sup>40</sup> He continued: “Those countries have to agree if any major steps are going to be made, that is true. But no votes.”<sup>41</sup>

Indeed, so undemocratic is the WTO that decisions are arrived at informally, via caucuses convoked in the corridors of the ministerials by the big trading powers. The formal plenary sessions, which in democracies are the central arena for decision-making, are reserved for speeches. The key agreements to come out of the first and second ministerials of the WTO – the decision to liberalize information technology trade taken at the first ministerial in Singapore in 1996, and the agreement to liberalize trade in electronic commerce arrived at in Geneva in 1998 – were all decided in informal backroom sessions and simply presented to the full assembly as *faits accomplis*. Consensus simply functioned to render non-transparent a process where smaller, weaker countries were pressured, browbeaten, or bullied to conform to the “consensus” forged among major trading powers.

In damage-containment mode after the collapse of the Seattle ministerial, US Trade Representative Charlene Barshefsky, WTO Director-General Mike Moore, and other representatives of rich countries have spoken about the need for WTO “reform”. But none has declared any intention of pushing for a one-country/one-vote majority decision-making system or a voting system weighted by population size, which would be the only fair and legitimate methods in a democratic international organization. The fact is, such mechanisms will never be adopted, for this would put the developing countries in a preponderant role in terms of decision-making.

### Building a more pluralistic system of international economic governance

Reform is a viable strategy when the system in question is fundamentally fair but has simply been corrupted, such as the case with some democracies. It is not a viable strategy when a system is as fundamentally unequal in purposes, principles, and processes as the WTO. The WTO systematically protects the trade and economic advantages of the rich countries, particularly the USA. It is based on a paradigm or philosophy that denigrates the right to take activist measures to achieve development on the part of less developed countries, thus leading to a radical

dilution of their right to “special and differential treatment”. The WTO raises inequality into a principle of decision-making.

The WTO is often promoted as a “rules-based” trading framework that protects the weaker and poorer countries from unilateral actions by the stronger states. The opposite is true: the WTO, like many other multilateral international agreements, is meant to institutionalize and legitimize inequality. Its main purpose is to reduce the tremendous policing costs for the stronger powers that would be involved in disciplining many small countries in a more fluid, less structured international system.

It is not surprising that both the WTO and the IMF are currently mired in a severe crisis of legitimacy. For both are highly centralized, highly unaccountable, highly non-transparent global institutions that seek to subjugate, control, or harness vast swathes of global economic, social, political, and environmental processes to the needs and interests of a global minority of states, élites, and TNCs. The dynamics of such institutions clash with the burgeoning democratic aspirations of peoples, countries, and communities in both the North and the South. The centralizing dynamics of these institutions clash with the efforts of communities and nations to regain control of their fate and achieve a modicum of security by deconcentrating and decentralizing economic and political power. In other words, these are Jurassic institutions in an age of participatory political and economic democracy.

If there is one thing that is clear, it is that developing country governments and international civil society must not allow their energies to be hijacked into reforming these institutions. This would only amount to administering a facelift to fundamentally flawed institutions. Indeed, today's need is not another centralized global institution, reformed or unreformed, but the deconcentration and decentralization of institutional power and the creation of a pluralistic system of institutions and organizations interacting with one another amidst broadly defined and flexible agreements and understandings.

It was under such a more pluralistic global system, where hegemonic power was still far from institutionalized in a set of all-encompassing and powerful multilateral organizations, that the Latin American countries and many Asian countries were able to achieve a modicum of industrial development in the period from 1950 to 1970. It was under a more pluralistic world system, under a GATT that was limited in its power, flexible, and more sympathetic to the special status of developing countries, that the East and South-East Asian countries were able to become newly industrializing countries through state trade and industrial policies that departed significantly from the free-market biases enshrined in the WTO.

The alternative to a powerful WTO and strong IMF is not a Hobbesian state of nature. It is always the powerful who have stoked this fear. The

reality of international economic relations in a world marked by a multiplicity of international and regional institutions that check one another is a far cry from the propaganda image of a “nasty and brutish” world. Of course, the threat of unilateral action by the powerful is ever present in such a system, but it is one that even the powerful hesitate to take for fear of its consequences on their legitimacy as well as the reaction it would provoke in the form of opposing coalitions.

In other words, what developing countries and international civil society should aim at is not to reform the WTO and IMF but, through a combination of passive and active measures, to reduce their power radically and make them simply another pair of international institutions coexisting with and being checked by other international organizations, agreements, and regional groupings. These would include such diverse actors and institutions as UNCTAD, the International Labour Organization, and other UN agencies or affiliates; multilateral environmental agreements such as the Basel Convention and CITES; and evolving trade blocs such as MERCOSUR in Latin America, SAARC in South Asia, the SADC in Southern Africa, and ASEAN in South-East Asia. It is in such a fluid, less structured, more pluralistic world with multiple checks and balances that the nations and communities of the South will be able to carve out the space to develop based on their values, their rhythms, and the strategies of their choice.

## Notes

1. See, among other works, UNCTAD, *Toward a New Trade Policy for Development* (New York: UNCTAD, 1964).
2. B. Nossiter, *The Global Struggle for More* (New York: Harper & Row, 1987): 42–43.
3. *Ibid.*: 45.
4. N. Adams, “The UN’s Neglected Brief – ‘The Advancement of All Peoples’”, in E. Childers (ed.), *Challenges to the UN* (New York: St Martin’s Press): 31.
5. Nossiter, note 2 above: 34.
6. Adams, note 4 above.
7. A. Maizels, “Reforming the World Commodity Economy”, in M. Cutajar (ed.), *UNCTAD and the North-South Dialogue* (New York: Pergamon Press, 1985): 108; United Nations, *World Economic Survey* (New York: United Nations, 1988): 42.
8. K. Lissakers, *Banks, Borrowers, and the Establishment: A Revisionist Account of the International Debt Crisis* (New York: Basic Books, 1991): 56.
9. E. White, “The Question of Foreign Investments and the Economic Crisis of Latin America”, in R. Feinberg and R. French-Davis (eds), *Development and External Debt in Latin America: Bases for a New Consensus* (Notre Dame: University of Notre Dame Press, 1988): 157–158.
10. Lissakers, note 8 above.
11. White, note 9 above: 158.

12. Quoted in Nossiter, note 2 above: 57.
13. D. Bandow, "The US Role in Promoting Third World Development", in Heritage Foundation, *US Aid to the Developing World: A Free Market Agenda* (Washington, DC: Heritage Foundation, 1985): xxii.
14. *Ibid.*: xxiii–xxiv.
15. S. Cleary, "Toward a New Adjustment in Africa", in "Beyond Adjustment", special issue of *African Environment* 7, Nos 1–4: 357.
16. J. Sheahan, "Development Dichotomies and Economic Development Strategy", in S. Teitel (ed.), *Towards a New Development Strategy for Latin America* (Washington, DC: Inter-American Development Bank, 1992): 33.
17. P. Gerchunoff and J. C. Torre, "What Role for the State in Latin America?", in Teitel, *ibid.*
18. An agreement reached between France, Germany, Japan, the USA, and the UK to drive down the price of the dollar. By 1985, the dollar had reached an all-time high relative to many major currencies, and the USA was experiencing a large trade deficit. The coordinated efforts by these countries resulted in a 30 per cent decline in the dollar over the next two years.
19. D. Mulford, remarks before the Asia-Pacific Capital Markets Conference, San Francisco, 17 November 1987.
20. Testimony of Ambassador Charlene Barshefsky, US Trade Representative, before the House Ways and Means Trade Subcommittee, US Congress, 24 February 1998.
21. Quoted in "Worsening Financial Flu Lowers Immunity to US Business", *New York Times*, 1 February (1998).
22. Adams, note 4 above: 43.
23. South Commission, *The Challenge to the South* (New York: Oxford University Press, 1991): 217.
24. M. Van der Stichele, "World Trade – Free Trade for Whom, Fair for Whom?" in Childers, note 4 above: 69.
25. *Ibid.*
26. "South Decries Moves to Close UNCTAD, UNIDO", *Third World Resurgence*, No. 56: 41.
27. The most-favoured nation (MFN) principle involves making provisions in a commercial treaty binding the signatories to extend trading benefits equal to those accorded any third state. The clause ensures equal commercial opportunities, especially concerning import duties and freedom of investment. For instance, under MFN, should contracting party A agree in negotiations with contracting party B to reduce the tariff on product X to 5 per cent, this same "tariff rate" must also apply to all other contracting parties as well.
28. National treatment is a basic non-discrimination principle, found in Article III of the GATT. It requires that a WTO member country must treat products imported from any other WTO member country no differently from (i.e. the same as) domestically produced products with regard to taxation, standards conformity, and all other restrictions.
29. R. Dornbusch, quoted in J. Polak, "The Changing Nature of IMF Conditionality", *Essays in International Finance* 184 (September 1991): 47.
30. N. Bullard, W. Bello, and K. Malhotra, *Taming the Tigers: The IMF and the Asian Crisis* (Bangkok: Focus on the Global South, 1998).
31. Quoted in AP, reproduced in *Business World*, 15 November (1999).
32. Op-ed, *Washington Post*, reproduced in *Today*, 15 November (1999).
33. J. Sachs, "Time to End the Backroom Poker Game", *Financial Times*, 15 November (1999).

- 34. *Ibid.*
- 35. Quoted in Oxfam, *Institutional Reform of the WTO*, Discussion Paper (London: Oxfam, March 2000).
- 36. Figures from World Trade Organization, *Annual Report 1998: International Trade Statistics* (Geneva: WTO, 1998): 12.
- 37. Quoted in "Cakes and Caviar: The Dunkel Draft and Third World Agriculture", *Ecologist* 23, No. 6 (November–December 1993): 220.
- 38. C. Fred Bergsten, Director, Institute for International Economics, testimony before the US Senate, Washington, DC, 13 October 1994.
- 39. *Ibid.*
- 40. *Ibid.*
- 41. *Ibid.*

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## Environment

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## Urbanization, industrialization, and sustainable development

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*Fred Langeweg, Henk Hilderink, and Rob Maas*

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### Introduction

One of the major challenges for humanity in this century is the ever-expanding human population and its need for habitation, services, and resources in an urban setting as more and more people conglomerate in larger and larger cities worldwide. This problem is highlighted by the proliferation of urban centres around the world. It is estimated that by the end of the twentieth century more than half of the human population will live in cities, and by the year 2025 more than two-thirds of the population will do so, with the highest growth rates in Latin America and sub-Saharan Africa.<sup>1</sup> Figure 10.1 shows the projected share of urban population from 1950 to 2030. This expansion and concentration of human habitation in the form of cities brings with it a multitude of new environmental, social, and economic challenges. The process of urbanization is closely linked to the industrialization process. Both processes lead to major spatial changes in materials and energy flow, and changes in the exposure of the population and nature to environmental pollution.

Although urbanization *per se* is not a specific theme covered in Agenda 21,<sup>2</sup> its effects and implications permeate a number of other issues, specifically sustainable consumption and production patterns (Chapter 4), demographic dynamics (Chapter 5), human settlements (Chapter 7), and environmentally sound management of solid wastes (Chapter 21). It is one of the major cross-cutting themes of Agenda 21. One key aspect of

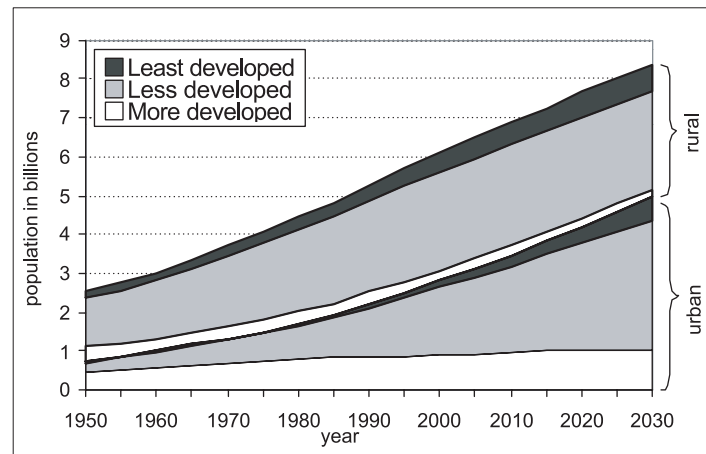


Figure 10.1: The share of urban population from 1950 to 2030

Source: United Nations, *UN World Population Prospects 1998*, publication ST/ESA/SERA/176 (New York: United Nations, 1999).

urbanization is industrialization, which is an Agenda 21 focus theme. Industry provides the urban population with the goods that it requires to develop and sustain itself.

In earlier chapters of this book, the challenges that population growth brings are discussed in the context of human development. This chapter will explore one natural link to population growth, which is the increase in the demand for human habitation and industrialization and their link to sustainable development.

### Sustainability: Balancing its social, economic, and ecological dimensions

The influence of the human species on the global ecosystem has increased considerably in the past century. As the land area occupied by human activities doubled, 30 per cent of the terrestrial natural area has disappeared. Agricultural societies have transformed into societies based on industry and trade. While the world economy has grown since 1900 by an average of 3 per cent per year, the use of energy and materials increased at almost the same rate. The concentration of CO<sub>2</sub> in the atmosphere has increased by 25–30 per cent. While in some areas nitrogen and phosphate concentrations in soil and water have increased and caused a loss of biodiversity, in other areas overexploitation has led to erosion and salinization. Myers estimates the loss of biodiversity at 5–10 per cent

and the loss of fertile soil at 20 per cent.<sup>3</sup> These losses are practically – at least within the new millennium – irreversible.

The messages of *Limits to Growth*<sup>4</sup> and the study that followed it, *Beyond the Limits*,<sup>5</sup> are the same – exponential growth in a closed system is not sustainable because of natural limits that will be encountered. The current view, however, is that the capacity of “ecosystem sinks” poses sharper limits to growth than the availability of “non-renewable resources”. In other words, the challenge is not to find new fossil resources, but to keep them in the ground, or to stretch the use of these resources over a much longer period of time.

As industrial output and population keep on growing, a combination of environmental and resource constraints is weakening the capacity of the capital sector to sustain investments. As a result food supply and health services could also decline and death rates rise.

Like *Limits to Growth*, many studies of the future suggest urgent changes in policy, including family planning, limiting the material standard of living to a certain level, and developing and implementing technologies to conserve resources, protect agricultural land, increase land yields, and abate pollution. All these are issues that are relevant to urban dwellers, as they are the major consumers of food products and other goods and ultimately the producers of most pollution.

The remainder of this chapter focuses on the role of industrialization and urbanization in global and local sustainable development. Industrialization and urbanization are two major transitions of the twentieth century that will shape the world in the new century.

## Global sustainability and industrialization

The structure of the global economy has changed considerably in the past century, and this transformation will continue. After the industrial revolution in the last half of the nineteenth century, GDP in developed regions was dominated by industrial production instead of agriculture. The development of new energy resources, in particular steam and later electricity, promoted this type of economic growth and change. Research has shown that when examining the shares of agriculture, industry, and services as a function of GDP per capita, the industrial share in the economy has a Kuznetz-type relationship with the size of GDP. It first rises with increasing GDP to 50–60 per cent, and then falls to a level of 25–35 per cent in the current most advanced market economies.<sup>6</sup>

There is a limit to industrial growth, however. This is because a sound rural economy is a prerequisite for a sound urban economy (likewise, the workers in the service sector are the main consumers of industrial

products). Although economies – when they progress – transform from an agricultural phase via an industrial phase towards a service and knowledge-oriented economy, this does not mean that at any stage the absolute level of nutrient or material throughput is decreasing. Industrial and urban economies grow because agricultural productivity is increasing.

For certain regions, the fuel of industrial growth may also be waning due to a number of reasons. For example, the “information age” may cause major changes in the structure of the economy. E-commerce could result in an increased consumer orientation of companies and global agglomerates of enterprises focusing on specific product mixes. In the future further shifts towards a service economy at both the global and the regional levels are to be expected. In a globalizing world, developing countries could take an increasing share in the global production of food and consumer goods. If regional markets are fully liberalized and if active transfer of knowledge and technology occurs, Western Europe for instance might lose its prominent position in the world market.

This means that there seem to be growing possibilities for further industrialization in regions with high demographic growth, but this industrialization needs rural co-development to succeed.

There are many issues associated with industrialization. Aside from the resource consumption and pollution problems, industrialization could also have some positive effects on the environment. This requires, however, that further economic growth is more than offset by a decline of the material and energy intensity of the economy, which necessitates the development of more efficient and renewable materials and more efficient technologies. But more “eco-efficiency” is not necessarily sufficient to meet the goals of sustainable development. There are many examples of an increase in pollution, materials, and energy use going hand in hand with (insufficient) improvements in efficiency.<sup>7</sup> Technological innovations may lead to substantial savings of energy and material use and to reductions in emissions to the environment, but they should be developed within a comprehensive framework in which the fulfilment of the ultimate needs is taken as a starting point and innovations are backed by changes in behaviour.

Focusing on these positive aspects is key if we are to minimize the negative aspects of both urbanization and its entailed industrialization. However, innovations and behavioural changes are not easily diffused into the economy. The diffusion time and the rate of increase in environmental efficiency differ for each type of innovation. Figure 10.2 shows the efficiency improvement and diffusion time of three kinds of environment-oriented system innovations.<sup>8</sup>

Function innovation might deliver the efficiency improvement by the factor of 10 to 20 that is needed to offset economic growth in the new

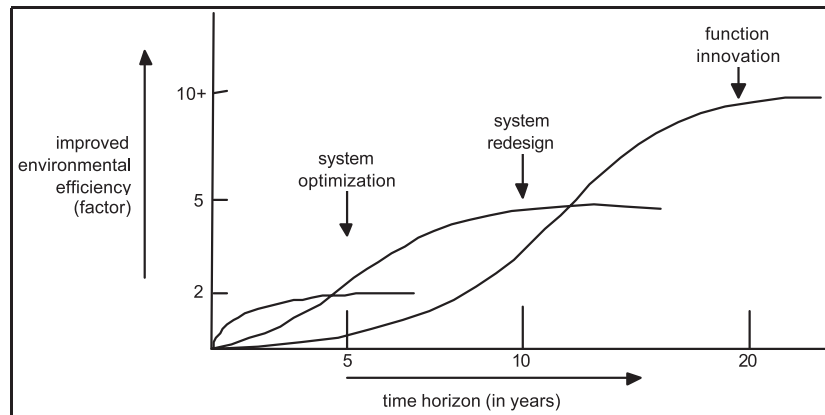


Figure 10.2: Efficiency improvement and diffusion time of three kinds of environment-oriented system innovations

Source: D. P. Van Vuuren, B. J. Strengers, and H. J. M. de Vries, *Long-term Perspectives on the World Metal Use: A Model-based Approach* (Bilthoven: RIVM Report 461502 021, 1999).

century, but it may take several decades to achieve full diffusion of such an innovation in society. Governments and international organizations play a crucial role in starting such an innovation process by investing in research and development and education. System optimization and redesign diffuse faster but create lower efficiency improvements. Governments could set challenging future emissions ceilings or legally binding efficiency standards to trigger technological and behavioural change. Financial and economic instruments like pricing, taxing, subsidies, and investment policies could also stimulate this outcome.

Moreover, function innovation will require a long development time, but at the same time it needs vision, initiatives, and leadership. It will become more and more difficult to influence technological developments in the future, as the share of governments and large firms in research and development is decreasing. As discussed in Chapter 6, research in the field of medicines, biotechnology, nanotechnology, new materials, and information technology is increasingly taking place in small (start-up) firms which sell their marketable innovations to large international companies. Without governmental interference, technological development is more likely to be focused on human needs like health, pleasure, and efficiency than on the protection of non-marketable common goods.

While markets are increasingly liberalized, state companies are privatized, and national regulations decentralized in many countries, industry shows a tendency towards a further centralization and globalization. The

question arises of whether the current international organizations focused on environmental and social aspects of sustainability are strong enough to counterbalance the economic power of multinational industries. Up to now the WTO has mainly focused on removing trade barriers. The more global markets are free, the more important general agreements on minimum requirements for social, cultural, and environmental protection will become.

### Local sustainability: Balancing environmental, social, and economic targets in urban areas

In complex agricultural societies, administrative centres and trading places grew into urban communities. The size of the cities depended heavily on the agricultural productivity and the organizational quality of the society. More than 2,000 years ago the number of large cities was limited to about 20. This number increased rapidly after the medieval period to over 1,000 cities having more than 100,000 inhabitants. Especially after the industrial revolution cities became the engines for economic growth. Most of the cultural heritage of nations is found in cities. Specialization and expansion of industries and services have led to a complex network of cities of various sizes. Nowadays urban areas are no longer limited to well-defined city boundaries. New modes of transport and communication have caused a wider spatial diffusion of urban activities: industries have become more footloose, services are no longer confined to the core of the cities, and high-income groups leave the neighbourhoods with the highest density and the poorest environmental quality. This is the way metropolitan areas have developed in advanced countries. Accessibility, social segregation, lack of social cohesion, air pollution in street canyons, traffic noise, and the loss of non-urban landscapes are the main challenges for the future.

In less advanced countries many cities are surrounded by informal settlements of low-income groups with poor access to clean water and urban facilities. Spatial and infrastructure planning are often lacking or lagging behind, which could harm the attractiveness of cities for economic activities despite the large potential (labour and consumer) market. The *World Development Report 1999/2000* states that urbanization and economic growth go hand in hand in all parts of the world, with the exception of Africa.<sup>9</sup> According to the World Bank, the African pattern of urbanization without economic growth is caused by subsidies on food and trade that favour urban consumers over rural producers. What this means is that poverty remains as the main problem of cities in Africa.

The share of urban residents is steadily increasing, and they could

ultimately become 80–90 per cent of the world population. Much of the urbanization is taking place in areas where water is scarce. Today 2.5 billion people live in areas where annually more than 50 per cent of the available water is used. In 2020 it is expected that 4 billion people will live in such areas.

The Global Scenario Group<sup>10</sup> has explored future urbanization trends up to the year 2050. As compared to 1995, the total population in developing regions will almost double to about 8 billion. Already now most urban dwellers live in developing countries. The population in the developed part of the world will increase only slightly to less than 1.5 billion. In advanced countries about 90 per cent of the population will live in urban areas. The urbanization rate in less advanced countries will almost double in this 50-year period to about 70 per cent.

The determination of causal mechanisms explaining urbanization is still in its early stages. An earlier UN study<sup>11</sup> suggested that income level and growth are positively associated with rural outmigration. An average additional \$100 per capita of GDP corresponds with a migration of about 0.3 per cent of the rural inhabitants to the urban areas. Most of the economic growth in the developed world is caused by the shift from agriculture to industry and services. The urban environment is well suited to accommodate this growth. Its energy and material efficiencies are high and it provides flexible and productive labour forces. In the developed world, some 60 per cent of GDP is generated in urban areas.<sup>12</sup> Some other factors play a substantial additional role in the developing world. Rural-to-urban migration accounts for 40–60 per cent of the total urbanization in these regions. On top of this process, the high fertility rates of the low-income groups in the urban population are speeding up urbanization.

Although urbanization in general is characterized by high population densities and high densities in the use of materials and energy, the spatial distribution of these indicators shows higher densities in large parts of Asia, North-West Europe and some parts of the Americas and Africa. High population density and high densities of human activities are a potential source of local environmental problems if no appropriate measures are taken. Insufficient investments in urban infrastructure and inadequate urban planning and management may result into a variety of environmental problems. Water supply and sanitation, waste disposal, and urban air quality are the main environmental problems associated with urbanization, although the variations both between cities and within city quarters are significant. The size and rate of control of these problems are related to GDP. Inadequate water supply, sanitation, and waste disposal are crucial causes of death due to infectious and parasitic diseases. Air pollution can cause respiratory and circulatory diseases.

Water-related problems and point sources of airborne emissions are

usually gradually solved when GDP increases, as means for investment become available for water supply, sanitation, and the substitution of fuels that contribute to local air pollution (such as coal). While air pollution due to point sources is decreasing, air pollution due to traffic is increasing with GDP. In advanced countries traffic is now the main source of air pollution in cities. In many developing countries decreases in the population's exposure to particulate matter due to the use of cleaner fuels are now substituted by an increase in photochemical smog, mainly caused by traffic. In some advanced countries, measures are under way to implement the cleanest car technologies and redesign urban traffic and transport systems in order to reduce high population exposure in street canyons.

Higher levels of energy use may cause severe air pollution problems affecting human health and nature. The highest levels of sulphur and nitrogen emissions per square kilometre nowadays occur in Western and Central Europe, South-East Asia, and the eastern part of North America. Emissions of particulate matter are following similar spatial patterns. Considerable effects on public health are associated with these types of air pollution. Currently the loss of about half a healthy life year per inhabitant is associated with air pollution in Western Europe. This loss may be considerably higher in parts of Asia.

Urbanization processes appear to be of great importance from an environmental perspective. Development of metropolitan areas at the sub-regional or even the regional level is going to play a dominant role in future land use. Investment in roads, railways, waterways, harbours, and airports plays a crucial role in the accessibility of cities and the network of cities that may arise in metropolitan areas. The protection of landscapes, natural parks, and forests in metropolitan areas will require a strict land-use plan and in some cases ownership of such "commons" by governmental organizations. Segregation within urban areas requires investment to upgrade the attractiveness of city quarters for companies and middle- and high-income classes. In order to balance all relevant economic, social, and environmental aspects, comprehensive urban and infrastructural planning will be needed. The right balance between the different domains will differ in time and space. Even the choice of relevant local indicators for sustainable development shows very different results among cities and stakeholders, and depends on the prevailing perspective on sustainability. It seems important to acknowledge these differences, for instance by facilitating public participation in the definition of indicators and desirable futures. Lessons from several local sustainability debates suggest that every town should develop its own set of indicators, and that the content of what "sustainability" means changes over time

and space. Harmonization of indicators seems less important than the interactive process of public participation, communication, and experimental forms of local partnership focused on integrated planning.

In the future most of the economic metabolism will take place in cities. Two factors are crucial for sustainable development: technological optimization of the urban metabolism, aimed at the reduction of material and energy losses and an increase in reliance on renewable resources; and the future lifestyle of the urban resident. Pricing, product information, education, and infrastructural urban planning are all ways to influence the consumer towards a sustainable lifestyle. Both in advanced and in less advanced countries further improvements in energy and materials efficiencies and the use of land can contribute to the protection of the surrounding ecosystems. The challenge is to define investment programmes that will improve the economic attractiveness of cities (accessibility, urban facilities) and at the same time reduce unemployment and poverty as well as pressures on the environment.

Policy studies carried out within the framework of UNEP's *Global Environment Outlook 2000*<sup>13</sup> underscore the global need for local action. In the absence of policy measures, the emission of sulphur and nitrogen compounds to the air will at least triple in the next three decades in continental Asia. To stabilize these emissions at their current levels a comprehensive urban policy is required. It will have to contain the accelerated introduction of clean technologies in energy production and transport, fuel switching, increasing transportation efficiency, and the promotion of investment in public transport.

In both advanced and developing countries uncontrolled urbanization is a major problem. Strict spatial planning together with clear property rules and land-pricing mechanisms could be part of the solution. Spatial planning tools could be developed so as to optimize land use for rural and urban purposes. Methods are being developed in the European Union and used in some of its member states. In May 1999 the European ministers responsible for spatial planning adopted the European Spatial Planning Perspective.<sup>14</sup> Common policies are proposed in this document with regards to spatial planning at a European scale. This planning perspective aims at narrowing the spatial differences in welfare and prosperity, optimizing business environments, and providing a common spatial framework. It defines three main goals to be reached:

- polycentric spatial development and a new urban-rural relationship;
- parity of access to infrastructure and knowledge;
- prudent management of the natural and cultural heritage.

The European urban system is developing strongly in the high-intensity economic area between London and Milan, in which the generation of

GDP per capita is also relatively high. This spatial trend is most likely to prevail in the next decades. The European spatial structure consists of several core areas of global importance supported by a number of highly competitive metropolitan regions outside these areas. An integrated transport, environment, and regional development policy should mitigate the negative effects of increasing traffic volumes. Trans-European networks for transport and telecommunications are an important component of such a policy. Implementing this policy requires substantial (private and public) investment and interregional cooperation.

Is there a possible role for the United Nations in all of this? If one applies the subsidiarity principle (which means that political actions are only taken at a more centralized level when those actions cannot be taken more effectively at a more decentralized level), the role of the United Nations for local governments is very limited. Subsidiarity seems crucial to maintaining cultural differences and a maximum of (local) freedom. The United Nations could help in capacity building, stimulate local initiatives and information exchange via the Internet, and disseminate successful local experiences, as is currently already done by UNCHS-Habitat and UNEP. The United Nations could, for instance, effectively exchange information between megacities via a council of mayors of the top 50 megacities of the world.

### Challenges for policy-making in the new millennium

Sustainable development requires economic efficiency, social equity, human security, and ecological stability and recovery. Substantial transfers of knowledge, technology, and financial resources are needed from advanced to less advanced regions to promote sustainable development at a global scale.

Ecological efficiency calls for a reduction in the intensity of the use of materials and energy by a factor of 10 to 20. Global diffusion of the best available technology may achieve a reduction by a factor of about two as a global average. Higher efficiency increases require greater investments in research and development for new processes and technologies. Their full diffusion through society may take decades at the least. Economic instruments like tax reduction schemes and subsidies can be used to speed up this innovation process. Multinational companies, now generating a substantial part of the world's gross product, need to play a prominent role in this search for sustainability. Strengthening international bodies for the protection of environmental, cultural, and social values could become necessary to counterbalance the unwanted effects of economic globalization.

The process of urbanization seems to be associated with economic growth and the sectoral composition of the economy. Cities are becoming part of metropolitan areas with regional and even global webs of economic centres connected with each other by transport systems. Poverty will be the main urban problem in developing regions. Local sustainability requires a more efficient use of water resources, materials, energy, and land as well as the development of an attractive environment for economic activities. This necessitates an adequate system of comprehensive urban and infrastructure planning, taking into account accessibility as well as the protection of the cultural and ecological heritage. Both the management of future uncertainties and the diversity of perspectives on sustainable development could be acknowledged by finding ways to increase public participation in designing desirable sustainable futures.

International cooperation at the regional and global levels is required in both the public and the private sector. Globalization of economies, self-determination, sustainable use of resources, and an adequate material standard of living are also contributing to human security and will reduce the risk of conflict and war. In order to protect common goods it could be assumed that citizens from all over the world will gradually accept a further globalization of governance. New international institutional arrangements could also involve multinational corporations and international financing.

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Water in our future

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*Motoyuki Suzuki*

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### Introduction

The holistic management of freshwater as a finite and vulnerable resource, and the integration of sectoral water plans and programmes within the framework of national economic and social policy, are of paramount importance for action . . .

Agenda 21, Chapter 18<sup>1</sup>

The earth is a blue planet covered with water, but only 2.5 per cent is the fresh water needed to support to human life.<sup>2</sup> Water use during the twentieth century grew at more than twice the rate of population increase, and a number of regions in different parts of the world are currently suffering chronic water stress. About one-third of the world's population lives in countries that are experiencing moderate to high water stress partly associated with population growth and the intensification of human activities. Moreover, World Meteorological Organization estimates show that by the year 2025 as much as two-thirds of the world population could be under stress conditions.<sup>3</sup>

This chapter briefly outlines some of the fundamental problems related to water quantity and quality that need to be solved in order to establish a sustainable form of anthropogenic activities in the next century. It is essentially a précis of the 1997 WMO report *Comprehensive Assessment of Freshwater Resources of the World*.<sup>4</sup> It also makes reference to the findings of another important study undertaken by the World Resources Institute.<sup>5</sup>

The future water crisis has been widely discussed at a number of international fora including:<sup>6</sup>

- 1972 United Nations Conference on the Human Environment in Stockholm;
- 1977 United Nations Water Conference in Mar del Plata, Argentina;
- 1990 Global Consultation on Safe Water and Sanitation for the 1990s in New Delhi, India;
- 1992 International Conference on Water and the Environment: Development Issues for the Twenty-first Century in Dublin, Ireland;
- 1992 United Nations Conference on Environment and Development in Rio de Janeiro, Brazil;
- 1994 Ministerial Conference on Drinking Water and Environmental Sanitation in Noordwijk, the Netherlands.

More recently, in March 2000 the World Water Vision was released on the occasion of the Second World Water Forum held in the Hague.<sup>7</sup> This vision, developed by the World Water Council, called for a massive campaign to raise public awareness of the dangers of inaction related to major water risks. It also called for the development of an action plan by the Global Water Partnership (GWP). This is an international network promoting integrated water resources management and is open to a broad range of organizations, including concerned national and international agencies and UN bodies. The proposed framework for action issued by the GWP in February 2000 will be discussed in the concluding section of this chapter.

## Water quantity

Global material cycles, including the water cycle, are governed by solar energy. Thirty per cent of solar radiation is directly reflected by air, clouds, and the earth's surface back into space and the rest is absorbed by the atmosphere and the earth, which then emit long-wave (low temperature) radiation back to space. Gases in the atmosphere and the earth's surface exchange energy in the form of radiation, sensible heat, and latent heat. The delicate balance thus established creates the environmental conditions wherein mankind can survive. The latent heat flux from the earth's surface is transported in the form of water vapour from the ocean and land areas, which eventually brings about fresh water precipitation. Due to the unevenness of precipitation and evaporation on the ocean and on land, fresh water becomes available in the form of running water from the land to the sea.

Most of that fresh water is currently frozen in the ice caps of Antarctica and Greenland, and most of the remainder is present as soil mois-

ture, or lies deep underground in groundwater aquifers, inaccessible for human use. As a result, less than 1 per cent of the world's fresh water is readily accessible for direct human use in lakes, rivers, reservoirs, and those underground sources that are shallow enough to be tapped at affordable cost. Only this small amount is regularly renewed by rain and snowfall, and therefore available on a sustainable basis. Nevertheless, these vital fresh water systems provide essential services for humanity that have been valued globally in the order of trillions of US dollars.<sup>8</sup>

Much of the approximately 110,000 cubic kilometres of precipitation that falls on the continents each year evaporates back into the atmosphere, or is absorbed by plants. About 42,700 cubic kilometres of the water that falls on earth flows through the world's river system. When the world's total river flow is divided by the world population (of 1995), the quotient amounts to an average of 7,300 cubic metres of water per capita per annum. When the growing world population is taken into account, this represents a drop of 37 per cent per person compared to the situation in 1970.<sup>9</sup>

Quite clearly, fresh water resources are very unevenly distributed, with the deserts as one extreme and the most humid regions as the other extreme. The arid and semi-arid zones of the world, which constitute 40 per cent of the land area, have only 2 per cent of global run-off.

The UNCSO argued:

Even in parts of the world with large river systems, there can be considerable variability in terms of when and where the water is available. Most of the annual water flow may come as floods following snowmelt or heavy rains and, unless captured by reservoirs, the water flows to the seas, sometimes causing seasonal flooding. Later in the year, the same areas may suffer droughts. A major factor determining the availability of water is the rate of evapotranspiration – the loss of water from land to atmosphere by evaporation from the soil and water surfaces, and transpiration from plants. Another important factor is that much of the world's accessible run-off occurs in areas far from human settlements, and water is very expensive to transport over long distances.<sup>10</sup>

It was estimated by the WMO that the amount of fresh water readily accessible for human use is about 9,000 cubic kilometres per year and additional 3,500 cubic kilometres per year can be exploited by the construction of dams and reservoirs. The number of large dams has increased sevenfold since 1950.<sup>11</sup>

Utilizing the remaining water resource for human needs becomes increasingly costly because of topography, distance, and environmental impacts. Humans are currently using about half the 12,500 cubic kilometres of water that are readily available. Taking into account an expected population increase of about 50 per cent in the next 50 years,

Table 11.1: Water resources and potential availability per capita by continent

Continent	Area (million km <sup>2</sup> )	Population (millions)	Water resources (km <sup>3</sup> /year)			Potential water availability (1,000 m <sup>3</sup> / year)	
			average	max	min	per km <sup>2</sup>	per capita
Europe	10.46	685.0	2,900	3,410	2,254	277	4.23
North America	24.30	453.0	7,890	8,917	6,895	324	17.40
Africa	30.10	708.0	4,050	5,082	3,073	134	5.72
Asia	43.50	3,445.0	13,510	15,008	11,800	311	3.92
South America	17.90	315.0	12,030	14,350	10,320	672	38.20
Australia and Oceania	8.95	28.7	2,404	2,880	1,891	269	83.70
World	135.00	5,633.0	42,785	44,751	39,775	317	7.60

Source: I. A. Shiklomanov, Summary of the monograph “World Water Resources at the Beginning of the 21st Century”, prepared in the Framework of the UHP UNESCO Joint Project, State Hydrological Institute (SHI), St Petersburg, 1999 (also accessible at <http://webworld.unesco.org/water/ihp/db/shiklomanov>).

coupled with expected increases in demand as a result of economic growth and lifestyle changes, there is unlikely to be much room for increased consumption. Table 11.1 shows the amounts of fresh water in six continents. The size of population determines how much water is potentially available per capita. According to the World Resources Institute, as the amount of water available per capita declines, the need to make trade-offs between alternative uses in terms of their environmental implications will become more acute.<sup>12</sup>

### Water scarcity and water stress

In the period from 1900 to 1995, global water withdrawals to satisfy demand grew by a factor of six, more than double the rate of population growth. Water scarcity in the early part of the twenty-first century could therefore create conditions similar to those experienced in the 1970s as a result of the oil shocks.<sup>13</sup> This rapid growth in water demand is due to the increasing reliance on irrigation to achieve food security, the growth of industrial uses, and the increasing use per capita for domestic purposes. As shown in Figure 11.1, the increased demands are causing water stress in many areas of the world (particularly in West Asia and Africa). Water stress can also be found in some humid areas where rising demand

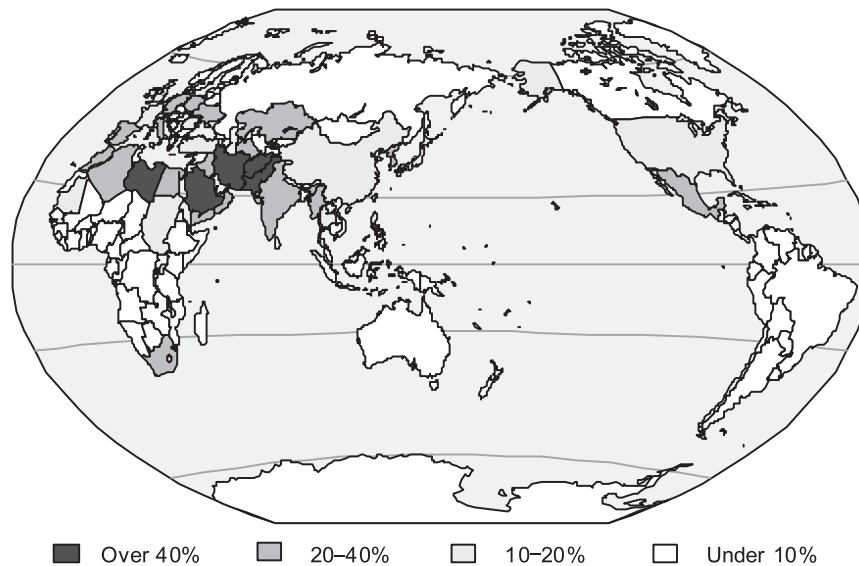


Figure 11.1: Water withdrawal as a percentage of water availability, 1995

Notes:

Under 10%: Low water stress. Countries that use less than 10 per cent of their available fresh water generally do not experience major stresses in respect of the available resources.

10-20%: Moderate water stress. Use in the range of 10-20 per cent of available water generally indicates that availability is becoming a limiting factor, and significant effort and investments are needed to increase supply and reduce demand.

20-40%: Medium-high water stress. When water withdrawals are in the range of 20-40 per cent of the water available, management of both supply and demand will be required to ensure that the uses remain sustainable. There will be a need to resolve competing human uses, and aquatic ecosystems will require special attention to ensure that they have adequate water flows. Developing countries in particular will need major investments to improve water-use efficiency, and the portion of GNP allocated to water resources management can become substantial.

Over 40%: High water stress. Use of more than 40 per cent of available water indicates serious scarcity, and usually an increasing dependence on desalination and use of groundwater faster than it is replenished. This means that there is an urgent need for intensive management of supply and demand. Present use patterns and withdrawals may not be sustainable, and water scarcity can become the limiting factor to economic growth.

or pollution have caused overutilization of the local resource. It is estimated that about 460 million people (8 per cent of the world's population) live in countries using so much of their water resources that they can be considered to be highly water stressed. This includes countries such as Libya, Saudi Arabia, Iran, Afghanistan, and Pakistan. Another quarter of the world's population lives in countries (such as India, South

Africa, Mexico, and Tunisia) where the use of water is so high that they are likely to face situations of serious water stress in the not too distant future.

In some areas, for instance in the north-eastern part of Syria, the withdrawals are so high that the flow of rivers decreases as they move downstream, and in other parts of the world some lakes are shrinking (for example, the Great Lakes between the USA and Canada, and the Aral Sea).

Groundwater supplies 1.5 billion people, and is the main or only source of water for rural inhabitants in many parts of the world and also increasingly the main source for irrigation. Underground sources are being heavily overused in a number of areas, including parts of China, India, Mexico, Thailand, the western USA, North Africa, and the Middle East, with water being pumped out faster than nature can replenish the supply.<sup>14</sup> The excessive use of groundwater is likely to increase over the next 30 years. Overpumping of groundwater has resulted in a drop in water levels by tens of metres in places like the West Bank and Gaza, making it increasingly difficult and expensive for people to have continued access to the water. In a number of regions, depletion has forced people to turn to lower-quality groundwater sources, some of which contain natural contaminants such as fluorides and arsenic, as is the case in Bangladesh. The overuse of groundwater can have a serious effect on the base flow of rivers, especially during dry periods, which is so vital for aquatic ecosystems.

It has been observed that water stress can begin once the use of fresh water rises above 10 per cent of renewable fresh water resources, becomes more pronounced as the use crosses the 20 per cent level, and gives a heavy burden if the level becomes more than 40 per cent. On average, a country can capture only about one-third of the annual flow of water in its rivers using dams, reservoirs, and intake pipes. A further limitation arises from the growing lack of acceptance of the social and environmental impacts of large dams. The closest and most economical sources of water are used first, and it becomes increasingly expensive to tap sources that are further away. Another limitation on water use stems from the fact that once withdrawals pass certain thresholds, which vary from site to site, lake and river levels fall to the point where other uses are harmed.

Figure 11.1 shows water withdrawal as a percentage of water availability in 1995, with four categories of water stress based on the amount of available fresh water. Figure 11.2 is prepared in a similar manner on the basis of predicted population increase and economic development in each continent in 2025. For illustrative purposes, Figure 11.3 provides data on the per capita water availability and use in Asian countries, with an indication of those currently facing water-related stresses.

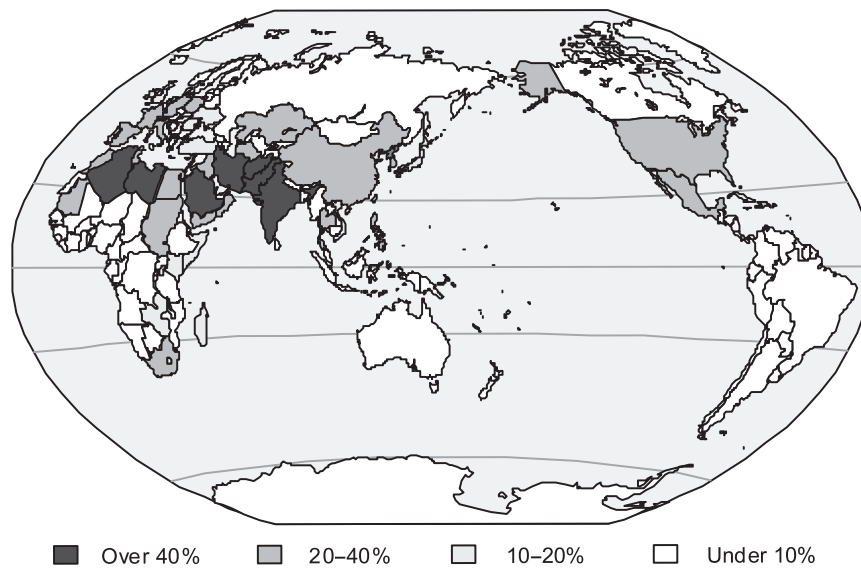


Figure 11.2: Predicted water withdrawal as a percentage of water availability in 2025

## Water quality and human health issues

A number of well-known, major water pollution problems were discussed in the 1997 WMO report.<sup>15</sup>

### *Health-related microbiological contamination*

Inadequately treated contaminated water is one of the major causes of human illness. Micro-organisms found in human and animal wastes such as bacteria, viruses, and protozoa are the cause of many waterborne diseases. These are present in virtually all wastes discharged, even those from most sewage treatment plants. It is essential to treat drinking water properly to prevent illness.

### *Surface water eutrophication*

There has been accelerated growth of algae caused by the phosphorus and nitrogen present in many discharges, including human and animal wastes, detergents, and run-off from agricultural fields. These two elements, when discharged into water, act as nutrients, greatly speeding up the process called eutrophication. Excessive algal growth leads to a decline in the oxygen content of the water, which can result in suffocation of

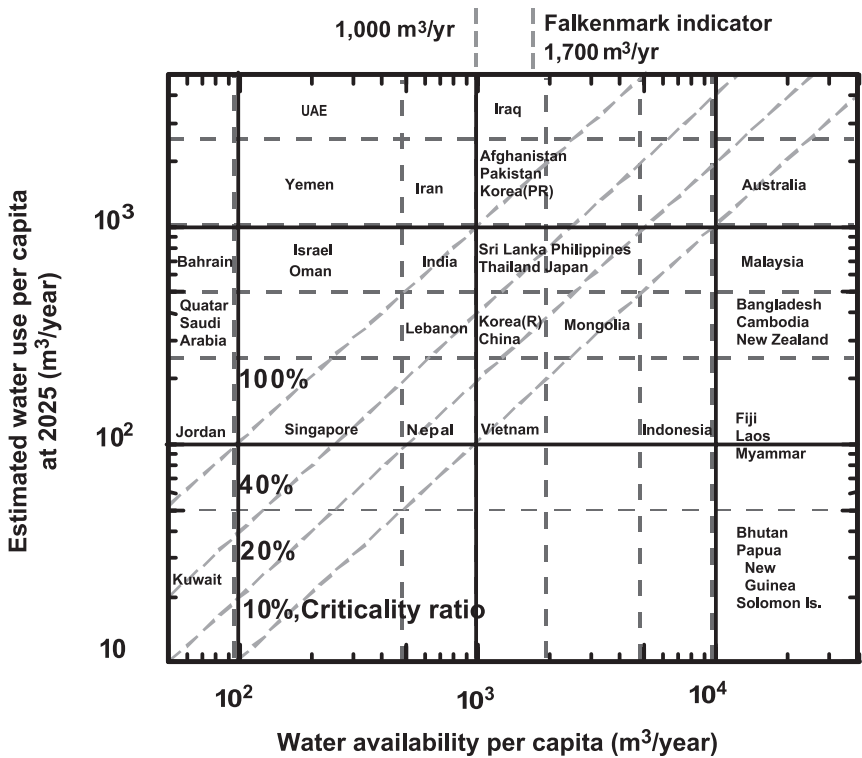


Figure 11.3: Water use and availability per capita in Asian countries in 2025

Notes:

1. The Falkenmark indicator suggests that when the total amount of renewable water resources per capita per year becomes less than 1,700 m³, water stress begins, and stress becomes severe when there is less than 1,000 m³.
2. The criticality ratio is used to show that water stress becomes high when water use exceeds 40 per cent of the available water resources.

some forms of aquatic life. It can also affect the taste of drinking water. Eutrophication is now resulting in the decline of water quality on all continents. Moreover, the draining of nutrients into oceans can lead to an increase in the number of toxic algal blooms, sometimes known as red tides, which can make seafood unsafe to eat.

### Groundwater pollution

Nitrates from fertilizers and human and stock wastes are polluting groundwater in many regions. High nitrate levels in drinking water decrease the oxygen-carrying capacity of haemoglobin in blood, which can

threaten the health of infants. According to UNEP, nitrate pollution will be one of the most pressing water quality problems in Europe and North America in the coming decade, and will become a serious problem in other countries, such as India, China, and Brazil, if present trends continue.<sup>16</sup>

### *Heavy metals in groundwater*

Heavy metals are found naturally in soil and water, but their worldwide production and use by industry, agriculture, and mining have released large amounts into the environment. The metals of greatest concern for human health are lead, mercury, arsenic, and cadmium. Many other metals, including copper, silver, selenium, zinc, and chromium, are also highly toxic to aquatic life. Water pollution related to metal production and use, including the release of acids from mining wastes, is a problem in many of the world's mining and metal-processing regions. Elevated levels of some metals, such as lead and mercury, are also found around many cities and downstream from metal smelters and coal-burning power plants.

### *Man-made chemicals in water bodies*

Some of the over 100,000 commercial chemicals in the world, as well as a number of by-product chemical wastes, are known or suspected to caused harmful effects in humans, plants, and animals. The members of one class of compounds, known as persistent organic pollutants (POPs) and including such well-known substances as polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT), have created many of these problems because they are toxic, highly persistent in the environment, and build up in the food chain. These and other chlorinated organic chemicals have been so widely distributed by air and ocean currents that they are found in the tissues of people and wildlife everywhere. Some of these chemicals are thought to disrupt the endocrine systems of animals, including human beings, potentially endangering the sustainability of natural ecosystems and human survival.

### *Water treatment*

Theoretically, all pollutants can be removed from water, but in practice decontaminating water, especially in the case of toxic substances, is very expensive and requires sophisticated techniques. Water pollution problems vary in severity around the world, depending on population den-

sities, the types and amounts of industrial and agricultural development, and the number and efficiency of waste treatment systems that are used. The global magnitude of pollution is difficult to quantify because of a scarcity of information in many countries. However, it is important to note that in most industrialized countries there has been a gradual decline with respect to some pollutants in surface waters (for example, faecal contamination has been reduced as a result of improved sewage treatment), but pollution from new chemicals has increased. Estimates for developing countries, however, which often lack the resources to build and maintain sewage treatment systems, indicate that 90 per cent of wastewater is discharged without treatment.<sup>17</sup>

### *Acid rain*

Acidic precipitation is caused by sulphuric and nitric compounds released from such sources as industries, motor vehicles, power plants, smelters, and incinerators. Acid rain currently affects large areas of the world, including parts of Europe, North America, Latin America, India, and Asia. It has killed ecosystems, and can threaten human health by dissolving metals into the water. In addition to acids, there is long-range airborne transport of a wide range of chemicals and metals. Pesticide use is another important source because some of the chemicals evaporate into the air and others adhere to tiny dust particles, and in both cases these chemicals can then be carried great distances by wind currents. Sometimes the pollutants build up in the food chain, and are passed on to humans who rely on unprocessed foods.

### *Other health issues*

Since most lakes and rivers eventually drain to the seas, fresh water waste discharges also have an impact on coastal and even on deep-sea ecosystems. About 80 per cent of marine pollution is caused by human activities on land. The water in the oceans will remain polluted until we can control pollution from land sources.

In the past two decades, essential water supply services have been provided to millions of people worldwide, saving a great many lives and reducing illness. However, the rate of supply has not kept pace with that of population growth, and 20 per cent of the world's population lack access to safe water supply, while 50 per cent lack access to adequate sanitation.

According the WHO's Roll Back Malaria campaign,<sup>18</sup> 20 per cent of the world's population is at risk from malaria, with 300–500 million cases per year and at least 1 million deaths per year, mainly in Africa. In addi-

tion, a total of more than 5 million people die each year from diseases caused by unsafe drinking water and a lack of sanitation. Provision of safe drinking water and sanitation could reduce the incidence of illness and death by as much as three-quarters, depending on the disease. Not only is the death toll a human tragedy, but disease means these people are less able to carry on productive lives, and this undermines social and economic development.

Rachel Carson's *Silent Spring* drew global attention to the impact of toxic chemicals on wildlife.<sup>19</sup> These effects include cancer, death, egg-shell thinning, population decline, reduced hatching success, abnormal behaviour, changes in organ development, infertility, birth defects, and a range of other illnesses. The UNCSD argues that:

In humans, high levels of exposure to some chemicals and heavy metals have been linked to a number of illnesses, including cancer, damage to the nervous system and birth defects. Pollutants can build up in the food chain to the point where they harm people, as in Minamata disease, which is caused by the eating of sea-food contaminated with mercury from industrial discharges. The cumulative effects of long-term exposure to a variety of chemicals at what seem like low concentrations cannot be well quantified at present.<sup>20</sup>

### The way forward

The 2000 report by the Global Water Partnership calls upon the international community to work towards “water security” as an overarching goal at all levels, from local through to global.<sup>21</sup> A comprehensive set of international development targets are proposed for the year 2015, including:

- reduce by half the number of people without access to hygienic sanitation facilities;
- reduce by half the proportion of people without sustainable access to adequate quantities of affordable and safe water;
- increase the water productivity for food production from rain-fed and irrigated farming by 30 per cent;
- reduce the risk of floods by 50 per cent for people living in floodplains;
- establish comprehensive policies for integrated water resource management in 75 per cent of countries by 2005 and in all countries by 2015.

The report makes an extensive range of proposals designed to improve water governance practices by ensuring that policies, laws, and regulations are in place with the supporting institutional structures. Full-cost pricing of water services is called for, as well as realignment of existing

economic and financial practices in the water supply sector. Efforts need to be made by the relevant UN bodies, the World Bank, and national governments to develop comprehensive accounting for the environmental and social effects of large water projects.

There are calls for the establishment of realistic water quality standards to protect aquatic ecosystems, with measures designed to ensure monitoring and enforcement. The basic argument is that water stress can be tackled through an integrated approach combining water resources management with decentralized implementation to ensure demand balance based on local conditions such as climate, industrial and agricultural activities and their water needs, economic conditions, traditions, and culture. It is estimated that for developing countries the total investment required per annum in order to respond to the World Water Vision would be in the order of US\$180 billion (this is a US\$100 billion increase on existing investment levels). Potential problems in responding to this vision are briefly outlined below for developing and developed countries.

### *Developing countries*

The developing world is characterized by a diversity of water problems and potential solutions. First, abundant water resources are found in some of the developing countries, for example countries in humid tropical areas. These countries often suffer from floods that occur during a short period of monsoon and rainy season and cause considerable damage to villages and farms. However, the condition of poverty in many of these countries means that they do not have sufficient drinking water supply and sanitation systems. Second, conversely, some developing countries in arid and semi-arid zones have limited water resources but do not suffer water stress. This is because people are too poor to utilize water resources. They lack the resources for development in terms of finance, technical expertise, and institutional support. They need adequate water supply, sanitation, and wastewater treatment. Third, in cases of high economic and population growth, some developing countries may face severe conditions in their water demand and supply balance. They need to consider restructuring production and consumption patterns away from wasteful, low-value, water-intensive uses. In addition, most of the new population will be found in the developing world, and these countries will move from being 37 per cent urban in 1995 to 56 per cent urban in 2025. At the same time, there will be more industrial development. These trends will take both people and water supplies from agriculture, creating an urgent need for more urban sanitation. Fourth, some developing countries are well endowed with land and water resources, and may have the opportunity to increase agricultural production and exports into the world

market. Others lack adequate access to the possibilities represented by water, and may have to rely on development assistance to help them in using their water wisely.

There are no simple solutions, but here are some basic pointers for consideration.

- High-water-stress developing countries could shift to high-value, less water-intensive crops, and develop the associated agricultural industries to process more of the products, thus raising the value-added component.
- As per the GWP report,<sup>22</sup> all developing countries are urged to give high priority to investments for wastewater treatment and reuse, and to formulate and implement pollution monitoring and control policies.
- They should develop the educational and information infrastructure necessary to improve the skills of the labour force required for the industrial transformation that needs to take place.
- For those developing countries aiming at short-term economic growth, highly polluting industries with little or no control over their discharges may appear an acceptable approach, but the potential negative and costly side-effects associated with damage to human health should never be overlooked, as the Minamata experience in Japan mentioned above clearly shows. The direct human costs of pollution related to industrial development and the overall long-term costs of redressing environmental damage resulting from such decisions have often been shown to be more expensive than the creation of low-polluting industries in the first place.

### *Developed countries*

For developed countries, the main problem is water pollution rather than supply, although some large countries contain water-poor regions. Developed countries generally have the financial resources to deal with regional water supply problems, often by means of water diversions. Pollution reduction and control are the major challenge for most countries in this category. Moreover, some developed countries have fairly large amounts of water but are facing stress conditions as a result of continuing water resource overuse and pollution. Other countries have already used most of their accessible water resources. They have little scope to increase the amount of water supplied for human uses through conventional means without inflicting damage on aquatic ecosystems or seriously depleting groundwater aquifers. For these countries an extensive range of measures would be required.

- Demand management, pollution control, and water allocation policies designed to maximize the socio-economic value of water are required.

- Water pricing should be considered seriously, since future abuse of water must be avoided. Some countries in this category with favourable land and climate conditions may have a significant potential for increased food production and could play an important role in providing food to world markets.
- Wastewater treatment and reuse, together with holistic restructuring of industrial/domestic activities themselves, will constitute essential mechanisms for pollution control and minimizing water abuse.
- Development of water-related technologies such as a technology to upgrade deteriorated water quality in developing countries is one of the most urgent policies to undertake in developed countries. Appropriate technologies that fit with the economic conditions of developing countries are greatly needed. With the application of existing technologies, the agricultural sector could reduce its water demands by 10–50 per cent, industries by 40–90 per cent, and cities by nearly a third with no impact on economic output or quality of life.<sup>23</sup>
- As water becomes scarcer and competition among various users increases, water ceases to be available as a free good and becomes in many areas a tradable commodity. Thus the role of governments is gradually shifting from one of providing water at very low cost to one of regulating water markets.

## Concluding remarks

What we need is a new “water ethic” that promotes the protection of natural ecosystems and the equitable use of water. As Postal strongly argues, we now need a shift in approach away from past efforts to continuously reach out for more water.<sup>24</sup> The challenge today is to do more with less – through water conservation and recycling. Experience in Japan, for instance, has shown how total industrial water use declined significantly in the 1970s and 1980s while industrial output grew steadily.

The chapter will conclude by quoting from the preface to the GWP framework for action report, which illustrates the need for a new partnership approach between North and South to resolve the contemporary, and growing, water crisis:

Ultimately, the message to convey is that averting a world water crisis is about everybody’s responsibility and demands a new way of thinking about water. This thinking must be based on integrated water resource management, participatory approaches to governance, and recognizing the economic and social aspects of managing water, with emphasis on the role of women. Full cost pricing offset by targeted subsidies for the poor will be needed. Everyone has a role to play: gov-

ernments as enablers and regulators, with communities and the private sector acting as engines of transformation on the ground.<sup>25</sup>

The UN system has an important role to play here in monitoring the hydrological cycle through the work of the World Meteorological Organization linked to the Global Environmental Monitoring System (GEMS) run by UNEP and the WHO. The WHO/UNICEF Global Drinking Water Supply Monitoring Programme also collects and analyses information on water supply and sanitation in developing countries. All of these, and other UN monitoring schemes, are essential in providing information to enhance our understanding of the water problem afflicting the globe. There is, however, no single UN agency with responsibility for water resource management and no single multilateral environmental agreement covering this topic. While our climate, forests, deserts, and biodiversity are protected by global conventions, our fresh water remains vulnerable. Perhaps in the run-up to the 2002 World Summit on Sustainable Development (Rio+10) more intensive debate will take place on this vitally important topic.

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10. UNCSD, note 6 above.
11. Revenga *et al.*, note 2 above.
12. *Ibid.*
13. S. Postal, *The Last Oasis: Facing Water Scarcity* (Washington, DC: Worldwatch Environmental Alert Series, 1997).
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21. Global Water Partnership, *Towards Water Security – A Framework for Action* (Stockholm: GWP, 2000), see <http://www.gwpforum.org>.
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23. Postal, note 13 above.
24. *Ibid.*
25. GWP, note 21 above.

## The importance of tropical atmospheric chemistry in global change research

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*Paul J. Crutzen*

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### The need for strongly enhanced research efforts in the developing tropics and subtropics

The main permanent atmospheric gases  $\text{N}_2$ ,  $\text{O}_2$ , and Ar together make up more than 99.9 per cent of the volume of the atmosphere. Nevertheless, earth's climate and the chemistry of the atmosphere are mainly determined by the remaining minor constituents, which because of their relatively low abundance are significantly affected by emissions from various human activities, in particular fossil fuel and biomass burning, chemical manufacturing, agriculture, and land-use changes. Most abundant among these remaining gases is carbon dioxide ( $\text{CO}_2$ ), which plays essential roles for earth's climate both as the source of carbon in the photosynthesis of plant matter and as a so-called "greenhouse gas" (GHG).  $\text{CO}_2$  does not, however, play any significant direct role in the chemistry of the atmosphere. Among the chemically active gases, methane ( $\text{CH}_4$ ) is most abundant, with a current volume-mixing ratio of about 1.7 ppmv (parts per million by volume), compared to a pre-industrial value of only about 0.7 ppmv. Its concentration in the atmosphere is still growing, although now at a slower rate (about 0.5 per cent per year) than in and before the 1980s. Methane plays important roles in the chemistry of both the troposphere and the stratosphere. It too is a GHG. The next most abundant gas of chemical and climatic importance is nitrous oxide ( $\text{N}_2\text{O}$ ). Chemi-

cally almost inert in the troposphere,  $\text{N}_2\text{O}$  is removed from the atmosphere by photochemical processes in the stratosphere. A fraction of the nitrous oxide is thereby oxidized to nitric oxide (NO), which, together with nitrogen dioxide ( $\text{NO}_2$ ), acts as a catalyst in an ozone-destroying cycle of reactions. Under natural conditions, the production of ozone ( $\text{O}_3$ ) by the photodissociation of  $\text{O}_2$  in the stratosphere is largely balanced by its catalytic destruction of  $\text{NO}_x$  (NO plus  $\text{NO}_2$ ). Because the abundance of  $\text{N}_2\text{O}$  is increasing by 0.2–0.3 per cent per year, partially due to the increased production of  $\text{N}_2\text{O}$  in soils as a consequence of the rapidly growing application of N-fertilizer, there is a growing anthropogenic effect on stratospheric ozone.

The most important anthropogenic impact on stratospheric ozone has been due to the emissions of a series of entirely man-made chlorine-containing (and bromine-containing) compounds, in particular  $\text{CFCl}_3$ ,  $\text{CF}_2\text{Cl}_2$ , the so-called CFCs, and  $\text{CCl}_4$ . Like  $\text{N}_2\text{O}$ , these gases are only removed from the atmosphere by photodissociation in the stratosphere, thereby producing Cl and ClO radicals, which, even more efficiently than  $\text{NO}_x$ , can break down ozone by catalytic reactions. Most surprisingly, the strongest depletions in stratospheric ozone have occurred over Antarctica during the springtime months of September and October. In the height region (14–21 km above the earth's surface) where until about two decades ago a maximum in  $\text{O}_3$  concentrations over Antarctica were naturally found, over the past 20 years and for decades to come ozone concentrations each spring have been and will be reduced to zero. This results in major depletions by factors of two to three in the total ozone abundance, and causes major increases in the fluxes of biologically damaging ultraviolet radiation at the earth's surface during spring.

### *Environmental surprise*

The possibility of such a catastrophic loss of ozone was not predicted and came as a total surprise to the scientific community, which had, up to the discovery of the "ozone hole", considered ozone concentrations at this altitude and in this high-latitude region to be conservative. However, due to the input of large amounts of industrial CFC gases and the development of particular meteorological and physicochemical conditions (temperatures below about  $-80^\circ\text{C}$ , leading to polar stratospheric cloud formation, followed by production of the ozone-destroying catalysts Cl and ClO by reaction on the surface of the cloud particles), rapid ozone destruction takes place. Because of the long residence times of the CFC gases in the atmosphere (50–100 years) the ozone hole will not be closed until the middle of the twenty-first century, despite the fact that the pro-

Table 12.1: Estimated rates of biomass burning in the tropics and subtropics

	Billion tonnes C/year
Slash-and-burn agriculture	0.5–1.0
Forest clearing	0.2–0.7
Savanna grass fires	0.3–1.6
Wood burning	0.3–0.6
Agricultural wastes	0.5–0.8
Total	1.8–4.7

duction of CFCs in the industrial, developed world stopped at the beginning of 1996. The totally unexpected appearance of the ozone hole in the part of the globe that is furthest away from the CFC release regions should be a warning. Precisely where the complex web of interacting processes in the global environment may be most sensitive to anthropogenic disturbances may be very hard to predict, and surprises cannot be excluded. Stresses on the environment should therefore be kept to a minimum.

Ozone in the atmosphere serves many functions. It acts as a filter against solar ultraviolet radiation, thereby protecting the biosphere from a large fraction of the biologically active solar UV-B radiation of wavelengths less than about 320 nm. About 90 per cent of all ozone is located in the stratosphere and 10 per cent in the troposphere. Both are substantially affected by human activities. Contrary to what has happened in the stratosphere, ozone concentrations in the troposphere have increased, not only in urban and suburban regions during photochemical smog episodes, but also more generally in regions that are influenced by anthropogenic emissions of the ozone precursors hydrocarbons, carbon monoxide (CO), and nitric oxide (NO). Affected is not only the mid-latitude zone of the northern hemisphere, but also the continental tropics and subtropics as a consequence of extensive biomass burning during the dry season. Ozone is deleterious to the biosphere, affecting human health and plant growth, including agricultural productivity. It is estimated that between 2,000 and 5,000 million tonnes of biomass are burned each year in the tropics and subtropics during the dry season, resulting in high emissions of light-absorbing smoke particles and ozone precursors (see Table 12.1). As a consequence, during the dry season high concentrations of ozone are produced in the rural areas of the tropics and subtropics (note that the so-called photochemical smog in the industrial regions is mostly an urban/suburban occurrence, whereas ozone production in the tropics is a rural phenomenon). In future, rapid population growth and enhanced agricultural and industrial activities in the developing world will lead to strong

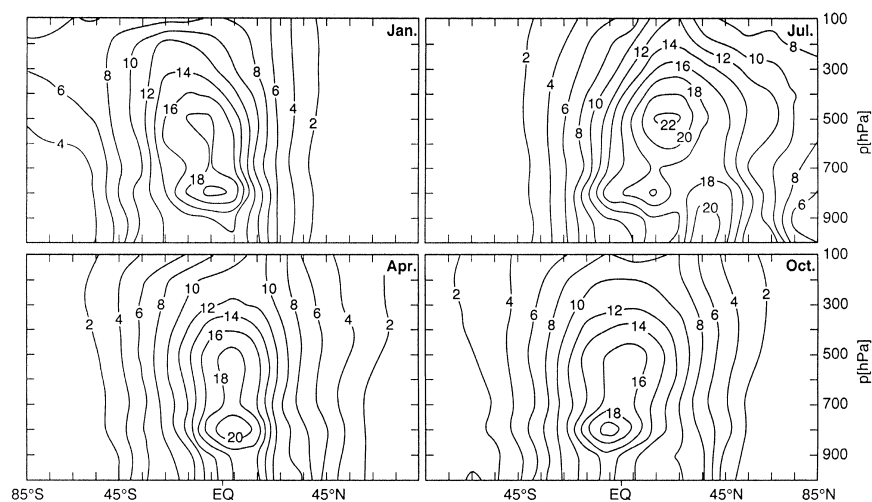


Figure 12.1: Calculated annual average OH concentrations as a function of latitude and season in units of 100,000 molecules per cubic centimetre

increases in air pollution, causing effects on health and climate parameters. The large potential for vastly increased pollutant loadings follows, for instance from the projected increase in the emissions of NO from 1.1 million tonnes N in 1990 to 7 million tonnes N in 2020 in the Indian sub-continent.<sup>1</sup> Similar developments can be expected in other parts of the developing world.

If their levels are not too high, however, the role of ozone and UV-B radiation in the troposphere is not only negative. In fact, they fulfil an essential function in “keeping the atmosphere clean” due to their indirect role in the removal of almost all gases that are emitted into the atmosphere by nature and mankind. This occurs mainly through reactions with hydroxyl (OH) radicals. These are largely formed by the absorption of solar UV-B radiation by ozone, leading to the production of excited O atoms which have enough energy to react with water vapour to produce hydroxyl (OH) radicals, the “detergents of the atmosphere”. Despite very low tropospheric concentrations, globally averaging as little as  $4 \times 10^{-14}$  by volume, it is highly reactive hydroxyl, and not abundant (21 per cent) molecular oxygen ( $O_2$ ), which is responsible for cleaning the atmosphere. Because of the maximum abundance of UV-B radiation and water vapour in these areas, the concentrations of hydroxyl and thus the removal of many gases from the atmosphere occur predominately in the tropics and subtropics (see Figure 12.1). A quantitative understanding of

the chemistry of the atmosphere therefore requires good knowledge of the chemistry of the tropics and subtropics.

### Focusing on the tropics and subtropics

Regarding the tropics and subtropics there exist major gaps in knowledge and observations of many key species in tropospheric chemistry – in the first place of ozone, but also of those species which determine the self-cleaning (or oxidizing) efficiency (largely determined by OH concentrations) of the atmosphere, such as CO, hydrocarbons, and NO<sub>x</sub>. It is not known whether the self-cleaning efficiency of the atmosphere will increase or decrease in the future. This will be largely determined by developments in the tropics. The continental tropics and subtropics are already substantially affected by mostly human-caused biomass burning. In future, agricultural and industrial activities will increase particularly strongly in these regions. The study of their influence on atmospheric chemistry (especially ozone and hydroxyl concentrations) and climate is an important task for the atmospheric chemistry community. This requires greatly enhanced research in the tropical world which must involve the participation of researchers from developing nations.

The present state of quantitative knowledge about particulate matter in the troposphere is in even worse shape than knowledge of the gas phase. The role of aerosol is manifold. Particulate matter influences the chemistry of the atmosphere by providing surfaces and liquid media for chemical reactions, which cannot take place in the gas phase. By the scattering and absorption of solar radiation, particulate matter plays a substantial role in the radiative properties of the atmosphere and, therefore, in the earth's climate. This influence is emphasized by the fact that atmospheric particles can serve as condensation and/or ice-forming nuclei. Recent studies have indicated the possibility that climate warming due to increasing levels of the greenhouse gases may have been substantially counteracted by the backscattering to space of solar radiation, both directly from the aerosol or indirectly by the increased albedo of clouds. It appears, indeed, that calculated and observed temperature trends agree better with each other when optical aerosol effects are included in global climate models, thus adding some credence to the significance of the aerosol-climate feedback. However, such conclusions are still based on rather weak grounds, again largely because of lack of knowledge about the physiochemical properties and distributions of atmospheric aerosol. In particular, most climate model runs were performed considering only sulphate aerosol, which is strongly derived from coal and oil burning.

However, several additional types of aerosol, which can likewise be influenced by human activities, are emitted to the atmosphere:

- sunlight-absorbing and sunlight-scattering smoke particles from fossil fuel and tropical and subtropical biomass burning;
- soil dust, largely from the subtropical deserts;
- organic aerosol, resulting from gaseous organic precursor emissions from vegetation, with large contributions from tropical forests;
- seasalt particles.

Clouds can provide major pathways for the chemical processing of natural and anthropogenic emissions. While this chemical cloud effect has been studied for a few major pollutants such as  $\text{SO}_2$ , there are many other soluble and reactive atmospheric constituents whose cloud-processing properties are largely unknown.

The lack of knowledge also extends to the interactions of gas-phase species with the aerosol. As an example, in all climate simulations the distributions of sulphate aerosols have been calculated, neglecting potential reactions of anthropogenic  $\text{SO}_2$  with the various types of aerosol. This may well mean that much of the sulphur which is emitted into the atmosphere may be deposited on pre-existing aerosol, such as soil dust and seasalt particles, instead of nucleating to new sulphate particles. If so, little additional sulphate particle formation could take place in regions with high emissions of pre-existing particles, implying that the sulphate cooling effect has probably been overestimated in most models. Neither the quantities of emissions nor the global distribution of the aerosol is even approximately known. However, one thing is clear: all types of aerosol play important roles for climate and the chemistry of the atmosphere. And again, the main gaps in knowledge are in the tropics and subtropics. What is needed most are measurements of the emissions and global distributions of the various kinds of aerosol, especially in the tropics and subtropics.

Closely connected to the climate and atmospheric chemistry aspects of global change are biosphere/atmosphere interactions, as many of the chemically and climatologically important trace gases are to a substantial degree emitted into, or removed from, the atmosphere by the biosphere. Besides  $\text{CO}_2$  and  $\text{N}_2\text{O}$ , one can especially mention  $\text{NO}$ ,  $\text{CH}_4$ , and reactive hydrocarbons which together have a substantial impact on  $\text{O}_3$  and  $\text{OH}$  concentrations and the ozone layer. They are increasingly impacted by human activities.

## Conclusions

It is urged that in future “global change” research efforts substantially more attention is given to the tropics and subtropics. This also requires

the involvement and training of local scientists to participate in joint field programmes. A strong scientific basis in this part of the world will in future not only benefit progress in science, but will also lead to greatly improved scientific inputs in political decision-making.

## Note

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## Energy requirements for the new millennium

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*Ingvar B. Fridleifsson*

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### Introduction

At the turn of the millennium, 2 billion people, a third of the world's population, have no access to modern energy services. World population is expected to double by the end of the twenty-first century. Economic development needs to continue, particularly in the South. This requires vast amounts of energy and vast amounts of money. During the 1990s, global energy capital expenditures have been over US\$200 billion per year. Interestingly enough, global annual government subsidies for conventional energy have constituted a similar amount.<sup>1</sup> One of the key issues to improve the standard of living of the poor is to make clean energy available to them at prices they can cope with. How can the energy requirements of this century, not to mention this millennium, be met?

The scarcity of energy resources forecasted in the 1970s did not occur. With technological and economic development, estimates of the ultimately available energy resource base continue to increase. It appears that economic development over the next century will not be constrained by geological resources. Environmental concerns, financing, and technological constraints appear more likely sources of future limitations.

An attempt will be made in this chapter to summarize the main findings of international commissions in recent years on how to meet the energy requirements of the twenty-first century. The main sources of information have been two books. First is the report of the World Energy

Council (WEC) published in 1993,<sup>2</sup> which followed the Brundtland Report.<sup>3</sup> The second main source of information is a book<sup>4</sup> presented at the World Energy Congress in 1998 and commissioned by the WEC and the International Institute for Applied Systems Analyses (IIASA); it gives the results of a five-year detailed study following in the footsteps of the WEC report.<sup>5</sup> Most of the data and figures in the present chapter were obtained from this book.

The aim of the WEC report<sup>6</sup> was to:

identify a realistic framework for the solution of regional and global energy problems, whereby adequate, sustainable energy at acceptable costs can be supplied to meet the needs of all people whilst achieving socially acceptable care and protection of the environment. It is to identify the realities, the real options and the agenda for achievement.

## Present energy situation

Since the dawn of humanity, man has used energy to make his life easier and more comfortable. Unfortunately, a third of the world's population are still at the level of using only fire for cooking and light. The majority, however, make use of different forms of energy to increase productivity and reduce the use of muscular power, for ease of transport, and for the general well-being of the people. Energy affects all aspects of modern life. There is a strong positive correlation between energy use per capita in a country and issues that we value highly, such as productivity per capita (Figure 13.1) and life expectancy (Figure 13.2). Similarly, there is an inverse correlation between energy use and issues such as infant mortality and illiteracy. It is of interest to note in Figure 13.2 that in the least developed countries a relatively small increment in energy use adds very significantly to the quality of life in these countries.

From regional analyses of energy use<sup>7</sup> it was found, not unexpectedly, that the first priority for the majority of the world's population is access to sufficient affordable energy. Some 70 per cent of the world's population live at a per capita energy consumption level one-quarter of that of Western Europe and one-sixth of that of the USA.<sup>8</sup> Table 13.1<sup>9</sup> shows key data from 1990 for the 11 regions of the world as regards world population, gross world product (GWP), global primary energy use, global energy-related net carbon emissions, and the approximate GDP per capita.

It is notable that in 1990, with just 5 per cent of the world's population, North America (Canada and the USA) accounted for 29 per cent of the GWP, 24 per cent of global primary energy use, and 25 per cent of global energy-related net carbon emissions. Sub-Saharan Africa, with 9 per cent

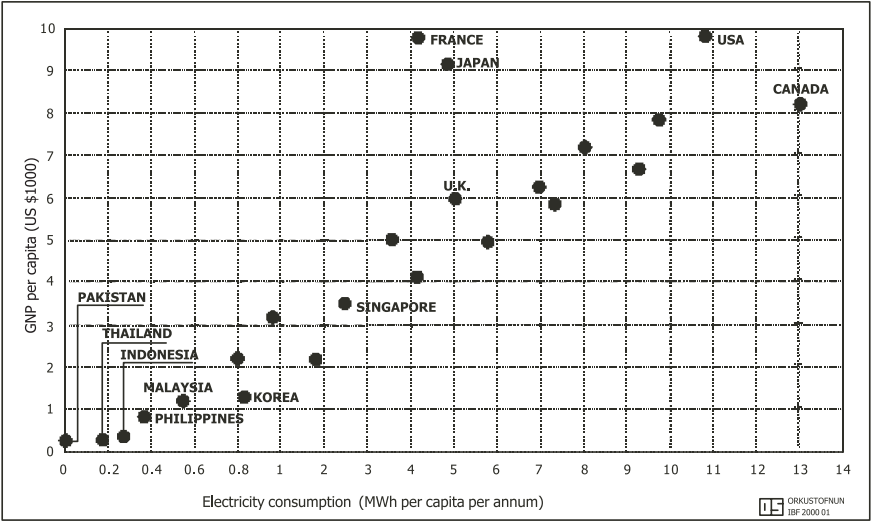


Figure 13.1: Electricity consumption and GNP per capita in selected countries

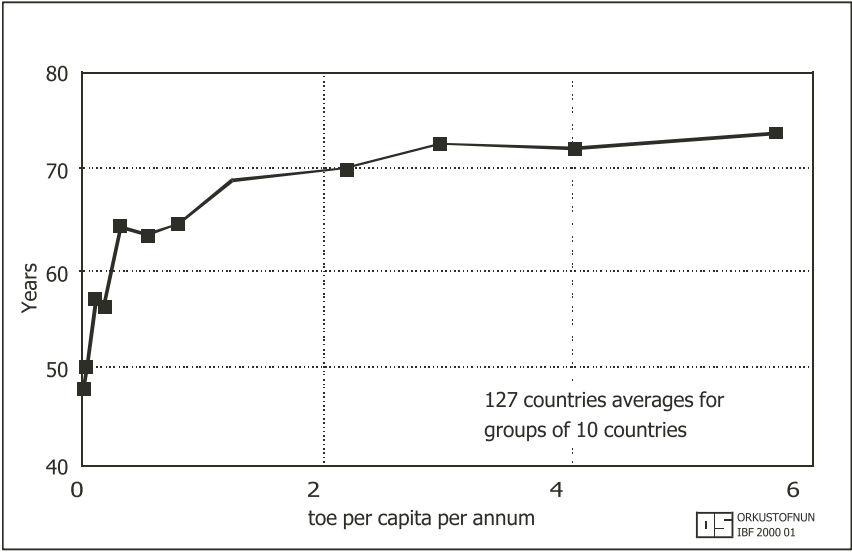


Figure 13.2: Life expectancy and energy use (from WEC)

Table 13.1: Key energy data from 1990 for the 11 regions of the world

	% world population	% gross world product	% global primary energy use	% global energy-related net carbon emission	GDP per capita US\$
NAM	5	29	24	25	~23,000
LAM	8.3	5.2	6.8	4.7	2,500
AFR	9	1	3	2.3	540
MEA	5	3	4	5	2,120
WEU	8	34	16	16	~17,000
EEU	2.4	1.4	—	4.8	2,400
FSU	5	4	—	17	—
CPA	24	2.3	11	12	—
SAS	20	2	4.9	3.2	334
PAS	8	3	4.7	3.5	1,500
PAO	2.7	16	6	6.3	~23,000

Notes:

NAM = North America.

LAM = Latin America.

AFR = Sub-Saharan Africa.

MEA = Middle East and North Africa.

WEU = Western Europe.

EEU = Central and Eastern Europe.

FSU = Newly independent states of the former Soviet Union.

CPA = Centrally planned Asia and China.

SAS = South Asia.

PAS = Other Pacific Asia.

PAO = Pacific OECD.

of the world's population, accounted for 1 per cent of the GWP, 3 per cent of global primary energy use (two-thirds from fuelwood), and 2 per cent of global energy-related net carbon emissions. South Asia, with 20 per cent of the world's population, accounted for less than 2 per cent of the GWP, 5 per cent of global primary energy use, and 3 per cent of global energy-related net carbon emissions.

The task of making energy available to the bulk of the people in the developing countries at prices they can cope with is certainly large. Still bigger is the task of providing *clean* energy to the developing countries as well as the industrialized nations and the countries of Central and Eastern Europe. And when we think that the world population is expected to double by the end of the twenty-first century, the task at hand for the peoples of the world is certainly such that many wonder how it can be met.

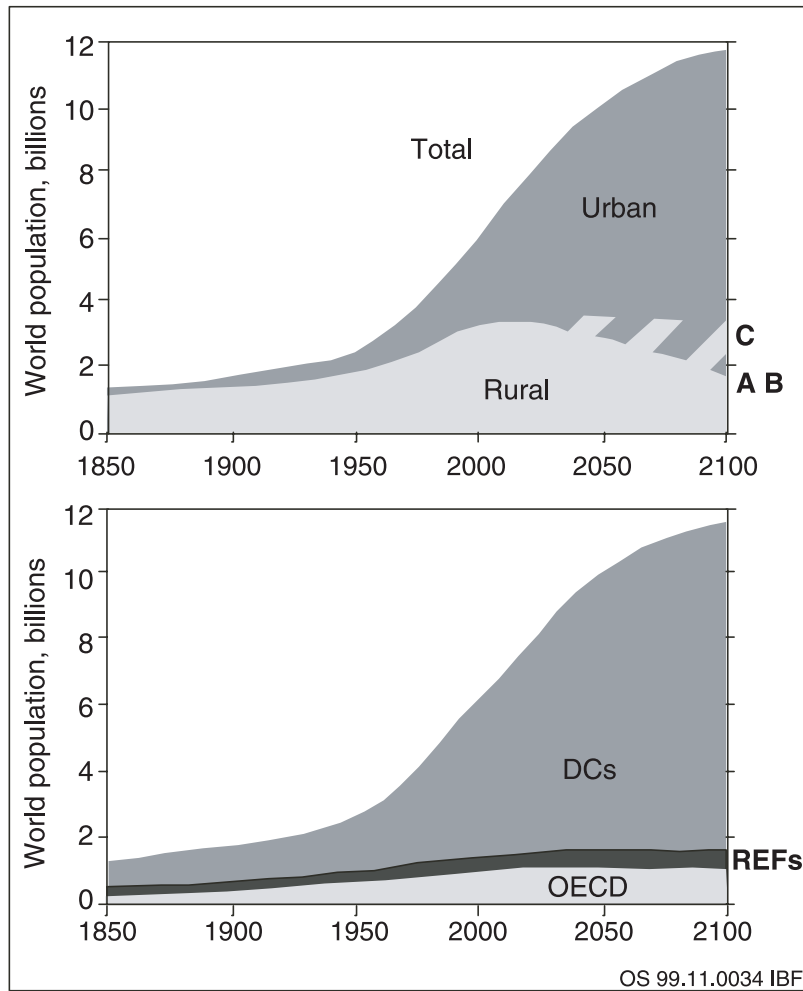


Figure 13.3: World population showing historical development from 1850 to 1990 and World Bank projections to 2100

Source: N. Nakicenovic, A. Grübler, and A. McDonald (eds), *Global Energy Perspectives* (Cambridge: Cambridge University Press, 1998).

### Population growth

Population growth is, of course, a central issue in studies of how to meet the energy requirements of the world. Figure 13.3<sup>10</sup> shows the historical development from 1850 to 1990 and World Bank projections to 2100.<sup>11</sup> Urbanization trends are based on UN estimates<sup>12</sup> and Berry.<sup>13</sup> The good

news in the 1992 World Bank and other global projections is that population growth is slowing down, although the consequences of the still-increasing population levels are alarming nonetheless. The next doubling of the world's population is expected to take much longer than the last one, which took only 40 years. The population is expected to rise from the present 6 billion to approximately 10.4 billion by 2100, according to the 1998 UN long-range projection (see also Chapter 7).<sup>14</sup> Virtually all of the population growth is expected to take place in the South. By 2100, the population of the USA, Canada, and the whole of Europe combined will drop to less than 10 per cent of the world total according to studies by the World Bank, IIASA, and the United Nations.<sup>15</sup>

By the year 2100, the presently categorized developing countries can be expected to account for about 80 per cent of the global energy demand.<sup>16</sup> Even then, energy per capita availability in the developing countries is likely to be far less than in the rest of the world – perhaps only 50–60 per cent of that in the OECD area by the same date. The WEC study suggests that by the end of the twenty-first century close to three-quarters of the world's population is likely to be urbanized, and the interim pressures on housing, sanitation, air and water quality, health care, and congestion are likely to have been intense. Energy systems geared to providing the comforts, motive power, and mobility that people seek from energy may have led to some profound changes. The challenge to urban transportation systems over that time frame is likely to have called forth some imaginative responses.<sup>17</sup>

### How to meet future energy requirements

The WEC study states that energy issues should be viewed in their total global perspective – social and institutional as well as economic and environmental. In particular, what people demand is not energy as such but the services which energy can provide – heating, cooling, cooking, lighting, mobility, and motive power. The WEC Commission developed three energy cases, each representing different assumptions in terms of economic development, energy efficiencies, technology transfer, and the financing of development around the world. These cases were developed to illustrate future possibilities. The main horizon year adopted was 2020.

The IIASA-WEC study expanded the WEC cases into six alternative scenarios. The principal focus is on the period between 2020 and 2050, but some results are also projected to 2100. Case A is basically a high-growth future in terms of income, energy, and technology. Case B has a more modest but perhaps more realistic growth scenario. Case C presents a “rich and green” future. It includes both substantial technological progress and unprecedented international cooperation centred explicitly on

Table 13.2: Characteristics of the three cases for the world in 2050 compared with 1990

	Base year 1990	Case A	Case B	Case C
Primary energy (Gtoe)	9	25	20	14
Primary energy mix (%)				
Coal	24	15	21	10
Oil	34	32	20	18
Gas	19	19	23	23
Nuclear	5	12	14	12
Renewables	18	22	22	37
Energy investment (US\$ trillion)	0.2	0.8	0.8	0.5
As % of GWP	1.2	0.8	1.1	0.7
Final energy (Gtoe)	6	17	14	10
Emissions				
Sulphur (MtS)	59	54	55	22
Net carbon (GtC)	6	12	10	5

Source: N. Nakicenovic, A. Grübler, and A. McDonald (eds), *Global Energy Perspectives* (Cambridge: Cambridge University Press, 1998).

environmental protection and international equity. The characteristics of the three cases for the world in 2050 compared with 1990 are shown in Table 13.2,<sup>18</sup> showing the primary energy mix, energy sector investments, and emissions.

All three cases provide for substantial social and economic development, particularly in the developing countries. They provide for improved energy efficiencies and environmental compatibility, and thus for associated growth in both the quantity and quality of energy services. To facilitate comparisons, all the cases assume the same population growth, with 10 billion people in 2050 and nearly 12 billion by 2100.

All scenarios except Case C approach the doubling of pre-industrial CO<sub>2</sub> concentrations that is the base for most climate calculations. In all scenarios except Case C, carbon concentrations continue to rise throughout the twenty-first century. Based on current knowledge, an increase of CO<sub>2</sub> concentrations to 600 ppmv by the end of the twenty-first century could lead to an increase in the mean global temperature of about 2.5 °C and a sea-level rise of up to half a metre. The scientific uncertainties of such estimates are, however, substantial.<sup>19</sup>

Case C is certainly the most challenging for the international community. It is optimistic about technology and geopolitics, but unlike Case A it assumes unprecedented progressive international cooperation focused explicitly on environmental protection and international equity.<sup>20</sup> It assumes a broad portfolio of environmental control technologies and policies, including incentives to encourage energy producers and con-

sumers to utilize energy more efficiently and carefully, “green taxes”, international environmental and economic agreements, and extensive technology transfer. It incorporates policies to reduce carbon emissions in 2100 to 2 gigatonnes carbon (GtC) per year, which is one-third of today’s level. One option is a carbon tax that gradually increases well above US\$100 per tonne of carbon in 2100, to a value comparable with average gasoline taxes in Western Europe at present.

Case A is divided into three scenarios: A1 (shown in Figure 13.4), which assumes gas and oil to provide nearly 20 per cent each of the primary energy in 2100, A2, which assumes coal to provide 40 per cent of the primary energy, and A3, which assumes fossil fuels being reduced to 30 per cent by 2100.

Similarly, Case C is divided into two scenarios: C1, in which nuclear energy is phased out and 80 per cent of the primary energy is provided by renewables, and C2, in which a new generation of safe nuclear reactors has been developed. Scenario C2 is shown in Figure 13.4.

The Kyoto Protocol of 1997 specifies emission limits for the OECD countries and the countries in transition to market economies (regions NAM, WEU, EEU, FSU, and PAO in Table 13.1). The IIASA-WEC study compared the energy-related carbon emission limits of these regions and concluded that in Case C all the regions are already well within their Kyoto limits in 2010, and heading toward yet lower emissions thereafter. Case B and Case A3 come close to being in compliance with the Kyoto Protocol.<sup>21</sup>

## The increased role of renewables

In all the scenarios, the peak of the fossil fuel era has passed.<sup>22</sup> Fossil energy consumption grows more slowly than total primary energy needs. Oil and gas are important transitional sources of energy in all scenarios, but their percentage share of total primary energy gradually declines throughout the next century. In absolute amounts, however, future oil and gas requirements are huge compared with current levels. By 2050 the highest scenarios imply increases in oil production of more than a factor of two and of gas production by close to a factor of five compared with current production levels. The role of coal is variable, from a revival in Case A2 and Case B to a decline in the other scenarios. In Case A1 (Figure 13.4) oil and gas maintain the highest market share of all scenarios and for the longest time. It may be worth recalling here that in long-term energy forecasts in the middle of the twentieth century, nuclear energy was expected to provide a major share of the energy requirements by year 2000!

Considerable progress is expected in the development of clean-fuels

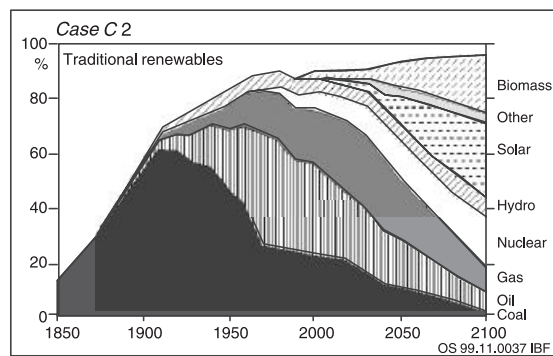
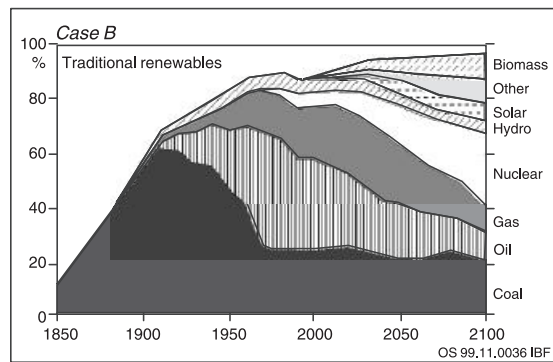
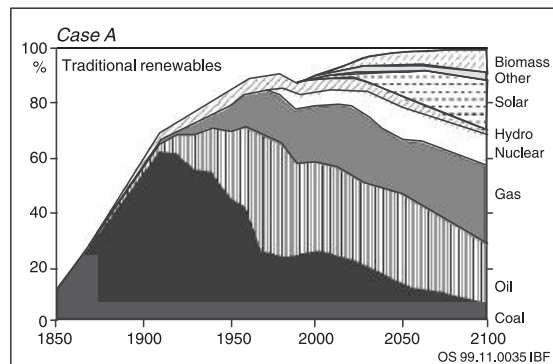


Figure 13.4: Evolution of primary energy shares – Historical development from 1850 to 1990 and in scenarios to 2100

Source: N. Nakicenovic, A. Grübler, and A. McDonald (eds), *Global Energy Perspectives* (Cambridge: Cambridge University Press, 1998).

technology. The development of fuel cells and the use of hydrogen as an energy carrier for transportation are also very important fields of research. The pace of such development is, however, difficult to quantify.

In all scenarios there is a significant expansion of renewables. Traditional uses of renewables (fuelwood and animal waste) are expected to be gradually replaced by high-quality energy carriers, including those from “new” renewable sources (such as modern biomass, solar, wind, and geothermal energy). Hydropower and traditional biomass are already important factors in the world’s energy mix, contributing about 18 per cent of the total world energy requirements, whereas the “new” renewables contribute only about 2 per cent of the world primary energy use.<sup>23</sup>

The “new” renewables are at a variable stage of development as yet. The period until 2020 is considered a very important transitional period for renewables in the energy market, especially as one of the potentially largest single contributors of the “new” renewables, namely solar energy for electricity production, is still not commercially competitive with conventional energy sources. “Modern” biomass, wind, and geothermal energy are, however, making relatively fast progress.<sup>24</sup>

The WEC Commission<sup>25</sup> estimated that the “new” renewables might in 2020 contribute 3–4 per cent of the total energy demand with minimum policy support and 8–12 per cent of the world energy demand with major policy support. Different opinions have been stated on the WEC Commission’s study on the potential role of the various renewable energy sources. An example will be given here regarding the role of hydropower and geothermal energy. Similar cases can probably be made for some of the other “new” renewables.

Björnsson *et al.*<sup>26</sup> made a special study of the potential role of hydropower and geothermal energy in the world energy scenario in 2020. Table 13.3<sup>27</sup> is divided into three parts, the first two of which are taken directly from the WEC Commission’s study.<sup>28</sup> The figures in the third part for hydro and geothermal are supplied by Björnsson *et al.* For traditional renewables, no policy support is envisaged, and for hydro major policy support is envisaged for “small hydro” only, according to the WEC. The figures for hydro in Table 13.3, however, refer to both “small” and “large” hydro.

Table 13.3 shows that major policy support can be expected to increase energy production from renewables in 2020 from 117 to 151 EJ/a, or by 29 per cent, according to the WEC,<sup>29</sup> and that the emphasis on hydro and geothermal advocated in Björnsson *et al.* could increase them from 117 to 181 EJ/a, or by 54 per cent. Production from geothermal would be increased by 276 per cent and that from hydro by 47 per cent over and above the “major policy support” figures given by the WEC. This is in line with the view expressed by Björnsson *et al.* that hydro and geothermal were given inadequate attention in the WEC study.

Table 13.3: Assumed primary energy production from renewables in 2020

Renewables	WEC				Björnsson <i>et al.</i> 1998	
	Minimum		Maximum			
	EJ/a	%	EJ/a	%	EJ/a	%
Traditional	55.6	47.6	55.6	36.9	55.6	30.8
Modern biomass	10.2	8.7	23.6	15.7	23.6	13.1
Solar	4.6	3.9	14.9	9.9	14.9	8.2
Wind	3.6	3.1	9.0	6.0	9.0	5.0
Oceanic	0.6	0.5	2.3	1.5	2.3	1.3
Geothermal	1.7	1.5	3.8	2.5	14.3	7.9
Hydropower	40.7	34.8	41.5	27.5	60.8	33.7
Total	117.0	100.0	150.7	100.0	180.5	100.0

Björnsson *et al.* concluded that:

- by vigorously developing the hydro and geothermal resources of the world over the next few decades, global emissions of carbon dioxide in 2020 from energy production and use can be reduced by some 10 per cent from the level estimated in Case B of the WEC 1993 study;
- there are ample undeveloped resources available for this;
- the environmental impacts of hydro and geothermal need not hinder their development;
- both energy sources possess a number of positive attributes from an operational point of view;
- they are generally cost competitive and involve lower financial risk than many other energy sources;
- accordingly, financing of the necessary investment, largely by private capital, should not be a serious obstacle.

Björnsson *et al.* conclude that hydro could contribute 61 EJ/a and geothermal 14 EJ/a, totalling 75 EJ/a, to the global primary energy supply in 2020, which is about 77 per cent higher than envisaged in Case B of the WEC study.

### The role of UN agencies

To meet the aim stated by the WEC Commission to supply adequate sustainable energy at acceptable costs to meet the needs of all people whilst achieving socially acceptable care and protection of the environment requires a concerted effort of all governments, international agencies, and business as well as the academic communities around the world. The UN system has a tradition for dealing with many of the key issues.

There are many areas of conflict on the horizon whichever of the scenarios is chosen to meet the future energy requirements of the world. Two energy sources, biomass and nuclear energy, will be taken as examples. All the scenarios involve a significant increase of use of biomass for energy production. Both agricultural food production and biomass production for energy require land. The IIASA-WEC study looked at the potential land-use conflict between agriculture and biomass energy. In Asia, for example, the land required for expanding agricultural production and achieving maximum biomass use would cover the entire arable land area by 2100. The study concludes that the future of biomass will in all likelihood be constrained, particularly in densely populated regions such as Asia.

All but one of the energy scenarios involves a great increase in the use of nuclear energy. Problems associated with the safety of nuclear plants and the storage and disposal of nuclear waste are of much public concern internationally. This has led many industrialized countries to stop building new nuclear plants. One of the world's most technologically developed countries, Sweden, decided after a national referendum to phase out by 2010 the nuclear plants which have provided over 40 per cent of its electricity since the mid-1980s. In addition to nuclear safety and waste disposal problems, international concern about the proliferation of weapons-grade fissile materials will increase as more and more nations install and operate nuclear plants. That will create conflicts of a political nature, but these are still closely related to the energy debate.

UN agencies have played a major role in the development of the energy sector, in particular in the developing countries. UNDP projects have been key elements in the early stages of energy projects in a large number of countries on all continents, not least in the development of renewable energy sources such as hydropower and geothermal energy. The World Bank has been instrumental in financing and in conducting quality control on major energy projects around the world. But it is not least in the arena of international agreements on the sustainable use of energy resources that the UN agencies have a major role to play.

It is clear that no single energy source is going to take over from the polluting fossil fuels. The integration of local energy sources in individual countries and regions into grids that make use of the best local and imported energy is important if we are to find solutions to regional and global energy problems. In the developing countries in particular, the expansion of the energy sector must go hand in hand with building infrastructure, social development, and economic growth. A high-technology energy industry cannot thrive in countries characterized by ox-carts.

Technology transfer from the industrialized to the developing countries is certainly of major importance. One of the main constraints of energy development in many countries is a shortage of skilled manpower

with practical experience. The developing countries rely heavily on foreign consultants, but in many cases the consultants have to work for a considerable time in a given country to be able to adjust their expertise to the special characteristics of the energy resources and infrastructure in that country. It is very important to ensure that the experience obtained during the development and implementation of major energy projects is maintained within the country when the consultants depart. Assigning fully qualified local experts to work as counterparts with the foreign consultants is the best way to achieve this. Many of the local experts need to receive a part of their training internationally. The energy sector can only work in true harmony with other sectors in a country when local competence has been secured in key functions at national level.

We must not, however, forget the need to educate the decision-makers who have to deal with the most complex matters in international fora. UN agencies might consider increasing the opportunities for multidisciplinary training of young professionals who have been chosen by their nations and by the international agencies to deal with the complex issues at hand for mankind. To meet the energy requirements of the world in the future can only be done in harmony with meeting many other human requirements. The common goal is to improve the quality of life of the peoples. All nations, the united nations of the world, are involved.

## Acknowledgement

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## Notes

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8. *Ibid.*
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## Global food security for tomorrow

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*Monkombu S. Swaminathan*

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### Introduction

The concept of food security has evolved during the last three decades to include not only food availability, but also economic access to food and the biological absorption of food in the body. Adequate per capita availability of food is a function of the balance between food production on the one hand, and growth in population and purchasing power on the other. Urbanization enhances the consumption of animal products and thereby increases the demand for feed grains and fodder. The “green revolution” of the 1960s and 1970s helped developing countries to gain a breathing spell during which they could attempt to achieve a balance between population growth and the population-supporting capacity of their ecosystems. In spite of the success of the population-stabilizing efforts in many developing countries, UN projections indicate that the global population may range from 8 to 10 billion by 2050 (see Chapter 7). This chapter will discuss the challenge of achieving sustainable advances in farm productivity, leading to an “ever-green revolution” in the fields of farm families with smallholdings.

### The challenge of sustainable agriculture

On the eve of the UN Conference on Environment and Development held in Rio de Janeiro in June 1992, the Union of Concerned Scientists

published an open letter entitled “World Scientists’ Warning to Humanity”, which stated that “human beings and the natural world are on a collision course”. The letter stated further: “if not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know.”<sup>1</sup> This warning was signed by over 1,600 scientists from leading scientific academies in 70 countries – the list included 104 Nobel laureates.

Colborn, Dumanoski, and Peterson Myers in their book *Our Stolen Future* and James Morgan in his book *The Last Generation* also provide a picture of the grim future that awaits the generations yet to be born if we lose further time in restoring harmony between humankind and nature.<sup>2</sup>

It is now widely realized that the genes, species, ecosystems, and traditional knowledge and wisdom that are being lost at an increasingly accelerated pace limit our options for adapting to local and global change, including potential changes in climate and sea level. The Hadley Centre of the UK Meteorological Office has recently predicted that even if governments cut greenhouse gas emissions, sea levels may rise by at least two metres over the next few hundred years. If the global community can limit emissions up to 550 ppm, which is twice the pre-industrial levels and 50 per cent above today’s level, about 2 billion persons can be saved from water shortages, low crop yields, and increased coastal flooding, especially in India and Africa.<sup>3</sup>

The *Global Biodiversity Assessment* published in 1995 by the United Nations Environment Programme estimates that about 13 to 14 million species may exist on our planet. Of these, fewer than 2 million species have so far been scientifically described.<sup>4</sup> Invertebrates and micro-organisms are yet to be studied in detail. In particular, our knowledge of soil micro-organisms is still poor. Also, biosystematics as a scientific discipline is tending to attract very few scholars among the younger generation.

Another important paradigm shift witnessed in recent decades in the area of management of natural resources is a change in the concept of “common heritage”. In the past, the atmosphere, oceans, and biodiversity used to be referred to as the common heritage of humankind. However, recent global conventions have led to an alteration in this concept in legal terms, as discussed in Chapter 16. Biodiversity is now the sovereign property of the nation in whose political frontiers it occurs. Further, the trade-related intellectual property rights (TRIPS) provisions of the World Trade Agreement have made it mandatory to cover products of genetic improvement with either patents or *sui generis* methods of intellectual property rights protection. Under the UN Convention on the Law of the Sea, nations with coastal areas have access to a 200-mile exclusive economic zone (EEZ). The Climate Convention and the Kyoto Protocol

provide for both common and differentiated responsibilities to countries. Thus, the global commons can be managed in a sustainable and equitable manner only through committed individual and collective action among nations.

A Chinese proverb warns: “If you do not change direction, you will end up where you are headed.” Since we do not want to reach where we are presently headed, what change of course should we bring about in the field of agriculture?

### Ecstasy and agony

We can look back to the twentieth century with pride and satisfaction on the revolution which the farmers of the Asia Pacific region have brought about in contemporary agricultural history. While we can and should rejoice about the past achievements of our farmers, scientists, extension workers, and policy-makers, there is no room for complacency. We will face several new problems.

- First, an increasing population leads to increased demand for food and reduced per capita availability of arable land and irrigation water.
- Second, improved purchasing power and increased urbanization leads to higher per capita food grain requirements due to increased consumption of animal products.
- Third, marine fish production is tending to become stagnant and coastal aquaculture is facing environmental problems.
- Four, there is increasing damage to the ecological foundations of agriculture, such as land, water, forests, biodiversity, and the atmosphere, and there are distinct possibilities for adverse changes in climate and sea level.
- Finally, while dramatic new technological developments are taking place, particularly in the field of biotechnology, their environmental, health, and social implications are yet to be fully understood.

Since land and water are shrinking resources for agriculture, there is no option except to produce more food and other agricultural commodities from less per capita arable land and irrigation water. In other words, the need for more food has to be met through higher yields per units of land, water, energy, and time. It would therefore be useful to examine how science can be mobilized to raise further the ceiling to biological productivity without associated ecological harm. It will be appropriate to refer to the emerging scientific progress on farms as an “ever-green revolution”, to emphasize that the productivity advance is sustainable over time since it is rooted in the principles of ecology, economics, social and gender equity, and employment generation.

The green revolution has so far helped to keep the rate of growth in food production above the population growth rate. The green revolution was, however, the result of public research, supported by public funds. The technologies of the emerging gene revolution, in contrast, are spear-headed by proprietary science and can come under monopolistic control. How then can we harness the power of frontier science to promote an ever-green revolution on our farms?

The twentieth century began with the rediscovery of Mendel's laws of inheritance. It ended with the moving of specific genes across sexual barriers with the help of molecular mapping and recombinant DNA technology. The impact of science and technology in every field of crop and animal husbandry, inland and marine fisheries, and forestry has been profound. To illustrate this, take the improvement of wheat production in India as an example.

Wheat cultivation started in the Indian subcontinent over 4,000 years ago. Wheat kernels have been found in the Mohenjodaro excavations dated 2000 BC. From that period up to August 1947, when the colonial rule ended, Indian farmers developed the capacity to produce 7 million tonnes of wheat per year. Between 1964 and 1968, when semi-dwarf strains containing the Norin 10 genes for dwarfing were introduced in irrigated areas, wheat production rose from 10 million tonnes to 17 million tonnes per year. In other words 4,000 years of progress were repeated in four years.<sup>5</sup> In 1998–1999, wheat production in India exceeded 70 million tonnes, a tenfold increase in about 50 years.

Similar progress has been made in improving the production and productivity of rice, maize, soyabean, potato, and several other crops, as well as in farm animals in many developing countries around the world. New technologies supported by appropriate services and public policies as well as international scientific cooperation have helped to prove doomsday predictions wrong and have led to the agricultural revolution (the green revolution) becoming one of the most significant of the scientific and socially meaningful revolutions of the twentieth century. A world without hunger is now within our reach. A hunger-free world will be possible if every nation pays concurrent attention to improving food availability through ecologically sustainable methods of production, to enhancing economic access to food by promoting a job-led economic growth strategy, and to ensuring the biological absorption of food in the body through the availability of safe drinking water and environmental hygiene. Steps should also be taken to enlarge the base of the food security basket by revitalizing the earlier tradition of cultivating a wide range of food crops.<sup>6</sup>

Emerging farming technologies will be based on precision farming methods leading to plant-scale rather than field-scale husbandry. Farming

will be knowledge intensive, using information from remote sensing, geographical information systems (GIS), global positioning systems (GPS), and information and computer technologies. Farmers in industrialized countries are already using satellite imagery and GPS for early detection of diseases and pests, and to target the application of pesticides, fertilizer, and water to those parts of their fields that need them urgently. Among other recent tools, the GIS methodology is an effective one for solving complex planning, management, and priority-setting problems. Similarly, remote-sensing technology can be mobilized in programmes designed to ensure drinking water security.

Biotechnology will play an increasingly important role in strengthening food, water, and health security systems. Recent widespread public concern relating to genetically modified organisms (GMOs) stresses the need for more effective and transparent mechanisms for assessing the benefits and risks associated with transgenic plants and animals. An internationally agreed biosafety protocol on the lines recommended in Article 19 of the Convention on Biological Diversity (CBD) is an urgent necessity. Biotechnology companies should agree to the labelling of GM foods in the market. All food safety and environmental concerns should be addressed with the seriousness they deserve. Broad-based national commissions on genetic modification for sustainable food and health security could be set up, consisting of independent professionals, environmentalists, representatives of civil society, farmers' and women's organizations, mass media, and the concerned government regulatory authorities. This will help to assure both farmers and consumers that the precautionary principle has been applied, while approving the release of GM crops.

Biodiversity-rich but biotechnology-poor countries are adversely affected by the prevailing non-adherence to the ethical and equity principles of benefit sharing contained in Articles 8 and 15 of the CBD. The primary conservers, largely tribal and rural women and men, live in poverty, while those who use their knowledge and material for producing commercial products become prosperous.<sup>7</sup> The invaluable contributions of tribal and rural families to genetic resource conservation and enhancement have been recognized in the Convention on Biological Diversity. Yet the political will to implement the equitable benefit-sharing provisions of the CBD is lacking. We need to take urgent steps to recognize and reward the contributions of indigenous communities to providing material of great importance to global food and health security. The three validated findings presented in Table 14.1 will be adequate to stress the significance of traditional knowledge and conservation efforts in helping to mitigate handicaps caused by ageing in human beings.

Article 27(b) of the TRIPS component of the World Trade Agreement

Table 14.1: Plant medicine and human health

Country/region	Plant	Property
India	<i>Trichopus Zeylanicus</i>	Helps to remove fatigue
India	<i>Bacopa monnieri</i>	Helps to improve memory
Tropical Africa	<i>Prunus Africana</i>	Treatment for benign prostatic hyperplasia

is now under review. All nations should agree to incorporate in this clause the ethics and equity principles enshrined in Articles 8(j) and 15 of the CBD. The World Intellectual Property Organization (WIPO) should help to make the principles of ethics and equity the foundation of intellectual property rights.

### Emerging scientific revolutions

Fortunately, as we enter the new century we are experiencing three major revolutions in science and technology which will influence agriculture and industry in a fundamental manner. It will therefore be appropriate to make a brief reference to them (see also Chapter 6):

- the gene revolution – which provides a molecular understanding of the genetic basis of living organisms, as well as the ability to use this understanding to develop new processes and products for agriculture, industry, the environment, and for human and animal health;
- the ecotechnology revolution – which promotes the blending of the best in traditional knowledge and technology with frontier technologies such as biotechnology, space and information technologies, renewable energy, and new materials;
- the information and communication revolution – which allows a very rapid growth in the systematic assimilation and dissemination of relevant and timely information, as well as a dramatically improved ability to access the universe of knowledge and communicate through low-cost electronic networks.

In principle, these three types of advances – when coupled with improvements in management and governance – greatly increase the power of a scientific approach to genetic improvement, the integrated management of natural resources and ecosystems, and the management of local and regional development strategies. These scientific revolutions seem to be proceeding at an ever-increasing pace, with most of the action occurring in industrialized nations. Also, new discoveries of great relevance to sustainable food and health security are coming under the purview of pro-

proprietary science, since they are covered by intellectual property rights. It is the duty of organizations devoted to public good to mobilize recent advances in science and technology for meeting the basic needs of the economically and socially underprivileged sections of the human family.

### *The gene revolution*

The past 10 years have seen dramatic advances in our understanding of how biological organisms function at the molecular level, as well as in our ability to analyse, understand, and manipulate DNA molecules, the biological material from which the genes in all organisms are made. The entire process has been accelerated by the Human Genome Project, which has poured substantial resources into the development of new technologies for working with human genes. The same technologies are directly applicable to all other organisms, including plants. Thus, a new scientific discipline of genomics has arisen. This discipline has contributed to powerful new approaches in agriculture and medicine, and has helped to promote the biotechnology industry.

Several large corporations in Europe and the USA have made major investments in adapting these technologies to produce new plant varieties of importance for large-scale commercial agriculture. The same technologies have equally important potential applications for addressing food security in the developing world.

The key technological developments in this area are:

- genomics – the molecular characterization of species;
- bioinformatics – databanks and data processing for genomic analysis;
- transformation – introduction of individual genes conferring potentially useful traits into plants, trees, livestock, and fish species;
- molecular breeding – identification and evaluation of useful traits by use of marker-assisted selection, which greatly speeds up traditional breeding processes;
- diagnostics – identification of pathogens by molecular characterization;
- vaccine technology – use of modern immunology to develop recombinant DNA vaccines for improved control against lethal diseases of animals and fish.

One example from the work of MS Swaminathan Research Foundation (MSSRF) scientists will illustrate the value of these new tools. As a part of the anticipatory research programme to meet the consequences of sea-level rise arising from global climate change, genes responsible for conferring the ability to withstand sea-water intrusion were identified in a few mangrove species through molecular mapping. They have been transferred to annual economic plants through recombinant DNA technology.

The sequencing of the genome of rice (*Oryza sativa* L.cv.Nipponbare)

by an international consortium supported by the Rockefeller Foundation and the International Rice Research Institute will permit allele mining for all genes of rice and possibly for other cereals. Thus, altogether unforeseen opportunities for creating novel genetic combinations have been opened up.

As mentioned earlier, there are widespread public concerns about the potential adverse impact of GMOs on human health, biodiversity, and the environment. The concerns are particularly great in food crops and not in the area of medicinal biotechnology. There is particular apprehension about food allergenic reactions. In order to take advantage of recombinant DNA technologies without associated harm to human or ecological health, it is important that every country has in place suitable institutional structures and regulations for biosafety, bioethics, and bio-surveillance. At the same time, there is need for greater investment of public funds for public goods research, the results of which can reach the unreached. For example, in food and agriculture there is a need to strengthen both national agricultural research systems and the international agricultural research centres supported by the Consultative Group on International Agricultural Research (CGIAR).

### *The ecotechnology revolution*

Knowledge is a continuum. There is much to learn from the past in terms of the ecological and social sustainability of technologies. At the same time, new developments have opened up new opportunities for developing technologies that can lead to higher productivity without adverse impact on the natural resource base. Blending traditional and frontier technologies leads to the birth of ecotechnologies with combined strengths in economics, ecology, social and gender equity, employment generation, and energy conservation.

There is need to conserve traditional wisdom and practices, which are often tending to become extinct.<sup>8</sup> The decision of the World Intellectual Property Organization to explore the intellectual property needs, rights, and expectations of holders of traditional knowledge, innovations, and culture is hence an important step in widening the concept of intellectual property. The Food and Agriculture Organization (FAO) has been a pioneer in the recognition of the contributions of farm families in genetic resources conservation and enhancement by promoting the concept of “farmers’ rights”. Like the WIPO, the UPOV (Union for the Protection of New Varieties of Crops) should also undertake the task of preparing an integrated concept of breeders’ and farmers’ rights. The UPOV itself should be restructured to become a union for the protection of farmers’ and breeders’ rights.

*The information technology revolution*

New communication and computing technologies are already influencing life on our planet in a profound manner.

- Access to the Internet, once the digital divide is overcome, can provide unrestricted low-cost access to information as well as highly interactive distance learning. The Internet will not only facilitate interactions amongst researchers, but also greatly improve their ability to communicate effectively with the potential users of their research knowledge.
- Computing makes it possible to process large-capacity databases (libraries, remote sensing, GIS data, and gene banks) and to construct simulation models with possible applications in ecosystem modelling, preparation of contingency plans to suit different weather probabilities, and market variables.
- The software industry is continuously providing new tools that increase research productivity and create new opportunities for understanding complex agro-ecosystems.
- Remote sensing and other space satellite outputs are providing detailed geographic information useful for land and natural resources management.

The promotion of ecotechnology development and dissemination, the effective adoption of integrated systems of gene and natural resources management, and the effective harnessing of information technologies should become essential elements of the “science and technology for basic human needs” movement.

## Conclusion

To sum up, there is no time to relax on the food production front. It is obvious that we have to produce more, but produce it in such a manner that there is no adverse environmental or social impact. Water is likely to be a serious constraint in many countries, as discussed in Chapter 11. Hence, priority should be given to developing and spreading efficient water management techniques, including aquifer management, wastewater recycling, and conjunctive use of surface and rain water. Future agricultural production technologies should be based on the foundation of integrated natural resources management.

The world can produce enough food for a population of 10 billion by harnessing the untapped yield reservoir existing even with currently available technologies, if greater attention is given to soil health care and water management. We must defend the productivity gains so far made, extend the gains to semi-arid and marginal environments, and work for

new gains using blends of frontier technologies and traditional ecological prudence. The problem of generating adequate purchasing power to enable families living in poverty to have economic access to food will still confront us. This is where a job-led economic growth strategy based on micro-level planning, micro-enterprises and micro-credit will be of great help. Integrated production and post-harvest technologies and on-farm and off-farm employment strategies will be needed to provide livelihoods for all in rural areas.

With increasing globalization of economies, it will be necessary to agree at the international level that safeguarding and strengthening the livelihood security of the poor should be a major goal of liberalized trade. The current trend of an increasing rich-poor divide will have to be stopped if social conflicts are not to increase. Thus, we are really walking a tightrope in terms of achieving sustainable solutions to the problems of population, poverty, and environmental degradation. The various international conferences held during the past decade, starting with the Children's Summit held in New York in 1990 and ending with the World Conference on Science held in Budapest in 1999, have indicated possible solutions to these problems. It is now for nations to act individually and collectively so that the uncommon opportunities opened up by science and technology and democratic systems of governance for creating a food-secure world are not missed.

According to the Asian Development Bank, over 900 million out of the 1.3 billion persons currently living on a per capita daily income of less than US\$1 are in Asia.<sup>9</sup> One in three Asians is poor. Poverty is the main cause of food insecurity at the level of individuals today. Most of the new jobs or livelihood opportunities in Asia will have to come from the on-farm and rural non-farm sectors. Macroeconomic policies at the national and global levels should ensure that they help to strengthen micro-enterprises supported by micro-credit. Technology and trade should become allies in the movement for a more equitable world. It would be useful if the UNU could organize a virtual college, together with the WTO, on the theme of "trade as an instrument for poverty eradication". This would help to strengthen the livelihood security of the poor, so very essential for food security. Through appropriate blends of technologies and public policies we now have uncommon opportunities for achieving the human quest for a hunger-free world by the year 2020.

## Notes

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## Land degradation: A global and regional problem

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*Adel El-Beltagy*

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Today, about 1.9 billion hectares of land worldwide (an area approximately the size of Canada and the USA) are affected by land degradation.<sup>1</sup> Each year about 21 million hectares of land become so degraded that crop production is uneconomic and about 6 million hectares of land are irreversibly lost for production.<sup>2</sup> These figures have serious implications for the future of humanity. The livelihoods of more than 900 million people in some 100 countries are now directly and adversely affected by land degradation.<sup>3</sup> Unless the current rate of degradation is slowed and reversed, the food security of humanity will be threatened and the ability of poor nations to increase their wealth through improved productivity will be impeded. Land degradation can be observed in all agroclimatic regions on all continents. Although climatic conditions, such as drought and floods, contribute to degradation, the main causes are human activities. Land degradation is a local problem in a vast number of locations, but it has cumulative effects at regional and global scales. The countries of the developing world, and particularly those in the arid and semi-arid zones, are the most seriously affected.<sup>4</sup>

Land degradation is a universal problem. We must not be misled into thinking it is restricted to agricultural land or agricultural livelihoods, although it is in these areas that the effects of land degradation are immediately apparent and most dramatic. In the developing world, land degradation is a symptom of underdevelopment. It results from a combination of social and economic factors, such as poverty and inequitable distribution of the land resources, and inappropriate land-use systems and

farming methods. In the dry areas, these factors are exacerbated by climate and the fragility of ecosystems.<sup>5</sup> Because agriculture in the poorer countries is the principal employer of labour and generator of income, the effects of land degradation are often disastrous and lead to famine and political turmoil.<sup>6</sup>

### Food security

As discussed in Chapter 14, food security is directly related to the ability of land to support its populations.<sup>7</sup> Should land degradation continue at the current rate, many regions will never achieve food security. Current estimates predict that food production in the developing world will have to double in the next 30 years to meet the needs of growing populations. Much of this population expansion is urban,<sup>8</sup> not least because declining quality and productivity of the land is driving migration to cities upwards in almost every country of the world. The increased demand for food in both rural regions and urban centres cannot be met by expanding the agricultural areas because – in most cases – the remaining land is not suitable for sustainable crop production.<sup>9</sup> At the national level, intensification is often the only viable solution for meeting food demand, and the best land on which to intensify production is inevitably the highest-quality land.

This intensification can increase food production in the higher-potential areas, simultaneously strengthening the regional and national economies and providing more food on a regional or national scale. However, it is the land users in the marginal areas who are most seriously affected by land degradation. The opportunity for intensification on their land is low. This often leaves the users and owners of the more marginal land with no prospect of developing their limited land resources, and therefore frequently dependent on government subsidies. Such policies condemn the people living in low-potential areas to continued reliance on outside funds and a low standard of living.<sup>10</sup> This problem of food security for the future is of prime importance. It is a challenge, even for the most favourable and productive agricultural areas. If land degradation, especially in marginal areas, is not stopped – and, if possible, reversed – food yields in many parts of the world will decline.<sup>11</sup>

### The nature of land degradation

An examination of the nature of land degradation is required. In general terms, land degradation is the decline of the natural land resources,

commonly caused by improper use of the land.<sup>12</sup> It is also defined as the reduction or loss of the biological or economic productivity and complexity of land, resulting from human activities.<sup>13</sup> The more degradation is allowed to advance, the more difficult and costly it gets to restore the land to its original state. If the land becomes irreversibly degraded, its potential for agricultural production is permanently lowered or even destroyed.<sup>14</sup> Land degradation encompasses soil degradation and the deterioration or loss of vegetation and landscape functions. These components do not act separately, but are intrinsically linked to each other and may act as mutual supporters and accelerators of the degradation process.

Soil degradation has physical, chemical, and biological dimensions.<sup>15</sup> The breakdown of soil structure affects the buffering, filtering, and moisture-retaining properties of soils. This breakdown may be caused by factors such as inappropriate tillage practices<sup>16</sup> and excessive trampling by grazing animals. Lack of replenishment of plant nutrients and organic matter leads to soil fertility decline and decreased biomass production.<sup>17</sup> Yields will decrease, and the protective groundcover on cropland and rangeland will be reduced. On bare, unprotected soils, the processes of soil erosion remove large quantities of fertile topsoil.<sup>18</sup> In sloping areas, water-induced erosion processes dominate, while on flatter land and in drier environments wind-induced erosion can be significant. Soil removed by erosion processes is permanently lost, as are the nutrients and organic matter that are essential components of soil fertility. The increase in suspended matter in the atmosphere from wind erosion enhances greenhouse effects, thereby contributing to global warming.<sup>19</sup> In irrigated areas, inappropriate irrigation and drainage practices and the use of saline water lead to soil salinization. Without appropriate preventive measures, salt-sensitive crops will disappear and be replaced by increasingly salt-tolerant plant species until the land is rendered unsuitable for any useful crop production.<sup>20</sup>

Prolonged overgrazing of rangeland and of crop residues in harvested fields weakens and degrades the vegetation, and results in the depletion of plant diversity and reduced biomass production.<sup>21</sup> The latter in turn leads to reduced soil organic matter and the deterioration of the soil structure.

The most significant landscape function affected by land degradation is the hydrologic balance of catchments. Unfavourable soil-surface characteristics of degraded lands and a lack of adequate plant cover lead to reduced surface retention and infiltration, and to higher surface runoff. This results not only in reduced soil moisture content in the soil profile, but also increased rates of soil erosion.<sup>22</sup> Especially in dry areas, reduced available soil moisture in turn negatively affects plant

growth and thus further reduces biomass production and protective soil cover.

Depending on climate, landforms, and land use, land degradation takes different forms and manifestations in different regions and land-use systems. It is the result of complex causes and processes, and oversimplification of the environmental, climatic, and land-use factors involved can lead to the incorrect conclusion that rehabilitation of degraded land is easy and simple. Typical forms of degradation, predominant under certain conditions, can be identified.

- In the more humid areas, rainfall can occur in heavy erosive showers. Especially in the sloping areas of the tropics and subtropics, these may cause serious soil erosion by runoff. High rainfall can also lead to high rates of nutrient leaching and soil acidification in many tropical regions.
- In the drier environments, vegetation cover is sparse on large areas of land. In these areas, strong seasonal winds can cause serious wind erosion, especially where the terrain is flat and the lack of standing plants or residues – due to overgrazing – leaves the soil vulnerable to the wind.
- In irrigated agriculture, inappropriate soil and water management practices and irrigation and drainage methods, and the use of marginal-quality waters without proper management lead to the accumulation of salts in the soil. Plant growth is affected by this soil salinization, which has disastrous effects on the productivity of the land in areas where irrigation is essential for crop production.
- On rangelands, overgrazing will not only reduce the overall protective soil cover but also lead to a long-term change in the composition of the vegetation. Plant biodiversity will change over time, unpalatable species will dominate, and total biomass production will be reduced. The degradation of vegetation affects millions of people in the traditional range-grazing lands of the drier part of the globe.

In principal, the main causes and initiators of land degradation processes are inappropriate land-use practices that fail to take into account the capabilities and the limitations of the land. Depending on the dominant processes, land degradation displays different forms and effects on the land's productivity. All forms of land degradation will ultimately lead to a reduction of the soil's fertility and productivity.<sup>23</sup> The general overall effect is reduced plant growth, leading to loss of protective soil cover and increased vulnerability of soil and vegetation to further degradation. To break this self-accelerating cause-and-effect chain, it is important to have a good understanding of the underlying causes of land-use practices leading to degradation.

## Degradation in dry areas

Land degradation in drylands is usually described as 'desertification', because it ultimately leads to the formation of deserts. More than 47 per cent of the earth's land surface (6.1 billion hectares) is dryland. These lands are the habitat and source of living for about a fifth of the world's population. The marginal drylands of the world experience enormous pressure on the environment, caused by human mismanagement and recurrent droughts.<sup>24</sup> The resilience of dryland resources (soil and vegetation) is usually low, and this is why drylands are particularly susceptible to degradation.<sup>25</sup> In the drylands, two forms of degradation are dominant: in the rangelands and rain-fed arable areas, wind erosion is characteristic, while in the irrigated areas soil salinization due to unsuitable irrigation-farming practices can be widely observed.

### *Soil erosion*

Drylands are more susceptible to wind erosion than any other form of degradation because soils tend to be dry, poorly structured, and sparsely covered by vegetation.<sup>26</sup> A major limitation in these areas is the lack of adequate and reliable rainfall to support a sustainable and protective land cover against the erosive forces of the wind. According to earlier studies, wind erosion only reaches threatening proportions when people disturb the balance of the ecosystem.<sup>27</sup> This is particularly true for areas where, due to growing population pressure, traditional practices of fallowing are replaced with slash-and-burn practices and continuous cultivation. Wind erosion measurements by the International Centre for Agricultural Research in the Dry Areas (ICARDA) in Syria revealed soil losses of up to 60 tonnes per hectare (which is equivalent to a loss of approximately 3 mm soil depth) during the windy season (from July to September) in areas which had been opened for rain-fed cereal cultivation without erosion protection measures.<sup>28</sup>

In regions where little or no nutrient amendments are used to replace the rapidly declining soil-nutrient pool, soil cover is declining rapidly, leading to wind erosion and land degradation. Wind erosion causes loss of soil depth, organic matter, clay content, nutrients, and indigenous seeds. Downstream effects, such as an increase of atmospheric dust, reduced visibility, blockage of roads and railway lines, and health problems are also causing considerable concern. In Morocco, for example, ICARDA research revealed that seasonal hot winds not only carry away soil but also affect crop performance through excessive evapotranspiration and the direct effect of the wind.<sup>29</sup> In the oasis regions, sand

encroachment affects wells, palm-tree plantations, and traditional irrigation systems.<sup>30</sup> In the southern and south-western parts of Tunisia, the movement of sand dunes poses a major threat to farmland.<sup>31</sup> Over considerable parts of Central and Western Asia and North Africa, large areas of the traditional semi-nomadic rangelands, the steppe, are being opened for barley cultivation. The consequent removal of the vegetation cover has exposed the soil surface, leading to the loss of the fine fertile fraction of the shallow soils through wind erosion. This has led to a tremendous decline of soil productivity and the quality of life of the land users.<sup>32</sup> An important conclusion of ICARDA's research is that there is no easy solution to reduce wind erosion in rain-fed annual cropping systems.<sup>33</sup>

### *Salinization*

The second most important land degradation process, after soil erosion, is soil salinization. Salt-affected soils occur in different environmental, geographical, and topographical conditions and they exist in all five continents. Salinization processes are dynamic, and Buringh<sup>34</sup> estimated that, due to salinization, the world loses at least 1.6 million hectares of fertile arable land every year. Two types of soil salinization can be distinguished. Primary salinization is a natural process caused by movement of saline water in the soil originating from saline springs, saline seepage, or groundwater upward fluxes (capillary movement), driven by climatic dryness, or due to coastal influence in surrounding lands. Secondary salinization, on the other hand, is caused by improper human activities, such as excessive or inadequate irrigation and the lack of proper drainage.

Salinity – whether primary or secondary – is undoubtedly affecting the livelihoods of many people. Ghassemi, Jakeman, and Nix<sup>35</sup> estimated that about 20 per cent – or about 45.4 million hectares – of irrigated land is salt affected. The 1977 United Nations Conference on Desertification estimated that 22 million hectares of the world's irrigated lands are waterlogged.<sup>36</sup> Rhoades estimated that, in the Near East region, 83.4 million hectares of land (not necessarily arable land) are salt affected.<sup>37</sup> The major effects of salinity on soil properties are swelling of clay soils, dispersion of fine soil particles, crust formation, and a decrease in water movement within the soil profile. The amount of sodium adsorbed to the soil particles and the amount of sodium in the irrigation water greatly influence the degree to which salinity affects soil properties. Options for the management of salinization are determined by the salinity or sodicity of the soil and the water. The major determinant for reclamation of salt-affected soils is the presence and functioning of proper drainage systems, which are critical for adequate leaching of accumulated salts.

The improper use of marginal waters for agriculture may also accelerate land degradation. Since the use of marginal-quality water is picking up in dry regions, sustainable strategies to facilitate such practices are needed. ICARDA, in collaboration with the national agricultural research systems (NARS) and other national and regional organizations, is working on developing such strategies.

### *Biodiversity depletion*

The dry areas of the world are the origin of a large number of globally important cereals and food legumes, such as barley, wheat, faba beans, and lentils. In these dry areas, biodiversity is being seriously depleted through the degradation of natural habitats, the intensification and expansion of cultivation, and overgrazing in natural rangelands. The result is that now, wild relatives of crop species grow only in marginal areas such as field borders, shallow soils, and remnants of natural vegetation. The type of habitat supporting these precious resources is either patchy or degraded. Traditionally, farming systems have maintained diversity in order to preserve stability of production under the climatic, disease, and pest risks. Wild relatives of crops, such as wild fruit trees for example, used to be left growing on field borders to supply seeds or rootstocks for planting. The replacement of traditional farming systems with modern agricultural practices is endangering these wild relatives. Increased food demands and market forces have encouraged the replacement of the locally adapted varieties of both fruit trees and field crops with high-yielding cultivars, hence hampering the gene pools of these crops. Over time, genetic diversity has eroded and agriculture is now based on fewer and fewer crops, and fewer and fewer genotypes. This genetic uniformity and the tendency to monocropping make them more vulnerable to disease and pest epidemics and weather extremes. Addressing the loss of biodiversity in these areas is therefore of global importance.

In dry areas, the depletion of biodiversity is most clearly visible in the degraded natural rangelands, which lose their productivity quickly due to heavy grazing pressure and inadequate grazing management. To manage the natural vegetation and plan the rehabilitation of degraded range areas efficiently, ICARDA has implemented a rangeland monitoring project, integrating the use of satellite imagery, field surveys, and geographic information systems. This project enables the estimation of biomass (feed) availability. Through a participatory approach and in collaboration with the pastoral communities and government authorities, adequate range-grazing schemes can be developed which will protect the plant resources of the rangelands.<sup>38</sup>

For periods of low feed availability on the rangelands, additional feed resources need to be available. In a collaborative project with Jordan, Syria, and Iraq, ICARDA has developed feed blocks from agro-industrial by-products, such as straw, poultry litter, olive-seed cake, beet pulp, date pulp, etc. These feed blocks are now being produced by the private sector in these countries and contribute significantly to the protection of the range resources at critical periods; they also generate additional income.<sup>39</sup>

For severely degraded rangelands, reseeding has shown to be a feasible option to restore plant productivity and biodiversity. Over the past six years, ICARDA has developed and improved range reseeding systems using a range-pitting machine, which is economic and can cover large areas in a short time. The systems are based on trapping the scarce rainfall near the seeds so that the plants have sufficient moisture concentrated at their roots for their early development. Seeds of locally adapted range species are used.<sup>40</sup> With these systems, large areas of severely degraded rangelands have been put back to productive use.

### The cost of land degradation

It is difficult to detail the economic losses resulting from land degradation. At the global level, it is estimated that the direct costs in terms of annual income forgone in areas directly affected by land degradation are about US\$44 billion per year. The indirect economic and social costs suffered outside the affected areas, including the displacement of people affected by loss of productive land resources, and coupled to losses to national food production, may be much greater.<sup>41</sup> For example, the social damage, the damage to future generations of people, and the loss of biodiversity cannot be estimated in monetary terms.<sup>42</sup> In addition, it is difficult to estimate the costs of dealing with the environmental refugees who have lost their homes and economic base in degraded lands. Not only do they add to the pressure on the resources in their refuge areas, but they are also responsible for invoking degradation there.<sup>43</sup>

Any costing of land degradation must include the cost for the reclamation of degraded land – the reversal of degradation. The options and requirements for reversing degradation depend on the degree of degradation. The earlier that degradation processes are recognized and reversed, the more efficient and cost-effective is the rehabilitation. As land degradation and rehabilitation are also very location-specific, there is no universally valid estimate of cost per unit area of land degraded or reclaimed.<sup>44</sup> Another important cost factor is the off-site effect costs. These

include the siltation of dams and watercourses that reduces the economic life of irrigation systems and power stations, and dust emissions that affect public transportation (roads and railways) and are health hazards.<sup>45</sup> In the USA, it has been estimated that the off-site costs of degradation may be 45 times greater than the direct cost of the loss of the land's productivity.<sup>46</sup>

### The global concern

Global concern about land degradation has grown mainly because of an increasing trend towards responsibility on the part of the global community – industrialized and developed – to secure a decent life for all world citizens; and the direct global effects of land degradation beyond national and regional boundaries. Through the emission of greenhouse gases and changes in the ecosystems that contribute to the reduction in carbon sinks, it contributes to climate change. It contributes to the depletion of biodiversity, directly through the degradation and destruction of lands, and indirectly by accentuating the need to expand cropping into natural forests and rangelands. It affects water resources through river and reservoir sedimentation and the change in the hydrological cycles of degraded catchments.<sup>47</sup> These global concerns open up the possibility of international cooperation in land degradation control. The direct and immediate causes, nature, and perception of land degradation are site-specific. Conventional approaches to land conservation and rehabilitation are local. Now, as land degradation poses a threat to the sustainable welfare of many people across geopolitical boundaries, it is a cause for regional and global concern.

### *Impact of globalization*

Globalization of trade and the removal of barriers for the movement of commodities and information in response to economic growth have important implications for the future sustainability of present land-use systems. Farmers, pastoralists, and other agricultural users of land resources may be guided more by considerations of immediate economic return than by longer-term concerns for resource husbandry, conservation, and sustainable production practices. However, globalization of information and knowledge systems may heighten awareness of the need for environmental protection and bring international attention to bear on rehabilitation and preventive measures at the local level. The world community has witnessed within the past decade a significant manifestation of con-

cern for environmental health, and a reversal of alarming trends in land degradation through landmark conventions on biodiversity, desertification, and climate.

### *Key medium- and long-term policy challenges*

What are the key challenges from a policy perspective? How can global conventions be made more effective by policy reforms? What policy elements can encourage sustainable land-use practices that are of benefit to poor people? Improvements in land use need the interest of all involved individuals and groups. A multilevel stakeholder approach for the planning process is essential to obtain socially balanced results, in terms of economic and ecological goals. All stakeholders – from the land-user level to the policy-maker level – should take part in a broad participatory process to identify problems, constraints, needs, interests, and aims. On the basis of this process, options and priorities for action should be negotiated.

National policies affect land users directly, and many governments integrate environmental, economic, and social concerns into the national planning process. National policies on sustainable land use can help to induce the necessary political, institutional, and economic changes. There is a need for coherent natural resources policies and frameworks that support regional autonomy and delegation of responsibility for natural resources management to the communal and local levels. They should also support and enforce the productive, sustainable use of the natural resources in local communities. Medium- and long-term policy changes require the creation of incentives for affected land users who are not able to invest in and sustain land rehabilitation measures.

- A secure land tenure system assuring long-term access to land and also allowing inheritance by following generations<sup>48</sup> is of great importance, because many of the investments necessary to maintain land quality and productivity are very long term.
- Land users in affected areas must have the financial capacity to make necessary investments for proper land husbandry. A re-evaluation of market prices is required to ensure fair and adequate valuation of agricultural goods and products.
- Alternatively, land users can become “land wardens” who take care of the land and its functions on behalf of society at large and are paid for their services from public funds.

An important role should be given to the *in situ* preservation of plant biodiversity and maintenance of the genetic pool. These practices have to be based on reliable public development policies, and governments will

have to accept these as “overhead costs” for maintaining environmentally sustainable land quality as a general service to society.

*Addressing the challenges at national and international level*

In areas endangered by degradation, the land is being severely overused and will not be able to sustain growing population pressures without further – possibly irreversible – degradation. This will seriously affect the livelihoods of people and may lead in the long run to social conflict and unrest. As degradation, rehabilitation, and social and economic development are tightly interdependent, several pathways are suggested to address the challenges on national and international levels.

At the national level:

- direct intervention in the affected areas;
- the development of non-agricultural employment opportunities;
- population planning to ensure population densities compatible with the population-carrying capacities of the region.

At the international level:

- mobilization of intellectual, institutional, and financial resources;
- greater efforts to implement provisions of international conventions;
- support to successful interventions at local levels that can be replicated across wider locations.

The disparities that exist among countries in terms of their natural resources, economic status, and educational level should be reflected in policies and action plans to be implemented.<sup>49</sup> This refers in particular to land ownership, population planning, and nature conservation policies. The policies and strategies must be directly linked to the use of and access to the natural resources by the land users and other stakeholders. The involvement of informal and formal institutions in land rehabilitation and sustainable land use can only be sustained if they are accepted and actively supported by the land users. This implies that local norms and values must be respected and indigenous knowledge accepted. The development process among stakeholders will be enhanced by better information exchange and improved knowledge of land users' limitations, needs, options, and visions with respect to sustainable land use.<sup>50</sup>

*The role of the United Nations*

There are organizations and initiatives at the international level which are concerned with land degradation and its control. In the UN system, the FAO, UNEP, and UNDP are the main stakeholders. These organizations have gained significant expertise and experience with land degradation at the regional and global scales. They are development-oriented

institutions contributing to global development mainly through global resource inventories, collection and provision of environmental and socio-economic data, and the assessment of global trends.

Because of the increasing significance of environmental degradation and its negative effects and impacts on the long-term ability of land to produce food and fibre for the future – especially in the marginal areas with high population pressures – the United Nations has established global conventions, including the Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD), and the Framework Convention on Climatic Change (UNFCCC). A large number of UN member countries have signed these conventions. This is a sign of increasing national concern about degradation and the need for countries, in cooperation with fellow UN member states, to address degradation at the national level with international cooperation and support. The aim of these conventions is to facilitate and foster interstate and regional cooperation for the sustainable management of fragile environments at the international scale. All these conventions emphasize global solidarity and initiate action programmes on sustainable land management.<sup>51</sup> However, these global conventions have three major deficiencies: they are far from the world of local land users; they have been poorly financed to date; and there is little coordination between their action plans at the local level.<sup>52</sup>

These conventions could coordinate eco-regional approaches to land rehabilitation and management, and to basinwide watershed development, combined with land-use planning towards sustainable land management. Although the CBD and the Ramsar Convention are undertaking separate cooperative activities – the river basin initiative for example – few cooperative agreements include the UNCCD as one of their partners. The reason for this lack of coordination and policy coherence among conventions is not a problem that hovers over land degradation alone. In fact, as will be discussed in Chapter 17 by Akiko Domoto, there is a need for a more holistic approach to environmental governance in general.

The Global Environment Facility (GEF) is a funding mechanism of the United Nations. It is specifically designed to facilitate the tackling of environmental problems – such as climate change, biodiversity depletion, and international waters – on a global scale, addressing tasks beyond the responsibility and capacity of single nation-states. This facility provides funding to cover the incremental cost of additional measures whose expected effects will go beyond state boundaries to generate global benefits.<sup>53</sup> Previously, land degradation control activities were not directly eligible for funding by the GEF. However, recent developments with the GEF signal the opening up of the institution to cover land degradation

problems more evenly. An important focus of GEF-funded projects is the participation and cooperation of land users as main stakeholders in environmental management.<sup>54</sup>

*The role of the CGIAR in research and technology development*

The causes and effects of land degradation are complex. The fight against it cannot be won at the land-user level alone. Holistic approaches will have to be developed that, besides implementing direct biophysical measures on the land, take into consideration the living conditions and the socio-economic setting of the rural areas and all the external forces and constraints directly and indirectly linked to the pressure on the land and its use. Solutions do not lie in the direct influence of the land user alone, but to a large extent in the general framework within which rural people live and have to produce to survive. This framework is largely determined by the state and its policies. General policy frameworks should emphasize and favour environmental conservation, encourage good stewardship of the land, and provide the scope and opportunities for agricultural development.

Research into degradation processes, their underlying causes, and their long-term effects and consequences on the land and the environment should be solution-oriented. The study of the processes of degradation should not be a purpose unto itself, masking the need to develop solutions that will lead to resource-protecting, productive, and sustainable land utilization.<sup>55</sup> Therefore, within the context of the land-use system, the term “research” is more appropriately replaced with the term “technology development”. Technology development encompasses packages of measures within the context of the land-use system, and has a spatial dimension. It involves components of traditional research, exchange of knowledge, and testing under “real-world” conditions, and implies the involvement of all stakeholders crucial for the appropriate management of the land.

To lead and assist technology development, the CGIAR – a World Bank initiative – has established research centres throughout the developing world whose aim is to support national institutions in the development of improved and adapted sustainable land-use technologies. In collaboration with national research and development institutions, these research institutes have had a significant impact on the development of improved land-use practices in many regions.

Each of these institutes has a particular mandate for research and technology development related to the improvement of the livelihood and the natural resource environment of rural people in developing countries. Some institutes have regional mandates (such as drylands,

humid tropics, or semi-arid areas), some are commodity-oriented (for example rice, potatoes, wheat, and maize), and some have thematic mandates (such as food policy, agroforestry, livestock, forestry, or aquatic resources). Over the past decades, these institutes have become centres of excellence in their fields of specialization. The comparative advantages of these institutes lie mainly in their high level of expertise, excellent research facilities, good regional knowledge and experience, and their independence from local governments. This makes them ideal partners for cooperation with local research and extension institutions (national agricultural research and extension services – NARES). Through partnerships with CGIAR centres, many NARES have carried out research on improvements to land use and the livelihood of rural people. The centres' role in capacity building for NARES research and extension staff has been highly successful. Through training programmes, NARES have become more qualified – and thus independent – to address environmental problems of national concern. Besides cooperation with NARES, excellent intercentre collaboration has been developed to complement capacities and experiences in tackling specific problems of regional and global significance. This intercentre collaboration also encompasses the involvement of NARES at the national levels. The main mechanisms of intercentre cooperation are consortia and eco-regional initiatives.

For the drylands, ICARDA has developed an approach to sustainable land management based on the principles of holism, integration, and participation. ICARDA has shown that addressing single components of a degrading land-use system will not solve land degradation. Only holistic approaches which address the entirety of the landscape and the land-use system will have a chance of success. The multidisciplinary dimension of land degradation also calls for integration. Only integrated approaches for research and cooperation will lead to success. Land degradation is intrinsically linked to the land users and the institutions and other parties directly or indirectly involved in land use. ICARDA's experience has shown that all these parties must be involved in solving land degradation problems. Therefore, only participatory approaches will be successful. Recently, ICARDA with the NARES of Jordan, Lebanon, the Palestinian Authority, and Syria have launched a project funded by the GEF and the UNDP that promotes community-driven conservation of agrobiodiversity. The focus is on 17 crop species (cereals, legumes, and fruit trees) and their wild relatives, for which the Near East region constitutes an important centre of diversity. The participation of the local communities is the main thrust of this project.

Important principles of intercentre cooperation are stakeholder participation, a focus on policy and institutional issues, consideration of equity concerns, interdisciplinarity, use of local knowledge systems,

acknowledgement of scale dependencies, and awareness of productivity expectations. The outputs are economically viable, socially acceptable, and environmentally sound technologies, improved methodologies and diagnostic tools, improved indicators for degradation and sustainability, decision-support systems for generating, testing, and extrapolating land management options, and improved frameworks for information exchange and policy dialogues.<sup>56</sup>

There are four main consortia that aim at the conservation and enhancement of land and water resources and the prevention of land degradation. The Combating Nutrient Depletion Consortium focuses on the conservation of soil fertility through improved nutrient management practices. The Managing Acid Soils Consortium focuses on the rehabilitation of degraded acid savannas using agro-sylvo-pastoral technologies. The Managing Soil Erosion Consortium develops acceptable land management practices that minimize soil erosion and its off-site impacts on catchment scales. The Optimizing Water Use Consortium focuses on crop water-use efficiency and water harvesting in semi-arid areas of North and sub-Saharan Africa and in West Asia. Each of these consortia addresses problems of global importance, initially focusing on a single eco-region and eventually expanding to other areas with similar constraints and problems. An important overall aim is to exploit synergies between the different consortia through standardized methods and information exchange.<sup>57</sup>

Presently, there are four eco-regional initiatives relevant to sustainable land management. The Desert Margin Initiative for Sub-Saharan Africa involves three centres. Its objective is to promote innovative and action-oriented dryland management research to arrest land degradation in the region. The Alternatives to Slash-and-Burn Programme aims at modifying and developing land-use systems and technologies that lead to sustainable alternatives to slash-and-burn agriculture and the reclamation of degraded land. Research sites are located in eight countries in Latin America, South-East Asia, and sub-Saharan Africa. The initiative is implemented by nine international research centres. The African Highlands Initiative is a consortium of nine international centres working in five African countries. The main objective is to improve the nutritional security and income of the communities in the densely settled highlands by developing productive land-use systems and practices which protect the fragile ecosystem and prevent further degradation of the land resources. The Consortium for the Sustainable Management of the Andean Region is an eco-regional initiative for four Andean countries focusing on the management of soil and water resources and of agro-biodiversity for the purpose of enhancing productivity and protecting the environment from further degradation.

The contribution of the CGIAR and its collaborating national institutions, especially through the consortia and eco-regional initiatives, has had and will continue to have a significant impact on the management of natural resources in fragile, degraded environments. The centres cannot solve land degradation *per se*, but they are able to show suitable pathways for managing land resources and they have an important function in advising governments on the policy guidelines that put the land user in a central position as manager or steward of the land. The land user may cause and accept degradation, but is also capable of productive and sustainable use of the land resources if the general conditions of rural livelihood are conducive to adequate land care. Another important function of the centres is to provide decision-makers with decision-support systems that will help not only to detect hazards of land degradation but also show pathways (avenues) for productive sustainable land management at the local, national, and regional scales.

## Conclusions

The problem of land degradation is not new. However, the magnitude of degradation demands collective action at various levels of society. The present extent and complexity of land degradation processes, their causes, and effects, need the attention of all players, from the local to the global levels. The first objective should be learning from each other's experience and giving transparency to the "lines of thought" of all stakeholders, from the directly affected land users to the global community at large. This will reveal reasons behind actions – or resistance to actions – at the various levels, and help with developing appropriate land husbandry strategies and technologies.

A major precondition for partnership is that the stakeholders (at all levels) need to have incentives – in the form of a benefit – to use land rehabilitation measures and efforts to achieve sustainable land management. These benefits can be monetary – through stabilized or increased land productivity – social, or idealistic. The potentials for such mutual benefits can only be identified and understood if all the players get together in fora to discuss land degradation and plan jointly supported actions for its control. Because of the wide diversity of stakeholders, a "common language" is needed to facilitate communication and minimize misunderstanding. Because of the different types and levels of interest, partnerships will take place on layers of "maximum common interest and benefit". These will normally be arranged along spatial units and at different scales. In a spatial hierarchy – from local to global level – stakeholders who are close to each other will have a high degree of

communality in terms of socio-cultural congruence and economic and biophysical constraints, aims, and opportunities. This will make them potentially good partners in development.

The problem of land degradation is best dealt with by prevention of the onset of degradation in the first place. However, these solutions must be within the conditions, constraints, and opportunities set by the larger context provided for by the government, society, and the environment.

Science and technology on their own cannot solve land degradation problems. In the ICARDA experience, strong partnerships are crucial preconditions for success, and these partnerships must be based on an accepted common philosophy. People must work together in the mutual understanding that only collectively will they achieve their aim of sustainable land management.

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## Global governance of biological diversity

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*A. Hamid Zakri*

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### Introduction

Biological diversity or biodiversity refers to the variability among living organisms from all sources including terrestrial ecosystems, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity at three levels, namely genetic, between species, and of ecosystems. Maintaining biodiversity is important because of the intrinsic value of nature but also for the reason that it supplies critical human needs for new medicines, food crops, fibre, and fuelwood, and provides essential services such as water purification and carbon storage. Biodiversity is therefore critical to sustainable development.

Yet recent human activities are eroding this biological capital at an alarming rate. Humans today annually mobilize approximately 40 per cent of the total primary production on land. More than 60 per cent of the world's major fisheries will not be able to recover from overfishing without restorative actions. Natural forests continue to disappear at a rate of some 14 million hectares each year. The magnitude of human impacts on ecosystems, combined with growing human population and consumption, mean that the challenge of meeting human demands will grow.

The underlying causes of loss of biodiversity stem from changes in relationships towards nature; the growth in human population and natural resource consumption; the impact of global trade; economic systems that fail to value the environment and its resources; and inequity in the own-

ership, management, and flow of benefits from both the use and conservation of biological resources.<sup>1</sup>

### Global initiatives on biological diversity

The loss of biodiversity has been a major preoccupation of the global scientific community for several decades. However, the initiatives taken by the World Conservation Union (IUCN), in particular its Commission on Environmental Law, since the early 1970s and throughout the 1980s gave institutional backing to the worldwide concern about the erosion of biological diversity.

The United Nations Conference on the Human Environment in Stockholm in 1972 granted the issues of biodiversity political and legal legitimacy at an international level, and emphasized the link between development and conservation.

In 1983 the United Nations General Assembly established the World Commission on Environment and Development (WCED), and in a landmark publication entitled *Our Common Future*, released in 1987,<sup>2</sup> the WCED pointed out that for “sustainable development” to be achieved there is a need to integrate environmental considerations into economic programmes. The WCED brought to the public domain the critical issues of biodiversity loss and conservation, which had for a long time been confined almost exclusively to scientific and technical discussions.

The United Nations Environment Programme (UNEP) took the global concerns regarding the management of biodiversity several steps further. Its governing council proposed strong international measures to protect biodiversity and in June 1987 established an ad hoc Working Group of Experts on Biological Diversity. After holding three sessions between November 1988 and July 1990, it was transformed by the governing council of UNEP into the ad hoc Working Group of Legal and Technical Experts on Biological Diversity. In 1991 the Group of Legal and Technical Experts was re-established and named the Intergovernmental Negotiating Committee for a Convention on Biological Diversity (CBD). It was this intergovernmental body that carried through the actual negotiation of the text of the convention.

### The Convention on Biological Diversity

#### *The negotiating process*

The process of negotiation lasted from March 1991 to May 1992. The CBD was meant to be part of the agenda of the United Nations Confer-

ence on Environment and Development (UNCED) scheduled to take place in Rio de Janeiro in June 1992.<sup>3</sup> Hence despite some difficult and at times confrontational moments in the five formal sessions of 10 working days each, there was a sense of urgency prevailing that the treaty needed to be concluded.<sup>4</sup>

According to Ambassador Vicente Sanchez, the chairman of the negotiating committee, the process that led to the adoption of the convention was initiated with the perception – particularly among developed countries – that it would be an all-encompassing convention on the conservation of species: a convention on parks and reserves. This notion proved to be unsustainable right from the start, and the discussion began evolving to include aspects of the complex environment/development interface. Consequently, as negotiations progressed, the character of the proposed convention was modified, and the process became much more complicated than had originally been planned. Certain questions and issues became central aspects of the negotiations.

- The cost of taking measures to conserve biodiversity versus the cost of not taking any such measures.
- Access to genetic resources and the different possibilities of regulating this access.
- Whether the focus should be only on wild species or whether it should include both wild and domesticated species.
- Access to and transfer of technology – including biotechnology – which must be considered for conservation and rational use of the components of biodiversity.
- Eventual sources and methods of funding the costs of the measures that would have to be agreed upon.
- The consequences and impact of biodiversity conservation on trade and development.

More than 150 governments signed the CBD during the Earth Summit in June 1992, and it entered into force on 29 December 1993 when the minimum number of 30 countries had become parties to it. By the end of 1999 some 175 countries had ratified the convention, making it one of the most widely ratified international treaties on any environmental issue.

#### *Fundamental issues covered by the CBD*

The objectives of the CBD (Article 1), namely the conservation of biodiversity, the sustainable utilization of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, reflect the compromise reached by the negotiators, in particular the need to balance conservation of biodiversity *per se* with the rights

of countries to utilize those resources in a sustainable manner. Further, parties should endeavour to undertake collaborative efforts to develop products from genetic resources.

The CBD marked the departure from the earlier concept of treating biodiversity as a “common heritage” of humankind, and moving to that of a “common concern”, since most components of biodiversity are located in areas under national jurisdiction. Article 3 literally reproduces Principle 21 of the Stockholm Declaration, recognizing that states have the sovereign right to exploit their own resources pursuant to their own environmental policies. Thus an important principle that had a merely political, non-binding character changed after 20 years into an international norm, at least in the field of biodiversity.<sup>5</sup>

On the issue of conservation and sustainable use, the CBD contains a number of significant obligations. For instance, Articles 6 and 10 require parties to develop national strategies and plans to integrate biodiversity into relevant sectoral or cross-sectoral plans, programmes, and policies, as well as into national decision-making. Article 7 obliges parties to identify important components of biodiversity and priorities which may need special conservation measures, or which may offer the greatest potential for sustainable use. There is also a need to identify and monitor processes and categories of activities which have significant adverse effects on conservation and sustainable use of biodiversity.

There is also an obligation to implement *in situ* conservation (Article 8) as well as *ex situ* conservation (Article 9).

Sustainability is now viewed as the guiding principle for development. Article 10 of the CBD deals specifically with obligations of parties to use components of biodiversity sustainably.

The role of indigenous and local communities in conserving biodiversity and the importance of traditional knowledge are recognized in Article 8(j).<sup>6</sup>

The importance of public education and awareness and the need for research and training are respectively dealt with in Articles 13 and 12. Article 15 of the convention establishes rules concerning access to genetic resources, stating that the regulation of this access is in the hands of national governments and subject to national legislation, and also that contracting parties will create conditions to facilitate giving other contracting parties access to genetic resources leading to adequate utilization, and will not impose restrictions contrary to the objectives of the agreement. Also, it establishes that contracting parties will endeavour to carry out scientific research based on genetic resources provided by contracting parties, with their full participation and, if possible, within their territories.

Closely related to the above, Article 16 regulates the access to technology and technology transfer, including biotechnology, establishing the compromise of each contracting party to secure and/or facilitate giving to other contracting parties access to pertinent technologies for the conservation and sustainable utilization of biodiversity as well as the transference of those technologies. The access and transfer of technology to developing countries is a matter of special regulation within the same article, where it is specified that it will be secured and/or facilitated under fair and most favourable terms, including on concessional and preferential terms where mutually agreed and, where necessary, in accordance with the financial mechanism established by Articles 20 and 21. In the case of technology subject to patents and other intellectual property rights, such access and transfer shall be provided on terms which recognize and are consistent with the adequate protection of intellectual property rights. These articles pay particular attention to the matter of contracting parties which provide genetic resources also obtaining access to and transfer of technology which makes use of those resources.

Regarding biotechnology and the distribution of the benefits arising from its use, it is established (Article 19) “that each Contracting Party will take legislative, administrative or political measures as appropriate” to secure the effective participation in its research activities on biotechnology of the contracting parties that provide genetic resources for such research, and to ensure that those activities take place, whenever feasible, in the same country that provides the resources. Furthermore, the article establishes that each contracting party will adopt all applicable measures to promote and foster, in fair and equitable conditions, priority access of the contracting parties, in particular developing countries, to results and benefits derived from the biotechnology based on genetic resources given by said parties.

With respect to the financial arrangements, Article 20 establishes that each contracting party undertakes to provide, in accordance with its capabilities, financial support and incentives for the activities which are intended to achieve the objectives of the convention, as well as the commitment of the parties which are developed countries to provide new and additional financial resources so that the parties which are developing countries can meet the agreed full incremental costs to them of implementing measures in fulfilment of the obligations of the convention and to benefit from its provisions. Article 21 stipulates that a mechanism will be established for the provision of financial resources to the parties which are developing countries on a grant or concessional basis. When the mechanism is established, its functions shall be performed by the Global Environment Facility (GEF) (Article 39), provided that this fund has been fully restructured according to the criteria spelled out in Article 21.

## The impact of globalization on biological diversity

As we move towards global economic integration and a world economy (described by van Wolferen in Chapter 2) which is characterized by the liberalization of trade, globalization of capital markets, and rapid diffusion of advanced technologies and consumption, three issues will be most affected as far as biodiversity is concerned. These are biotechnology, biosafety, and bioprospecting.<sup>7</sup>

### *Biotechnology*

The importance of biotechnology is discussed in Chapter 6 of this volume by Glenn and Gordon, and also by Swaminathan in Chapter 14 in terms of the gene revolution. The potential contribution of biotechnology to the conservation and sustainable use of biodiversity has received considerable international attention, particularly in the context of the CBD. Biodiversity provides raw materials for various biotechnology industries in the agricultural, pharmaceutical, and chemical sectors. The growth of the biotechnology industry in the past two decades has been closely associated with the systematic search for genetic material and the transformation of this into new products, such as chemicals and drugs. New biotechnological techniques have made it relatively easy to search for, screen, and store genetic material. Genetic resources have increased in value with a major resurgence in screening of genetic resources for their medicinal and biochemical properties.

Biotechnology is science-intensive. It involves the use of scientific knowledge and expertise from a wide range of disciplines such as botany, genetics, biochemistry, and molecular biology. For example, prospecting for new genetic material with certain biochemical properties requires interdisciplinary expertise and involves a series of procedures including searching, collection, identification of plant material, preparation of extracts, bioassay of each fraction of the extracts, verification of isolated compounds, elucidation of the chemical structures, and large sample isolation of compounds for pharmacological and toxicological tests.

Although the CBD does not make express provision for a trade-off between access to genetic resources and access to transfer of technology, it established a clear link between the supply of genetic resources (from developing to developed countries), and access to and transfer of technology (from developed to developing countries) which makes use of those resources. This link can be forged through collaboration between various partners so as to allow industrialized countries to gain access to

genetic resources while enhancing the technological competence of the developing countries.

It has been argued that under such a venture, the developing country would not have to give away evaluated and characterized genetic material to a foreign enterprise interested in further development and eventual commercialization of derived products.<sup>8</sup> The foreign enterprise would bring into the partnership its advanced technological know-how, especially in the field of biotechnology. The genetic material and technology would respectively pose as assets belonging to each contributor, while both partners would share any new or improved material or product generated through the collaboration.

Others have pointed out that while the role of biotechnology in the conservation and sustainable use of genetic resources has been recognized, the nature of the technology has not been well understood. International discussions on transfer of biotechnology to the developing countries have not been based on understanding differences between biotechnology and other technologies.<sup>9</sup> Biotechnology has often been perceived as comprising hardware or machinery. Its tacit nature has largely been ignored or not understood. Due to its science-intensive nature, its development, acquisition, and transfer do not involve the use of massive mechanical equipment but rather the acquisition and application of scientific knowledge.

Therefore, to apply biotechnology effectively to realize the objectives of the CBD, it is imperative that countries put in place appropriate measures to facilitate its development and transfer. Apart from the physical infrastructure, it is important that a long-term programme on human resource development be initiated with emphasis on the acquisition of scientific knowledge and skills in subjects like molecular biology, biochemistry, and genetics. Developing countries must invest in education and training, and it would be helpful if financial assistance could also be extended by international funding agencies to realize this goal.

The ability of the developing countries to benefit from their biological resources will depend largely on the extent to which they integrate biotechnology development into their development strategies. Each developing country needs to determine its national needs and decide how much to invest in biotechnology development in relation to other development activities. It has been emphasized that there is a need to give priority to biotechnology development as a strategic sector that would enable the developing country to derive economic benefits from the conservation of biological resources.<sup>10</sup> This should include specific measures that build on the technological competence already available in the country as well as the acquisition of foreign technology.

*Biosafety*

Recent developments have shown that biotechnology can contribute significantly to national development by enhancing the performance of plants, animals, and micro-organisms, by reducing the cost of health care and of agricultural and industrial products, and by ensuring conservation and sustainable use of biodiversity. It is, however, important to note, particularly now as products developed through modern biotechnology are entering the market-place, that biotechnology poses some risks because techniques such as genetic engineering make it possible to alter genes and genetic materials in ways that do not occur naturally by mating or natural recombination.

Safety in biotechnology has always been a sensitive issue in international fora, considering the potential short- and long-term risks posed once organisms resulting from modern biotechnology applications are released in the environment, for example through international trade. There are significant knowledge gaps in the field of interaction between LMOs (living modified organisms) and the environment, particularly in centres of origin and genetic diversity. Developing countries are thus concerned that some LMOs imported into their countries, deliberately or unintentionally, might be harmful to humans and the environment. On the other hand, there are fears that international biosafety regulations might hinder the development and application of biotechnology and prevent the bioindustry that has already invested a lot in biotechnology from reaping the results of its investments.

Many countries at present have not sufficiently developed their capabilities for taking advantage of the new opportunities in biotechnology applications, nor for building the regulatory framework that is essential for its safe application. A basic preoccupation of many countries and regions is still how to gain access to the new applications of biotechnology. Unfortunately this will not be a simple task, since such access needs to be built upon appropriate biosafety regulatory mechanisms. Paradoxically, however, regulations cannot be developed in a vacuum without the technology that brings about experience and creates stewardship, commitment, and motivation through ownership.

A further complication is that in the past technologies were largely in the public domain, whereas today fewer and fewer technologies that developing countries may want to transfer, adapt, and adopt are public, and this is likely to decline even further in the future. As a result, another new dimension to biotechnology transfer and biosafety has emerged, namely international relations. The entering into force of the Convention on Biological Diversity has partly brought about this latter aspect.

Paradoxically, the attention to biosafety within the Convention on Biological Diversity is a reflection of existing concerns rather than the emergence of a new issue. Although there are two articles in the convention that deal specifically with biosafety (Articles 8(g) and 19.3), biosafety really enters into the process of the convention as a result of the agreements stipulated in Article 16 for facilitating access to the methods and products of biotechnology (technology transfer). Thus the connection of biosafety with biodiversity is twofold. First, the transfer of appropriate biotechnology applications in a safe and effective way presupposes – and should presuppose – that biosafety regulatory mechanisms are in place. Second, the saving and protection of biodiversity is a complex endeavour that requires, on the one hand, protecting natural habitats (for example from the invasion of alien species) and, on the other hand, alleviating pressure on land extension into natural habitats. One of the most significant events in the future development of biotechnology, including the innovation, commercialization, and market availability of products, will be the creation of an internationally agreed biosafety protocol.

Article 19.3 of the CBD provides for parties to consider the need for and modalities of a protocol setting out procedures in the field of the safe transfer, handling, and use of LMOs that may have an adverse effect on biodiversity and its components.

An Ad Hoc Working Group of Experts on Biosafety was established by the Conference of Parties (COP) of the CBD in 1994. Elements which have initially been favoured unanimously to be included in the biosafety protocol are all activities related to LMOs that may have adverse effects on biodiversity; transboundary movement of LMOs; release of LMOs in centres of origin/genetic diversity; mechanisms for risk assessment and management; procedures for advance informed agreement (AIA); facilitated information exchange; capacity building and implementation; and definition of terms. Elements with partial support include socio-economic considerations; liability and compensation; and financial issues.

The working group convened six times between July 1996 and February 1999, including an extraordinary meeting of the COP, but due to the contentious nature of some of the issues it has not completed its work up to now. Outstanding issues include the scope of the protocol and whether to include/exclude “products thereof” of LMOs; the procedure of advance informed agreement; the process of notification; handling, transport, packaging, and identification (or labelling); relationships with non-parties; and socio-economic considerations.

While some may assert that the protocol was not related to trade, its implications for transport of commercial products across political boundaries and provision of proprietary information cannot be ignored. Indeed, some have suggested that the biosafety negotiations could not be

concluded on schedule partly because they dealt essentially with international trade issues that were deemed to be in the jurisdiction of the WTO, whereas others argue that the interests of key states were threatened (see Chapter 6 of this volume).

### *Bioprospecting*

In September 1991, Costa Rica's National Biodiversity Institute (INBio) – a private, non-profit organization – and the US-based firm Merck Pharmaceuticals announced an agreement under which INBio would provide Merck with chemical extracts from wild plants, insects, and micro-organisms from Costa Rica's conserved wildlands for Merck's drug-screening programme in return for a two-year research and sampling budget of US\$1,135,000 and royalties on any resulting commercial products. INBio agreed to contribute 10 per cent of the budget and 50 per cent of any royalties to the government's National Park Fund for the conservation of national parks in Costa Rica, and Merck agreed to provide technical assistance and training to help establish drug research capacity in Costa Rica.

This agreement represents a watershed in the history of "biodiversity prospecting" – the exploration of biodiversity for commercially valuable genetic and biochemical resources. For decades, ecologists and environmentalists have been arguing that pharmaceutical and other commercial applications of biodiversity should help justify its conservation. However, industry investment in natural product research since the mid-1960s has been small, and it actually declined in the pharmaceutical industry during the 1960s and 1970s. Clearly, the INBio-Merck agreement demonstrates a shift in industry focus and the true economic potential of these resources.

This ground-breaking agreement also shows how companies can return a portion of the benefits of pharmaceutical development to the developing country where the chemical compounds originated. Further, it ensures that some of these proceeds will directly finance conservation, while the remainder will indirectly finance conservation through biodiversity research, development, and industry in association with the national parks. Coming as it did during the final negotiations of the international Convention on Biological Diversity, the Merck-INBio agreement validated what was becoming – after heated debate – an underlying tenet of the convention: the fair and equitable distribution of the benefits of the use of genetic resources among *all* those who invest in their continued existence.

Although its close link to conservation efforts has earned it exceptional attention, the Merck-INBio agreement is just one of a rapidly growing number of biodiversity prospecting ventures. Japan has launched a major

biodiversity research programme in Micronesia, the US National Institute of Health is screening wild species for compounds active against HIV and cancer, and both Indonesia and Kenya are establishing inventory programmes similar to INBio's.

This flurry of interest and enthusiasm in biodiversity prospecting is taking place in a policy vacuum. Virtually no precedent exists for national policies and legislation to govern and regulate wildland biodiversity prospecting. Yet the 175 countries that have signed the CBD must now pass implementing legislation that establishes just such a policy framework.

The stakes are high as countries begin to fill this policy vacuum. Done well, biodiversity prospecting can contribute greatly to environmentally sound development and return benefits to the custodians of genetic resources – the national public at large, staff of conservation units, farmers, forest dwellers, and the indigenous people who maintain or tolerate the resources involved. Carried out in the mould of previous resource exploitation ventures, biodiversity prospecting can have a negligible or potentially harmful effect on biodiversity conservation and environmentally sound development.

The value of biodiversity as a raw material for pharmaceutical and biotechnology industries is only a portion of its value to society. It makes good economic sense – and often meets ethical norms – for countries and communities to conserve biodiversity whether or not they become biodiversity prospectors. Indeed, it is entirely possible – and sometimes highly appropriate – for nations to invest in biodiversity conservation without ever seeking to commercialize genetic and biochemical resources. The normative question of whether or not countries should commercialize genetic and biochemical resources is not addressed here, but the urgent need to ensure that the commercialization already under way supports conservation and development is.

### Key policy challenges in the short and medium terms

For developing countries the key issues in the biodiversity negotiations were the establishment of special systems of intellectual property rights and appropriate mechanisms for compensating developing countries for the biological resources provided by them; the establishment of mechanisms giving developing countries access to the technologies that are developed through the use of genetic resources that they provide; and additional funding to facilitate implementation of the CBD and access to technology. In essence, developing countries were seeking to implement a new way of business: a state of affairs where the flows of benefits arising from biodiversity are more equitable.<sup>11</sup>

*The flow of benefits*

The three levels of biodiversity – ecosystems, species, and genetic variability – are all used in quite different ways and consequently have different benefits. So, for instance, ecosystems are relied upon as a means to protect watersheds, to stabilize climate, and for ecotourism. Species variability, on the other hand, is not only used for ecotourism but is also used to provide variety in our diets and ultimately to guarantee food security. Genetic variability also ensures food security, by providing the basis upon which farmers and scientists are able to develop crops that are resistant to new pathogens. Genetic variability also provides the source of new ideas and drugs in the pharmaceutical industry. The advent of biotechnology has meant that the use and importance of genetic resources have increased dramatically. Thus other industries such as the waste disposal industry, the cosmetics industry, and the horticultural industry are all starting to focus on natural genetic diversity as a means by which to develop new products and expand markets.

Although the flow of benefits arising from the use of biodiversity is complex and multidirectional, with every country receiving benefits of one sort or another from the world's biodiversity, these benefits have in the past generally been to the advantage of the developed countries. The use of genetic resources illustrates this general flow and is representative of the other uses of biodiversity. The technology to apply genetic resources is largely held in the developed world, whereas the resources are largely located in the developing world. Ownership of the genetic resources and access to the resources were, prior to the CBD, dependent upon the type of genetic resource. Wild or natural genetic resources, those in which the developing world is rich, were considered the common heritage of mankind and hence unownable. For example, the 1983 International Undertaking on Plant Genetic Resources (IUPGR) which, as far as the use of genetic resources is concerned, was until the CBD the most important international instrument, embodied this attitude. The object of the undertaking is to “ensure that plant genetic resources of economic and/or social interest, particularly for agriculture, will be explored, preserved, evaluated and made available for plant breeding and for scientific purposes”. The undertaking is grounded on the “universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction”.

The Consultative Group on International Agricultural Research (CGIAR), which holds the largest international *ex-situ* collection of genetic resources, operated on the basis that all its genetic stock was available on a free and unrestricted basis for *bona fide* users. It held these resources “on trust for the whole world community”. CGIAR stated that “The CGIAR recognizes that the Centres’ gene bank collections cannot

be considered amongst the Centres' assets.... As trustees of international germ plasm collections, the Centres have an obligation to manage them for the benefit of the world community ... This management responsibility includes ... a guarantee of unrestricted access for the benefit of the world community." If, however, genes had been altered by biotechnology or "improved", then ownership was permitted through the concept of intellectual property rights (IPRs).<sup>12</sup> For example, microbial genetic resources which have been purified are patentable, and plant varieties that have been developed by biotechnology or advanced agricultural technology can be owned through the system of plant breeder rights developed under the UPOV Convention.

Distinguishing between natural genes and "improved" genetic resources in such a way contributes to a lack of equitable distribution of the benefits of use. It allows different types of control over access and the extent that providers can appropriate the benefit or value of the resource. The different treatment of genetic resources is commonly referred to as asymmetric access to genetic resources.

Many industries from developed countries benefit enormously from this asymmetric access. Numerous studies have shown that pharmaceutical companies have made significant profits from developing drugs based upon pharmacologically active biochemicals of wild flora found in developing countries. An often-cited example of this is the case of two cancer drugs which Eli Lilly, a large American pharmaceutical company, developed from Madagascar's rosy periwinkle which earned \$100 million per year during the lifetime of the patent. Rarely have pharmaceutical companies paid any compensation for this type of use of genetic resources to developing countries. They have in the past considered natural genetic resources as a public good, and one to which they have a right of free access. In some instances the inequity is exacerbated by the fact that the drug which the pharmaceutical company develops is then sold in the developing country where the genetic lead came from.

Similarly inequitable distribution of benefits is evident in the use of other aspects of biodiversity. For example, with regard to the use of ecosystems, the developed world effectively receives free and uncompensated from the developing world such benefits as the sequestration of carbon dioxide that takes place in the forests of the developing world and the use of the ecosystem diversity of the developing world by international ecotourism.

### *The reasons for equitable distribution of benefits*

Apart from the moral imperative to address the imbalance in the flow of benefits there are good policy reasons why this imbalance needs to be addressed.

Regulatory measures used in international regimes to protect biodiversity, such as the establishment of protected areas, setting quotas, hunting seasons, and prohibiting the taking of certain species, have almost without exception failed to ensure conservation of living resources. One instructive example of this failure is the attempts to regulate whaling. Under the 1948 International Convention for the Regulation of Whaling, the International Whaling Commission has tried for nearly 50 years to implement a regulatory regime which managed whaling on a sustainable basis. Yet despite the numerous attempts to develop quite sophisticated management plans, none has so far been successful. The only approach which has had some success in conserving whales is the moratorium on all commercial whaling, which has been in force since 1985: an approach which can hardly be described as sustainable use of a resource. Indeed, even at the national level, where quotas and other regulatory techniques are underpinned by sanctions (and therefore capable of being enforced in a manner unlike the consensual nature of international regulation), the purely regulatory approach to sustainable use has rarely been successful. National attempts to ban the taking of endangered species represent an example of such a policy failure which is relevant for almost every country in the world.

The inadequacies of the traditional legal approach to the problem of conserving biodiversity or living resources mean that policy-makers have increasingly turned to different approaches. A popular alternative in recent years is the use of economic instruments, which rely upon persuasion and incentives as opposed to duties and obligations. Economic instruments work on the basis that they motivate conservation by creating financial incentives. They provide those that bear the burden of conservation with non-altruistic reasons for undertaking this task. They also provide the resources to undertake the burden. In economic parlance these instruments seek to internalize the external cost and benefits of an activity. This means empowering those who live with and have control over biodiversity to receive just compensation for the use of this resource by others. In legal parlance this is what is meant by equitable distribution of benefits.

Finally and perhaps most importantly, creating a more balanced and equitable distribution of benefits not only provides more resources for developing countries to undertake more conservation measures, but also reconciles the divergent interests of developed countries which wish to conserve biodiversity and developing countries which wish to develop their economies. To the extent that this occurs the principle of equitable distribution of benefits bridges the gap and resolves the tensions between the developed and the developing world, and provides the basis for a compromise which allowed the adoption of the CBD.

*Implementing equitable distribution of benefits*

There are numerous techniques for redistributing the flow of benefits. Trade development rights, debt-for-nature swaps, correction of trade distortions, elimination of perverse incentives, international resource taxes, and commodity cartels are all examples of techniques which at their heart are about making those that use a resource pay for that use, or in the words of the economists internalizing the externalities.

The mechanisms which negotiators considered in respect to creating a more balanced flow of benefits and the ways that the CBD attempts to develop the guiding principle of equitable distribution of benefits into a legally binding commitment are providing financial assistance through the financial mechanism; sustainable use of biodiversity; technology transfer; and controlling access to genetic resources.

During the negotiation of the CBD each one of these issues was dominated by strong North/South tensions. Access-related issues were on the whole some of the most difficult in the negotiations. In order to be willing to discuss and eventually take on the conservation obligations, developing countries made certain demands of their own. Not only did they press for the convention to become more directly use-oriented, but many made their participation in the negotiations conditional on the inclusion in the CBD of obligations and measures on three types of access: access to genetic resources, which they wished to have recognized as subject to national authority; access to relevant technology, stressing that it includes biotechnology; and access for the providing states to benefits ultimately gained from the use of genetic material in the development of biotechnology.

*Addressing the challenges nationally and internationally*

The onus of responsibility for conserving and sustainably using biodiversity lies at the national level. This responsibility is linked to the principle of sovereign rights of states over their natural resources which has been one of the important tenets of the CBD. The detailed responsibilities and obligations on these matters are reflected in the relevant articles of the CBD, such as general measures for conservation and sustainable use (Article 6), *in situ* conservation (Article 8), and sustainable use of components of biological diversity (Article 10).

National governments have much to do, considering the spectrum of actions parties have to undertake and the wide range of policies they have to review. By the same token, the notion that conservation of biodiversity is a “common concern” of humankind implies a common

responsibility for the issue based on its paramount importance to the international community as a whole.

The effectiveness of any international treaty is dependent upon the extent to which it is respected and implemented by its parties. Already this is happening in the CBD. For instance, many countries are currently taking measures to translate and implement plans on access and equitable sharing of benefits of genetic resources. The importance of national-level implementation for the convention has meant that the CBD process has moved rapidly to put into place structures that will be crucial for ensuring its provisions are implemented by its parties. It is therefore important that assistance to developing country parties to implement the provisions of the CBD through the financial mechanism should be simultaneously followed up.

The success of national action, seen from a global perspective, will depend on the will of both the developed and the developing country parties to meet their obligations.

### Comparative advantage of the United Nations

In so far as biodiversity is concerned, the question is academic as to whether the United Nations has a comparative advantage in addressing the challenges. It is inevitable that the governance of such a global issue as biodiversity needs the direct involvement of this organization.

It is interesting to note the level of interest and commitment shown by countries towards the CBD. Signed by more than 150 governments at UNCED in Rio de Janeiro in June 1992, it came into force barely 18 months later. Today, with 175 country parties to it, it must be one of the biggest treaties ever ratified in the UN system.

The CBD presents an opportunity to realize important goals. Immediately after UNCED one might have anticipated further progress would have been made by now. However, the recently concluded UN General Assembly Special Session was an awkward reminder of how hard it has been to sustain enthusiasm, much less secure funding and institutional commitments. Moreover, of all the commitments to come out of UNCED, the CBD has proven the hardest to market to politicians and the public. Biological diversity is consistently ranked last in public awareness among all environmental issues, ranging from wildlife to climate change. Indeed, the constituency for biodiversity has to be considered soft even among many who consider themselves environmentalists. It is easier to rally support for particular biological assets, tigers or wetlands, than for a relatively abstract biodiversity.

Parties to the CBD cannot ignore that they are launching an uphill

campaign at an unpropitious time, just when the environmental movement's momentum appears to be plateauing. For the parties, merely educating the public and world leaders about the stakes, much less agreeing among themselves, will itself consume considerable effort. In this context, the process needs to be realistic about its goals.

From its inception, the CBD has been burdened with a lack of clarity and potential conflict in its institutional mission. On the one hand, there are those whose primary motive is to conserve nature for future generations. On the other, there are those for whom conservation must be subordinate to development. Of course, as argued in the introduction to this volume, there is an important range of policy options in which the two aims are congruent, where "sustainable development" is more than a motto; there, cooperation will be easiest to achieve. But when the path of conservation departs from that of economic benefits, when the parties consider proposals that would preserve valued assets but at a cost to development, which course will they take?

Even within the ambit of conservation, institutional tensions persist that need to be resolved. Those whose predominant concern is loss of species and ecosystems are tempted to seize upon this new framework convention as an opportunity to attack all biology-related problems on all fronts. But there is already a host of treaties, agreements, and institutions that address biodiversity. Some believe that is part of the problem, that present efforts are too fragmented and too "piecemeal", and that all these diverse efforts require coordination or consolidation. There is no way to draw clear lines between biodiversity, on the one hand, and most of the problems that beset mankind, on the other. Desertification, rivers, toxic waste, ocean management, and other issues addressed elsewhere in this volume all impact on biodiversity, as do weapons testing, trade, agriculture, mining, and auto emissions. Moreover, there is little evidence that great umbrella agencies are in any way more effective or efficient than moderately sized institutions with more sharply focused mandates.

It is clear that biodiversity cannot be safeguarded without advancing into areas already addressed by other regimes, and that the CBD should avoid duplicating any ongoing efforts that are working moderately well. Where other agencies have already initiated biodiversity-advancing policies, the CBD should restrict its role to identifying problems that have been overlooked and recommending improvements.

Even this limited role will, however, inevitably create tensions. For example, to what extent should the convention pursue its own agenda concurrently and independently from other conventions? How far can the CBD withdraw from forest management and still maintain credibility? Where trade-related matters are concerned, should the parties to the CBD try to influence the WTO, or do their best to withdraw trade-

related matters (for example, in genetic resources) from the WTO and place them under a competing regime? Even though the answers to these questions and others raised by the overlapping mandates of various processes have no immediate answer, one can be sure that the CBD cannot take on all issues before it. The underlying question must be, in which areas is a commanding role worth developing? In the light of the alternative institutional competencies of UNEP and the CSD, and of so many other agencies, what can the CBD contribute uniquely or pre-eminently? To what extent can it even fill the role of institutional steward?

Even if the parties steer a clear path away from other institutions and take up only the tasks most clearly within the purview of the convention, they will have to give some aims priority over others, if only because of budgetary and institutional constraints. A core agenda for the aims of the convention has already been laid out in a series of first-rate studies going back to the 1980 World Conservation Strategy and continuing through the Conserving the World's Biological Diversity and Global Biodiversity Strategy. At this point the question is not what *should* be done? There is more to do than can be handled. The question is one of focus: which of many worthwhile objectives take precedence? Perhaps it is possible to identify and prioritize projects that are win-win: those that can enjoy the support of conservationists and developmentalists alike. The worst tragedy would be for the parties to bog down over relatively remote and peripheral issues while the central needs that inspired the convention continue to be postponed. Consider the amount of total effort that has gone into biosafety. Supporters justify the attention by labelling the issue "crucial". But it is possible to suppose that biosafety has been labelled "crucial" because it is something the parties have been able to agree to spend time on, putting off discussion of problems that are far more consequential.

### Potential for partnerships in collectively addressing these challenges

Given the nature of the issues which the convention seeks to address, the CBD is heavily dependent for its effectiveness on the actions of parties and other institutions. The need to develop institutional links with other international bodies, to develop cooperative relationships with such bodies, and hence mechanisms for coordinating these relationships, is fundamental to the implementation of the convention, as outlined by Domoto in Chapter 17. Each COP has reaffirmed the importance it attaches to cooperation and coordination between the CBD and other conventions, institutions, and processes of relevance. Consequently, it is not possible

simply to think of the institutional structure of the convention in terms of those institutions established by the process itself.

The most important example of the role that external bodies play in the institutional structure of the convention is the financial mechanism, which in institutional terms is largely housed in the Global Environment Facility, and its implementing agencies: UNEP, the UNDP, and the World Bank.

Institutional links have been established with a wide range of other bodies. The secretariat of the CBD has participated in the Inter-Agency Task Force of the Intergovernmental Panel on Forests and the Inter-Agency Committee on Sustainable Development (IACSD) of the United Nations. Agreements to provide a framework for developing institutional links and cooperation with other bodies have been concluded between the secretariat of the CBD and the secretariats of the Ramsar Convention on Wetlands, the Convention on International Trade in Endangered Species of Fauna and Flora, the Convention for the Protection of the World Cultural and Natural Heritage, the Convention on Migratory Species, the Intergovernmental Oceanographic Commission, the World Bank, the IUCN, UNCTAD, and the FAO amongst others.

The Conference of the Parties to the CBD has regularly adopted decisions directed towards other processes and invited them to take an active role in the implementation of aspects of the convention. For example, the third meeting of the COP invited the Convention on Wetlands of International Importance to cooperate as a lead partner in the implementation of activities under the CBD related to wetlands. Consequently, the Ramsar Bureau has played an important role in the preparations for the consideration of the biological diversity of inland waters. As a result it is expected that the programme of work which the COP may establish to address the issue will invite the full and active participation of the Convention on Wetlands of International Importance process.

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## International environmental governance – Its impact on social and human development

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*Akiko Domoto*

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### Introduction

The dawning of a new century has throughout history been seen as an appropriate time to reflect on the 100 years that have gone before and, if necessary, to chart a new course for the future. As we are privileged to be standing on the threshold of both a new century and a new millennium, such reflection seems especially timely.

This is particularly so when one looks at the state of the natural environment. While the environment continues to be seen in some circles as peripheral, a “side” issue as it were, there is an increasing recognition that it is in fact “the context of everything else”,<sup>1</sup> and that humans are inseparable from the ecosystems in which they live. Some positive trends can be pointed out on the environmental front, particularly in relation to reduced water and air pollution in parts of the industrialized world. To a certain extent, these trends are the result of efforts to improve resource efficiency and resource management within firms and at the local and national levels. The general picture, however, is of a planet under siege. Rapidly declining biological diversity, increased evidence of climatic change, and ongoing encroachment of desert in many parts of the world are some of the bleaker indicators.

Environmental decline often has the greatest impact on the world’s poorest people, who depend directly on the environment around them for food, drinking water, and shelter and often experience the severest

effects of environmental pollution. And, as the Secretary-General of the United Nations points out in his April 2000 report, *We the Peoples: The Role of the United Nations in the 21st Century*, the impact of environmental degradation on future generations is also of great concern. He warns that we are failing to ensure that future generations will have “the freedom . . . to sustain their lives on this planet”.<sup>2</sup>

The causes of this very serious state of environmental affairs are complex. One of the most important factors is that the earth’s ecosystems and how they function have been, and continue to be, taken for granted in humankind’s pursuit of economic growth. As a result, present systems of production and consumption, and the governance structures which preside over them, are both fundamentally out of touch with the interconnected and cyclical patterns of the natural world and unable to adapt to change in these patterns.

But we are at a turning point. There is growing awareness that twentieth-century patterns cannot be continued indefinitely. This is not least because a globalizing economy is leading to both the globalization of environmental degradation and the globalization of a constituency wishing to address it. New patterns of thought, production, and consumption – some already being developed – need to be encouraged and built upon. This will require governance structures that are imaginative, responsive to change, and built on a clear vision of the links between the environment, the economy, and society. Integral to these structures must be strengthened partnerships between states, parliamentarians, civil society, and business. The role of the United Nations in the process will be an important one.

This chapter begins with an overview of the state of the environment, focusing on key trends and their links to human development. It then looks at some of the efforts made by the international community to address these problems, focusing particularly on multilateral environmental agreements and on the environmental impacts of economic globalization. The chapter closes with a discussion of the need and possibilities for more holistic and responsive forms of international environmental governance, looking closely at the special role which the United Nations can play.

### The state of nature

The five-year review of the United Nations Conference on Environment and Development (UNCED), conducted in 1997, concluded that all unsustainable trends were worsening at a faster rate than they had been at the time of the 1992 Earth Summit.<sup>3</sup> At the core of this degradation is

what the UNDP's most recent *Human Development Report* refers to as "the unprecedented growth in world consumption".<sup>4</sup> The impacts of this growth are twofold: deepening scarcity of renewable resources and rising levels of waste.

### *Renewable resources*

Historically, resource scarcity was thought to be largely applicable to non-renewable resources such as oil and minerals. Increasingly, however, it is unsustainable use of renewable resources that is the primary threat to the planet and its people. One of the most potent examples is that of forest-land and resources. It is estimated that 20 per cent of the world's tropical forests were cleared between 1960 and 1990. Rates of forest clearing do not seem to be declining; in the Amazon region, for instance, satellite data show a 50 per cent increase in the number of forest fires set to clear land for agricultural purposes.<sup>5</sup> This rapid loss of forest cover is an important contributing factor to the expansion of deserts worldwide. Desertification is said to now affect 110 states; some of the world's poorest countries are most severely affected.

As discussed in Chapter 16, the loss of forest cover is also a key threat to biological diversity. According to the 1997 IUCN Red List of Threatened Plants, almost 34,000 plant species, equivalent to 12.5 per cent of the world's vascular flora, are threatened. The situation for animals is even more serious. The 1996 IUCN Red List of Threatened Animals shows that approximately 25 per cent of all known mammal species are under threat of extinction.<sup>6</sup> Other threats to biodiversity, such as invasive species and the potential transfer of genetic material from genetically modified plants and animals to traditional varieties, have received dramatically heightened interest in recent years.<sup>7</sup>

Concern regarding forest and biodiversity loss pales in comparison, however, to that exhibited with regard to water. As mentioned by Suzuki in Chapter 11, the World Water Vision released by the World Water Council in March 2000 outlines in stark terms the water crisis that confronts us. It notes, for instance, that half of the lakes and rivers in North America and Europe are severely polluted, that one in five of the earth's people lack access to safe drinking water, and that many aquifers around the world are severely overexploited.

### *Waste*

Along with vast increases in resource consumption has come massive production of waste. Perhaps best known are chlorofluorocarbons (CFCs), greenhouse gas emissions, and toxic chemicals, all of which threaten to

overwhelm natural sink capacities. Less well known, but of equal importance, is mounting evidence that human contributions to the supply of fixed nitrogen are destabilizing the global nitrogen cycle.

As argued in Chapter 12, the effects of the release of CFCs and other ozone-depleting substances into the atmosphere caught the scientific community by surprise and have resulted in serious degradation of the earth's ozone layer. At northern mid-latitudes the ozone layer has decreased by as much as 6 per cent since 1979, resulting in increased incidence of skin cancer and eye cataracts, and decreased productivity in some ecosystems.<sup>8</sup>

Increased greenhouse gas, and particularly carbon dioxide, emissions are having a noticeable impact on the earth's climate. Annual storm damage has increased by 40 times since the 1980s, strikingly close to what climate models had predicted.<sup>9</sup> As for the future, the Intergovernmental Panel on Climate Change predicts that by 2100 global mean temperature could rise 1–4.5°C from the present mean.<sup>10</sup> The warming of the oceans may decrease their capacity to absorb carbon, further exacerbating the warming of the atmosphere.<sup>11</sup> Climate change is likely to increase the stress on the earth's biological diversity as a result of rising sea levels, enhanced desertification, and other impacts.<sup>12</sup>

Toxic chemicals, especially persistent organic pollutants (POPs), are yet another product of human economic activity with serious environmental impacts. An increasing amount of scientific evidence is linking certain POPs to reproductive disorders, damage to the central nervous system, and cancers in animals and humans. POPs are now found in all parts of the globe, even those where they have never been used or produced.<sup>13</sup>

Finally, a word about nitrogen is in order. *Global Environment Outlook 2000*, a report published by the United Nations Environment Programme,<sup>14</sup> notes that massive additional quantities of nitrogen are being deposited into aquatic and terrestrial ecosystems as a result of increasingly intensive agriculture, the combustion of fossil fuels, and extensive cultivation of leguminous crops. The report goes on to state that human activities now outstrip natural processes in terms of total contribution to the global supply of fixed nitrogen. The consequences of this massive increase in nitrogen loading in the environment include dangerous levels of nitrogen in drinking water supplies, acid rain, and eutrophication of waterways.

The above resource scarcity and waste-induced threats to the environment often interact in complex ways, increasing the stress on ecosystems to levels much higher than the sum of individual stresses, often with unpredictable results.<sup>15</sup> This is an important aspect of what Norman Myers has termed the “surprise phenomena”. Myers argues that one of

the prominent features of the future will be “environmental discontinuities ... many of them arising from synergistic interactions between two or more environmental problems”.<sup>16</sup> While some synergistic interactions are already known, the future will no doubt bring awareness of many more which cannot even be imagined at the present time.

The ultimate result of overconsumption of resources, overproduction of waste, and the multitude of synergies between them is not only reduced biological diversity and increased pollution, but an overall reduction in the ability of ecosystems to provide the goods and services which human societies, in all their diversity, require.<sup>17</sup> The fact that many of these goods and services cannot be created artificially with existing technology – or, if they can, are utterly inaccessible to the poor – renders efforts to reverse present environmental trends a matter of utmost urgency.

### Complex answers to complex questions

During the past decade, major efforts have been made at the international level to develop governance structures to address the stresses on our global environment. The 1992 United Nations Conference on Environment and Development (UNCED), more commonly known as the Earth Summit, epitomizes what we now think of as international environmental governance, though it was by no means the first global forum on the environment.<sup>18</sup> The Earth Summit resulted in the Framework Convention on Climate Change, the Convention on Biological Diversity, the Convention to Combat Desertification, and the Forest Principles. Based on these documents, significant efforts are being made to reverse the tide of environmental decline. While the importance of these agreements – and many others like them<sup>19</sup> – should not be minimized, what is missing is a holistic perspective and approach not only to environmental issues *per se*, but to how they are connected to the fundamental trends which characterize economic globalization. For the most part, environmental problems continue to be addressed as largely static phenomena, isolated both from one another and from the economic trends that lie at their roots. In short, there is a discrepancy between fragmented environmental governance systems and the holistic character of the environment itself.

#### *The environment as a whole*

There are many practical advantages to breaking down environmental problems into manageable “chunks” and addressing them with separate pieces of legislation. Climate change in itself, for instance, is a complex phenomenon and the negotiations surrounding the Framework Conven-

tion on Climate Change and its Kyoto Protocol are difficult even for experts to follow. However, a failure to keep sight of the linkages between “distinct” phenomena like climate change, ozone depletion, and biodiversity loss can cause, at best, waste of effort and funds and, at worst, exacerbation of the problem that was meant to be solved in the first place. The importance of linkages can be illustrated by looking at the interaction between the Climate Change Convention and two other international environmental agreements, the Montreal Protocol and the Convention on Biological Diversity (as discussed in Chapter 16).

In a recent paper, Sebastian Oberthur points out that as a result of the banning of CFC production under the Montreal Protocol, the Multilateral Fund for the Implementation of the Montreal Protocol and the GEF have been supporting conversion to HFC technology in developing countries and economies in transition. However, Oberthur notes that HFCs have a high global warming potential and are subject, therefore, to limitations under the Kyoto Protocol.<sup>20</sup> The secretariats of the two conventions are now working to address this point of friction, but the example illustrates the difficulties and conflicts that can arise when account is not taken of links between environmental challenges and the policies and programmes put in place to address them.

While climate change and biodiversity loss are also closely interlinked, the two conventions which address these issues – the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity – were drafted in relative isolation from one another. As a result, the national action plans, legislation, public education, and other requirements included in the two conventions do not specify an integrated approach to climate change and biodiversity loss.<sup>21</sup> This has led to some concerns – particularly among academics and NGOs – about the negative impacts on biodiversity, particularly in tropical forests, of implementing the Climate Change Convention. A joint study produced by the United Nations University, the Global Environment Information Centre, and the UNU Institute of Advanced Studies notes, for instance, that countries with tropical forests do not receive financial compensation for keeping forests standing, yet could receive financial benefits under the Clean Development Mechanism if they plant fast-growing, carbon-fixing plantations. This is possible even though existing tropical forests harbour greater levels of biological diversity and may, in fact, sequester higher yields of carbon than do plantations.<sup>22</sup>

Recognizing the serious implications of gaps, overlaps, and contradictions between many of the international environmental agreements, the United Nations University organized a conference in July 1999 entitled *Interlinkages: International Conference on Synergies and Coordination Between Multilateral Environmental Agreements*. On the negative side,

the conference failed to draw participants from some of the key convention secretariats, suggesting perhaps a lack of concern about the impact of gaps and overlaps between the conventions, or a fear of losing turf as a result of increased cooperation between UN bodies. At the same time, however, the conference illustrated in a concrete manner the renewed willingness of the United Nations to undertake its environmental activities in a more coherent fashion and to play a leadership role in environmental governance in the coming century.

The Interlinkages Conference came out with thought-provoking results which, if implemented, could contribute to greater collaboration and synergy, with positive environmental and development impacts. For instance, the conference's working group on scientific mechanisms suggested that existing thematic assessments (such as that of the IPCC on climate change) investigate relevant linkages, and that assessment bodies communicate with each other in order to avoid duplication of work. To deepen awareness among policy-makers of synergies between environmental issues, the working group further recommended that summaries for policy-makers emphasize key interlinkages, and that channels be developed for two-way communication between scientists and policy-makers. Taking a broader view, the working group on scientific mechanisms also suggested that an open-ended ad hoc panel comprised of scientific, technical, policy, and economic experts be convened by UNEP to look at interlinkages both from a conventions point of view and from a regional and development perspective. This latter point underscores the importance of not only looking at linkages between environmental issues, but also at the relationship between environmental and socio-economic factors. The environment-economy nexus is the focus of the following section.

### *The economy-environment equation*

Ensuring that environmental agreements do not come into conflict with one another is a thorny problem. However, as has been shown throughout this volume, it pales in comparison to the difficulties encountered in addressing the interrelationship and friction between an increasingly borderless world economy and the environment, and between the rules and institutions which govern them.

During the past several decades, overall growth and structural change in the world economy, and particularly in trade and investment, have been astounding. The World Trade Organization (WTO) estimates that total trade in 1997 was 14 times that in 1950. In recent years, investment has grown even more rapidly than trade. Daniel Griswold reports that multinational companies worldwide invested \$350 billion in productive

assets outside their home countries in 1996, double 1992 levels. He also notes that in the past 20 years, annual global flows of foreign direct investment have grown five times faster than trade and 10 times faster than production.<sup>23</sup>

While overall growth has unquestionably occurred, broadening gaps in income distribution both within and between countries are giving rise to increased concern in many quarters, as argued convincingly in Chapter 5 by Cornia. James Davis and Cheryl Bishop write, for instance, that while the top 1 per cent of the US population experienced a 28.1 per cent increase in wealth between 1983 and 1993, the bottom 40 per cent saw a 49.7 per cent drop during the same period.<sup>24</sup> At the international level, the UNDP reports that the income gap between the top 20 per cent and bottom 20 per cent rose from 30:1 in 1960 to 78:1 in 1994.<sup>25</sup> It is estimated that about 1.4 billion people now live on a dollar or less a day. This stands in sharp contrast to the 12 per cent increase in wealth enjoyed by the world's 6 million dollar millionaires in 1998.<sup>26</sup> Ironically, 1998 was the year of Asia's financial crisis, which plunged millions into poverty.

Rapid, though uneven, growth in the world economy is occurring in step with a precipitous decline in environmental quality, as indicated above. Most disconcerting is the growing body of evidence suggesting that those who benefit least from economic growth suffer most from the environmental degradation in which it results. The example of hazardous waste, an important by-product of many of the world's most profitable industries, is a particularly telling one. Michael Dorsey reports that OECD countries exported an estimated 2,611,677 tonnes of hazardous waste to countries outside the OECD between 1989 and 1994.<sup>27</sup> Often recipient countries are developing nations with inadequate legal frameworks and infrastructure for safely handling this waste. In such situations, negative human and environmental consequences are almost unavoidable. Within OECD countries, hazardous waste storage and treatment facilities are often located in poor, minority communities. As Dorsey reports, a US General Accounting Office study in the early 1980s concluded that "blacks make up the majority of the population in three out of four communities where landfills are located".<sup>28</sup> Land degradation due to unsustainable forestry and agricultural practices, the decline of fisheries worldwide, and increasing scarcity of safe water also disproportionately affect the poor.

While present modes of economic production, trade, and investment may have negative environmental and human consequences, the argument presented in this volume is not that economic growth *per se* is the problem. The issue, rather, is that structures which govern how production, trade, and investment occur are inadequate for the task of protecting

the environment and human life. Current economic governance structures continue to make rules that actively undermine existing environmental and social safeguards and limit the ability of national governments to respond adequately to new environmental concerns.

These claims are made most frequently in regard to the WTO.<sup>29</sup> Regarding the environment, concerns have been raised that the WTO's opposition to process-related trade restrictions is incompatible with the increased focus of environmental laws and policies on life-cycle assessment. Furthermore, it is argued that WTO rulings "[fail] to acknowledge the right of countries to take action to protect the atmosphere, the oceans, and other parts of the global commons".<sup>30</sup> Part of the problem seems to be that, while the WTO has a Committee on Trade and Environment which looks at the positive impacts of trade liberalization on the environment and at the potential negative effects of environmental protection on trade, the committee is not mandated to examine any potentially negative impacts of trade on the environment.<sup>31</sup>

A recent paper commissioned by the World Trade Organization agrees that some of these problems exist and need to be addressed. It argues that "economic integration has important environmental repercussions ... [and] that the ongoing dismantling of economic borders reinforces the need to cooperate on environmental matters, especially on trans-boundary and global environmental problems that are beyond the control of any individual nation".<sup>32</sup> This admission, however, does not go far enough.

Cooperation on environmental matters alone cannot address the environmental challenges we face. Rapidly rising resource consumption, and the social and environmental impacts that go with it, cannot be addressed in environmental agreements alone. Furthermore, poverty, itself in part a result of certain trade and investment patterns, can and often does result in severe environmental damage. A more far-reaching approach is required based on a rigorous enquiry into the environmental and social impacts of trade liberalization. Based on the results of this enquiry, governance structures must be built and strengthened – not only at the global, but also at the regional, national, and local levels – "to preserve the advantages of global markets and competition, but also to provide enough space for human, community and environmental resources to ensure that globalization works for people – not just for profits".<sup>33</sup>

### Towards a more holistic form of environmental governance

While the UNDP report quoted above emphasizes the importance of governance at all levels, from local to global, thinking about environmental

governance has tended to focus on the international level and to pay insufficient attention to the need for sustainable development. The urgent need to rectify both of these problems is addressed in the following section. Special attention is then paid to the role that the United Nations may be able to play in this process.

*Integrating the international, regional, national, and local*

Many of the environmental threats we face are global in scope or have the potential to become so. As such, international conventions and other such mechanisms are of vital importance. However, international environmental governance can only be effective if it is integrated into local, national, and regional governance structures which encompass governments as well as civil society and the business sector.

This integration implies two-way influence. On the one hand, international governance structures, and the rules that flow from them, must have the capacity to shape national policy. While international trade policy is rather effective in this regard, the impact of international environmental agreements is often less evident. This is particularly because the WTO, unlike the average environmental agreement, has a powerful dispute resolution mechanism under which WTO members are able to challenge each other's domestic legislation as it relates to trade.<sup>34</sup> If international environmental agreements are to be effective in the face of ongoing economic liberalization, it is important that they, too, have mechanisms which encourage compliance at the national level, and that economic imperatives are not given automatic precedence over environmental and social exigencies. This latter point will be returned to in the discussion of the role of the United Nations below.

The inverse of ensuring the impact of the international on the national must also be true. If international rule-making is to change local and national policy, then the citizens of affected countries have the right and duty<sup>35</sup> to participate, either directly or indirectly, in this international decision-making. Parliamentary representatives and civil society organizations are important avenues for participation.

Key global networks of parliamentarians, such as the Inter-Parliamentary Union (IPU) and the Global Legislators Organization for a Balanced Environment (GLOBE), have expressed a growing interest in enhancing parliamentary participation in international fora. The IPU set out in very eloquent terms why parliamentary involvement is so vital in its *Final Declaration of the Parliamentary Meeting on the Occasion of UNCTAD X* in Bangkok in February 2000:

As members of parliament, we speak for constituencies that cut across the divide of rich and poor, capital and labour, the public and private sector, and corporate

and small-scale enterprise ... [G]reater parliamentary involvement can only be beneficial to development. Indeed, democracy, respect for the rule of law, and a government that is transparent and accountable to parliament are indispensable building blocks for good governance and sustainable development.<sup>36</sup>

GLOBE International very much shares this perspective. As a member of that organization, the author submitted an Action Agenda on International Environmental Governance to the GLOBE International General Assembly in April 2000 which, among other things, "call[s] on parliaments and their members to increase their involvement in international negotiations on trade, finance, development and environmental issues".

Numerous suggestions have been made over the past several years with regard to how enhanced parliamentary participation might be accomplished in practice. For instance, Inge Kaul has suggested the creation of "a venue in which representatives of national parliaments could meet ... to discuss international cooperation perspectives and needs".<sup>37</sup> Slightly more controversially, Kaul argues that the chief delegates of UN delegations should not be drawn from the executive but rather from the legislative branch of government.<sup>38</sup> Regardless of the final structure chosen to ensure representation, the basic rule of thumb should be that where decision-making authority moves from national legislatures to international organizations with no direct accountability to citizens, it is imperative that such organizations are transparent and facilitate participation by the people who will be affected by their decisions. The parliamentary initiatives described above are just some of the responses to this imperative.

Civil society organizations have also made many proposals on mechanisms for improving and broadening their participation in international governance. They have been rather successful in some areas, particularly in relation to the UN General Assembly and its specialized agencies. Since 1996, for instance, consultative status with the UN's Economic and Social Council (ECOSOC) has been broadened to include not only international, but also regional, subregional, and national NGOs. In addition, many of the UN's specialized agencies now have NGO focal points, NGO advisory committees, and other formalized mechanisms which allow for the sharing of experience between the agencies and their NGO partners.<sup>39</sup>

NGOs have been less satisfied with their access to bodies such as the WTO, which falls outside the UN system. Some improvement, such as greater access to documentation and the establishment of "dialogue symposia", has taken place since the formation of the WTO. However, it was evident in Seattle in 1999 that most civil society organizations believe that much more can be accomplished through activities and protest outside the WTO than by any action inside it. Many academics and NGO

leaders have argued that it is time for NGOs to be granted consultative status with the WTO, since NGOs are likely to play as constructive a role there as they do in so many other intergovernmental organizations.<sup>40</sup>

### *Towards sustainable development*

Economic and environmental governance structures at the international level have also tended at times to pay not much more than lip service to the need for sustainable development. This is not least because international rule-making is a complex mixture of compromises between all parties and undue influence by parties with the most resources available to promote their national or corporate agenda. While there is no simple solution to this problem, governance structures and rule-making need to be designed so as to better ensure that the overriding objective of international governance is achieved: a kind of development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”.<sup>41</sup>

### *The role of the United Nations*

It is therefore encouraging to see the leadership role that the United Nations is taking to promote a more holistic approach to international environmental governance, both within the United Nations itself and in cooperation with its many partners worldwide. With respect to the UN's in-house efforts, the Secretary-General's 1997 Programme for Reform<sup>42</sup> notes in a section on environment, habitat, and sustainable development that there “is a need for a more integrated systemic approach to policies and programmes throughout the whole range of United Nations activities in the economic, social and development fields by mainstreaming the Organization's commitment to sustainable development”. The Programme for Reform goes on to identify UNEP as the focal point for harmonization and coordination of the UN's environment-related activities and emphasizes the Secretary-General's support for this process. Given the UN's central role in many of the world's key environmental conventions, its influence on and support for environment and development programmes in many developing countries, and its power to convene most of the world's governments, this shift towards a holistic approach within the United Nations is welcome indeed.<sup>43</sup>

In a variety of different fora, the United Nations is also encouraging national governments to take a similar, systematic approach to governance and policy formation at the national level. For instance, in the area of natural resource management, the secretariat of the Convention on Biological Diversity encourages governments to increase intersectoral communication and cooperation, possibly through the “formation of

inter-ministerial bodies within the government or the creation of networks for sharing information and experience".<sup>44</sup> This is one vital part of ensuring that international agreements are translated into real policy changes at the national level. It is, after all, national policies or the lack thereof that bear much of the responsibility for current environmental trends.

The United Nations has also made progress in building partnerships with business, civil society, and parliamentarians, as alluded to earlier in this chapter. Existing ties between the business community and the United Nations are being enhanced in order to strengthen the stake which business has in sustainable development programmes and policies at the local, national, and international levels. It is encouraging that the International Chamber of Commerce and World Economic Forum have already established consultation mechanisms with the United Nations.<sup>45</sup> At the World Economic Forum in Davos in January 1999, UN Secretary-General Kofi Annan urged business leaders to support appropriate public policies and embrace the "Global Compact", which includes support for a precautionary approach to the environment, and encouragement of the development and diffusion of environmentally friendly technology.<sup>46</sup>

These cooperative efforts should work to enhance and encourage the exciting and successful efforts to promote effective environmental governance that are being made by many governments and corporations in both industrialized and developing countries, often with the support of local residents, environmental NGOs, and investors.<sup>47</sup> They should also act as an impetus for ensuring that economic activities which are not adequately regulated for their social and environmental impacts under national law are "brought within the frame of global governance".<sup>48</sup> This does not mean that business or the United Nations must encourage the World Trade Organization and other such economic governance bodies to become environmental watchdogs. Rather, it suggests that bodies like the WTO must be urged to ensure that the rules which they put in place support the maintenance and development of environmental and social safeguards and rule-making. This would entail, for instance, UNEP and the secretariats of environmental conventions being actively consulted on economic rule-making and the results of these consultations being fed into the economic decision-making process.

The United Nations has also made great strides in involving civil society in its work in recent years. Recognition on the part of the United Nations of the importance of tapping into civil society, in all its diversity, truly began in the early 1990s with the drafting of Agenda 21. Originally a largely scientific document, Agenda 21 soon came to include a whole new section entitled "Strengthening the Role of Major Groups". Due to energetic and effective lobbying on the part of many of these groups, women, children and youth, indigenous peoples, NGOs, local authorities,

workers and trade unions, business and industry, the science and technology community, and farmers were all recognized as stakeholders in governance.<sup>49</sup> This was not an act of charity on the part of the United Nations. Rather, the United Nations recognized, in the words of the Commission on Global Governance, that an “adequate” system of governance “must encompass actors who have the power to achieve results”.<sup>50</sup> Effective cooperation with all of these groups would make the United Nations a dynamic and powerful organization indeed.

The rising number of NGOs with ECOSOC consultative status is one indication of the growing participation of civil society in the work of the United Nations. The Secretary-General’s Programme for Reform<sup>51</sup> notes that NGOs with ECOSOC consultative status have climbed in number from 41 in 1948 to approximately 1,200 at present. Much of this growth has taken place since the Earth Summit.<sup>52</sup> Unfortunately, however, only 15 per cent of the NGOs with ECOSOC status are from developing countries, a figure reflecting how far the United Nations still has to go in its quest for full and balanced consultations with civil society.

It is therefore encouraging, to see the initiative taken by the United Nations University in 1996 to convene a “World NGO Conference” to follow up on the recommendations of the Commission on Global Governance. The World Civil Society Conference (WOCSOC), as this meeting came to be known, was held in December 1999 in Montreal. Its objectives included the drawing of lessons from cooperation between civil society and the United Nations, and the enhancement of cooperation among civil society actors in order to meet the needs of the twenty-first century.<sup>53</sup> The support of the United Nations itself for this meeting was clear, as the Secretary-General himself gave the keynote speech and the outcomes of the conference were welcomed as input to the preparations for the UN Millennium Assembly held in September 2000.

Important efforts have been made by the United Nations to involve parliamentarians in its work as well. For example, an agreement was reached between the United Nations and the Inter-Parliamentary Union in 1996 that forms the foundation for an enhanced consultative relationship between the two organizations. Much more, however, could and ought to be done. As Stilwell notes, parliaments continue to be “the mainstay of democracy” and “the most representative political institution”.<sup>54</sup> The United Nations, which continues to operate largely as if there are only two categories of representation – governments and NGOs – would do well to make more space for parliamentary involvement. This recommendation applies equally to other multilateral institutions, such as the WTO.

Finally, as a convener the United Nations is also in a powerful position to take leadership in building a dialogue between the many actors who are already concerned about and active in the area of international

environmental governance. In such a process, the United Nations would need to pay serious attention to the links between international economic governance and existing structures of environmental governance at the global, regional, national, and local levels. The UNDP has recently suggested that a task force “be established on global economic governance with ... 10 industrial and 10 developing countries, but also with representatives of civil society and private financial and corporate actors”.<sup>55</sup> This idea could quite easily be modified to take a broader sustainable development perspective, so that the task force would consider the complex linkages between the economy, the environment, and development concerns. In order to ensure such a broad approach, the task force would also need to include scientists and elected representatives of the people, as a damaging communication gap continues to lie between those who understand environmental problems (scientists) and those who have the political wherewithal to do something about them (policy-makers). A task force of this nature could potentially make great strides in building awareness within states, parliaments, corporations, international financial institutions, and civil society of the importance of taking a holistic approach to economic and environmental governance issues.

## Conclusion

In a world affected increasingly by the international flow of goods, services, and people on the one hand, and the sometimes negative social and environmental impacts of these flows on the other, governance at the global level is becoming the key locus for innovative thinking and solutions. While many of the global environmental challenges we face can best be addressed at the international level, solutions arrived at by those who govern at this level will only be sustainable on two conditions.

First, they must be found and implemented in partnership with the broad range of people they are designed to benefit. Whereas governance was seen as largely the job of governments throughout much of the twentieth century, there is an increasingly realization that good governance necessitates the participation of all sectors of society. Greatly enhanced transparency and participation by elected representatives and NGOs in the rule-making process are of central importance. The business community must also be included in order to strengthen its commitment to sustainable development. Important advances have been made in this regard within the United Nations and in many international environmental conventions, but economic governance mechanisms – whose activities have major environmental and social impacts – remain largely closed to civil society and parliamentarians.

Second, and even more importantly, solutions need to be based on the understanding that human society and the environment are interconnected, and that without a sound environment society cannot function. This means both that environmental agreements need to take into greater consideration the development needs of the poor, and that more economically oriented governance mechanisms need to operate with a fuller understanding of the linkages between the economy and the environment. The economic governance structures which presently exist do little to protect the environment, and arguably do much to destroy it. An unfettered market, without mechanisms to value goods, services, and investment at their true ecological and social costs, is something we can no longer afford. Without the building and rebuilding of governance structures to correct the horrifying environmental mistakes human society has made and to lift the world's impoverished people to a decent standard of living, all of our governance efforts to date can be termed little more than unmitigated failures. It is only an interlinked, holistic approach to governance which puts the environment and people's needs first that will suffice for the coming century.

## Notes

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# Acronyms

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AIA	advance informed agreement
ASEAN	Association of South-East Asian Nations
CBD	Convention on Biological Diversity
CFC	chlorofluorocarbon
CFE	compensatory financing facility
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species
COP	Conference of Parties to the CBD
CSD	UN Commission on Sustainable Development
DAC	OECD Development Assistance Committee
DDT	dichlorodiphenyltrichloroethane
DNA	deoxyribonucleic acid
ECLAC	UN Economic Commission for Latin America
EEZ	exclusive economic zone
ECOSOC	UN Economic and Social Council
ESAF	extended structural adjustment facility
EU	European Union
FAO	Food and Agriculture Organization
FDI	foreign direct investment
G77	Group of 77
GATS	General Agreement on Trade and Services
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GDP-PPP	gross domestic product-purchasing power parity
GEF	Global Environment Facility

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GEMS	Global Environmental Monitoring System
GHG	greenhouse gas
GIS	geographical information system
GLOBE	Global Legislators Organization for a Balanced Environment
GM	genetically modified
GMO	genetically modified organism
GNP	gross national product
GPS	global positioning system
GSTF	Global Science and Technology Facility
GWP	Global Water Partnership
GWP	gross world product
HFC	hydrofluorocarbon
HIPC	heavily indebted poor country
IACSD	Inter-Agency Committee on Sustainable Development
ICARDA	International Centre for Agricultural Research in the Dry Areas
I-G	inequality-growth
IBRD	International Bank for Reconstruction and Development
ICSU	International Council for Science
ICT	information and communication technology
IDA	International Development Association
IDG	international development goal
IFI	international financial institution
IIASA	International Institute for Applied Systems Analysis
ILO	International Labour Organization
IMF	International Monetary Fund
INBio	National Biodiversity Institute (Costa Rica)
IPC	Intergrated Programme for Commodities
IPCC	Intergovernmental Panel on Climate Change
IPR	intellectual property right
IPU	Inter-Parliamentary Union
ISS	International Space Station
ITO	International Trade Organization
IUCN	International Union for Conservation of Nature and Natural Resources (World Conservation Union)
IUPGR	International Undertaking on Plant Genetic Resources
LDC	least developed country
LMO	living modified organism
MDC	more developed country
MERCOSUR	Southern Cone Common Market
MFN	most-favoured nation
MNC	multinational corporation
MSSRF	MS Swaminathan Research Foundation
NARES	national agricultural research and extension services
NARS	national agricultural research systems
NASA	National Aeronautics and Space Administration

NGO	non-governmental organization
NIC	newly industrializing country
NIEO	new international economic order
ODA	official development assistance
ODI	Overseas Development Institute (USA)
OECD	Organization for Economic Cooperation and Development
ONCHO	Onchocerciasis (Riverblindness) Control Programme
OPEC	Organization of Petroleum Exporting Countries
PCB	polychlorinated biphenyl
POP	persistent organic pollutant
PPP	purchasing power parity
RBGH	recombinant bovine growth hormone
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
SADCC	Southern Africa Development Coordination Conference
SAP	structural adjustment programme
SAPRI	Structural Adjustment Programme Review Initiative
SSA	sub-Saharan Africa
SUNFED	Special UN Fund for Economic Development
TFR	total fertility rate
TRIPS	trade-related intellectual property rights
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCSD	United Nations Commission on Sustainable Development
UNCTAD	United Nations Conference on Trade and Development
UNDCP	United Nations International Drug Control Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNU/WIDER	United Nations University World Institute for Development Economic Research
UPOV	Union for the Protection of New Varieties of Crops
WCED	World Commission on Environment and Development
WEC	World Energy Council
WHO	World Health Organization
WIID	World Income Inequality Database
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
WOCSOC	World Civil Society Conference
WTO	World Trade Organization

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# Index

- adult literacy rates 3, 65–66
- Africa
  - African Virtual University 72
  - employment informalization 48–49
  - fertility rates 128
  - inequality trends 84
  - population ageing 130–131
  - population projections 139
  - primary education 53
  - structural adjustment programmes 38, 48–49, 53, 167
  - urbanization 190
- agriculture
  - Asia Pacific region 236
  - biodiversity depletion 251–252, 258
  - ecotechnology revolution 241
  - ever-green revolution 236–237
  - food security 10, 234–243, 246
  - future challenges 236
  - gene revolution 240–241
  - history of 237
  - information technology 242
  - land degradation 245–261
  - plant medicine 239
  - sustainable 234–236
  - technological development 237–238, 239–242
- Annan, Kofi 20, 26, 35, 296
- Asian financial crisis 38–40, 50, 56, 58, 59, 167–168, 172, 173, 291
- atmosphere
  - see also* climate change
  - aerosol 217–218
  - air pollution 215–216
  - CO<sub>2</sub> concentration 186, 226
  - Convention on Climatic Change 235–236, 256, 288–289
  - detergents 216
  - main gases 213–214
  - ozone hole 9, 214–215, 287
  - tropospheric chemistry 217–218
- Barshefsky, Charlene 178
- Bergsten, C. Fred 176, 178
- biodiversity 10–11
  - see also* Convention on Biological Diversity
  - bioprospecting 273–274
  - biosafety 11, 271–273
  - biotechnology 116–119, 269–270
  - equitable distribution of benefits 276–278
  - flow of benefits 275–276
  - Global Biodiversity Assessment* 235
  - global initiatives 265
  - impact of globalization 269–274

- biodiversity (cont.)
  - land degradation 251–252, 258
  - loss of 186–187, 264–265
  - national responsibility 278–279
  - partnership approach 281–282
  - policy challenges 274–278
  - role of United Nations 279–281
  - sovereign property 235
  - threatened species 286
- bioprospecting 273–274
- biosafety 11, 271–273
- biotechnology 116–119, 269–270
- Block, John 175
- Brundtland Commission 13
- Cairo Population Conference 127, 136, 141
- China
  - inequality trends 81–82
  - land reforms 88
  - poverty reduction 102
- climate change
  - see also* atmosphere
  - CO<sub>2</sub> concentration 186, 226
  - Convention on Climatic Change 235–236, 256, 288–289
  - greenhouses gases 213–214
  - Kyoto Protocol 227, 235–236
  - ozone hole 9, 214–215, 287
  - relationship with population 141–145
  - sea level rise 235
- Comprehensive Development Framework 70–71
- Convention on Biological Diversity 238, 256, 288
  - see also* biodiversity
  - bioprospecting 273–274
  - biosafety 271–273
  - biotechnology 269–270
  - cooperative approach 295–296
  - equitable distribution of benefits 276–278
  - flow of benefits 275–276
  - issues covered 266–268
  - lack of clarity 280
  - national responsibility 278–279
  - negotiating process 265–266
  - partnership approach 281–282
  - policy challenges 274–278
  - role of United Nations 279–281
  - sustainability 267
  - technology transfer 268
- Convention on Climatic Change 235–236, 256, 288–289
- Convention to Combat Desertification 256, 288–289
- corruption
  - economic effects 152
  - role in development 151–154
- disease, spread of 69–70
- distribution-growth nexus 95–98
- Dornbusch, Rudiger 171
- Earth Summit 9, 141, 198, 234–235, 265–266, 285, 288, 297
- economics
  - see also* structural adjustment
  - programmes, Washington Consensus
  - Bretton Woods institutions 163–164
  - challenges of globalization 45–46
  - crisis in IMF/WTO 161
  - demonization of South 165–166
  - dismantling UN development system 169–170
  - e-commerce 115–116, 188
  - econometric analysis of inequality 84–88
  - econometric test of inequality-growth relationship 99
  - economic self-determination 42
  - economy-environment equation 290–292
  - effects of corruption 152
  - employment informalization 48–49
  - equitable growth 47–48
  - financial rents 93–94
  - future of global trade 174–176
  - General Agreement on Tariffs and Trade (GATT) 170–171, 174–178
  - growth in world economy 186
  - industrialization 187–190
  - institutions 36–41
  - newly industrializing countries 167–169
  - official development aid 69, 72, 149, 154–158
  - pluralistic governance 178–180
  - role of OPEC 164, 165–166
  - Southern agenda 161–162, 164–165
  - structural adjustment 166–167
  - World Trade Organization 170–171
  - WTO crisis 174–176
- employment
  - informalization 48–49
  - insecurity 56–59

- 
- energy
    - CO<sub>2</sub> concentrations 226
    - electricity consumption 222
    - future requirements 225–227
    - geothermal 229–230
    - hydropower 229–230
    - nuclear 231
    - present requirements 221–224
    - primary energy shares 228
    - regional data 223
    - relationship with life expectancy 221–222
    - relationship with population 224–225
    - renewables 227–230
    - requirements 9–10
    - role of UN agencies 230–232
    - technology transfer 231–232
    - urbanization 225
  - environment
    - see also* agriculture, atmosphere, biodiversity, climate change, land degradation, water
    - acid rain 206
    - air pollution 215–216
    - biodiversity 10–11, 186–187, 235, 238, 264–282
    - biomass burning 215
    - climate change 141–145
    - current state of 285–288
    - declining quality of 284–285
    - deforestation 143–144, 286
    - economic value 11
    - economy-environment equation 290–292
    - hazardous waste 291
    - holistic approach 288–290, 292–298
    - impact on human development 12–16, 284–299
    - integrated governance 293–295
    - Kyoto Protocol 20, 227, 235–236
    - land degradation 10, 245–261
    - need for commitment 17–18
    - nitrogen cycle 287
    - pollution 11, 286–288
    - recommendations 24
    - renewable resources 286
    - role of United Nations 295–298
    - sea level rise 235
    - soil erosion 186–187
    - sustainable agriculture 234–236
    - sustainable development 295
    - sustainable economic system 18–20
    - technological innovation 188–189
    - threats to 7–12
    - toxic chemicals 207
    - waste 286–288
    - water pollution 203–207
  - food production 10
  - food security 234–243
  - General Agreement on Tariffs and Trade (GATT) 170–171, 174–178
  - Global Action Plan for Basic Education 70
  - global governance system 6–7
  - globalization
    - causes of inequality 88–95
    - challenges of 59–60
    - definitions of 33–34
    - distribution-growth nexus 95–98
    - econometric analysis of inequality 84–88
    - economic challenges 45–46
    - economic self-determination 42
    - effects of 3–4, 14–15, 66
    - employment informalization 48–49
    - employment insecurity 56–59
    - equitable growth 47–48
    - financial pressure 93–94
    - global income distribution 77–78
    - human capital 52–56
    - impact on biodiversity 269–274
    - impact on land degradation 253–254
    - importance of states 43–44
    - industrialization 187–190
    - inequality 49–52, 63–64, 77–88
    - instability 56
    - institutions 36–41
    - integration 46–47
    - interdependence of nations 69
    - international corporate power 42–43
    - official development assistance 69, 72, 149, 154–158
    - recommendations 22–23
    - role of middle class 41–42
    - role of UN system 60–61
    - spread of disease 69–70
    - technology 113–114
    - trade liberalization 35–36, 92–93
  - Global Water Partnership 198, 207, 209–211
  - growth
    - distribution-growth nexus 95–98
    - impact of inequality 95–103

- HIV/AIDS 67–68
- Human Genome Project 240
- human development
  - acceleration of 68–73
  - adult literacy rates 3, 65–66
  - basic services infrastructure 69
  - capacity development 16–17, 23
  - challenges of 2–7
  - Comprehensive Development Framework 70–71
  - corruption 151–154
  - democratization 14–15
  - effectiveness of international cooperation 149–150
  - employment informalization 48–49
  - employment insecurity 56–59
  - energy requirements 220–221
  - equitable growth 47–48
  - food security 234–243
  - freedoms 13, 45
  - Gini ratios 51
  - global challenges 112
  - global economy 69
  - global income distribution 77–78
  - history of 65
  - HIV/AIDS 67–68
  - human capital 52–56
  - impact of environmental governance 284–299
  - income gap 291
  - industrialization 187–190
  - inequality 49–52, 63–64
  - infant mortality rates 3, 65–66, 128
  - institutional infrastructure 150–151, 154–156
  - integration with environment 12–16
  - international development goals 71
  - life expectancy rates 3, 65–66, 128, 134, 221–222
  - link with economic growth 68
  - official development aid 69, 72, 149, 154–158
  - population growth 5–6
  - population variable 126–127
  - poverty rates 4–5, 65–67
  - principles for effectiveness 24–26
  - recommendations 22
  - role of new technology 72
  - role of World Bank 163–164
  - role of World Trade Organization 176–177
  - social expenditure 53–54
  - social indicators 55, 66
  - Southern economic agenda 161–162, 164–165
  - sustainability 186–194, 295
  - sustainable economic system 18–20
  - urbanization 185–186
- India, agricultural production 237
- industrialization, global sustainability 187–190
- inequality
  - access to education 89
  - causes of rise in 88–95
  - China 81–82
  - distribution-growth nexus 95–98
  - econometric analysis 84–88
  - econometric test of inequality-growth relationship 99
  - effects of globalization 63–64
  - erosion of state powers 94–95
  - financial pressure 93–94
  - former Soviet bloc 79–81
  - global income distribution 77–78
  - impact on growth 95–103
  - inequality-growth relationship 98–99
  - labour institutions 94
  - land concentration 88
  - Latin America 81
  - natural resources 89
  - new causes 91–95, 104–106
  - OECD countries 78–79
  - poverty reduction 99–103
  - social indicators 55
  - South Asia 83–84
  - South-East Asia 82–83
  - stabilization 91–92
  - structural adjustment programmes 50, 91–92
  - sub-Saharan Africa 84
  - tackling causes 103–106
  - technological change 91
  - trade liberalization 92–93
  - traditional causes 88–90, 103–104
  - urban bias 90
  - wages and incomes 49–52
- infant mortality rates 3, 65–66, 128
- information technology 114–116, 242
- institutional infrastructure, role in development 150–151, 154–156

- International Conference on Environment and Economics 1974 13
- International Conference on Water and Environment 1992 198
- international development goals 71
- International Monetary Fund (IMF)
  - Asian financial crisis 38
  - compensatory financing facility 164–165
  - crisis situation 161, 173–174
  - criticisms of 172
  - failure of structural adjustment programmes 171–172
  - founding of 163
  - heavily indebted poor countries initiative 73
  - poverty reduction policy 171
  - structural adjustment programmes 166–167
- Japan
  - economic system 39–40
  - land reforms 88
- Kaul, Inge 294
- Kyoto Protocol 20, 227, 235–236
- labour institutions, role in inequality 94
- land concentration 88
- land degradation 10
  - biodiversity depletion 251–252, 258
  - consortia to combat 259
  - cost of 252–253
  - dry areas 249–252
  - food security 246
  - global concern 253–260
  - hydrologic balance 247–248
  - impact of globalization 253–254
  - manifestations of 248
  - nature of 246–248
  - policy challenges 254–255
  - research initiatives 257–260
  - role of CGIAR 257–260
  - role of United Nations 255–257
  - salinization 250–251
  - scope of problem 245–246
  - soil degradation 247
  - soil erosion 249–250
  - technology development 257–260
- Latin America
  - access to education 53, 89
  - economic deterioration 38
  - employment informalization 49–50
  - employment insecurity 57
  - inequality trends 81
  - land concentration 88
  - structural adjustment programmes 53, 167
  - trade liberalization 93
  - liberalization, types of 35–36
  - life expectancy rates 3, 65–66, 128, 134, 221–222
  - Mauritius, demographic transition 133–135
  - McNamara, Robert 164, 166
  - Millennium Report 1, 17, 20, 27
  - Ministerial Conference on Drinking Water and Environmental Sanitation 1994 198
  - Moore, Mike 178
  - Nader, Ralph 171
  - nanotechnology 119–120
  - OECD countries, inequality trends 78–79
  - official development assistance 69, 72, 149, 154–158
  - OPEC, role in development 164, 165–166
  - population
    - ageing 130–132
    - contraceptive practices 134–136
    - demographic transition 132–137
    - demographic trends 129
    - food security 234
    - growth in 5–6, 14
    - homeostasis 132
    - infant mortality rates 3, 65–66, 128
    - life expectancy rates 3, 65–66, 128, 134
    - long-term trends 127–130
    - projections 137–141, 224
    - relationship with climate change 141–145
    - relationship with energy 224–225
    - role in human development 126–127
    - total fertility rate 128–129
    - world outlook 137–141
  - poverty
    - food insecurity 243
    - global income distribution 77–78
    - income gap 291
    - rates of 4–5, 67, 101
    - reduction of 99–103
    - rising inequality 99–103

- poverty (cont.)
  - role of Washington Consensus 76–77
  - tackling causes 103–106
- Ramsar Convention 256
- Rio+5 17–18, 285
- Rio+10 17–18, 24
- Russia, economic deterioration 37, 43
- Sachs, Jeffrey 173, 174
- soil erosion 186–187
- South Asia, inequality trends 83–84
- South-East Asia
  - HIV/AIDS 67–68
  - inequality trends 82–83
  - structural adjustment programmes 167–169
- Soviet Union, former
  - inequality trends 79–81
  - poverty rates 67
- space technology 120–122
- Stiglitz, Joseph 173
- Stockholm Conference 1972 13, 23, 198, 265
- structural adjustment programmes 166–167
  - see also* economics
  - Africa 38, 48–49, 53, 167
  - cause of inequality 91–92
  - dismantling of 173
  - employment insecurity 57–58
  - failure of 171–172
  - income inequality 50
  - Latin America 53, 167
  - social expenditure 53–54
  - social indicators 55
  - South-East Asia 167–169
- Summers, Larry 172–173
- technology
  - agricultural production 237–238, 239–242
  - bioprospecting 273–274
  - biosafety 271–273
  - biotechnology 116–119, 269–270
  - cause of inequality 91
  - cloning 118–119
  - Convention on Biological Diversity 268
  - diffusion of innovations 188–189
  - e-commerce 115–116, 188
  - ecotechnology revolution 241
  - energy production 231–232
  - gene revolution 240–241
  - globalization of 113–114
  - information technology 114–116, 242
  - Internet access 115–116, 242
  - nanotechnology 119–120
  - potential of 110–113
  - role in combating land degradation 257–260
  - role in human development 15–16, 72
  - role of United Nations 122–124
  - space technology 120–122
- trade liberalization 92–93
- UN Conference on Desertification 1977 250
- UN Water Conference 1977 198
- United Nations
  - dismantling of development system 169–170
  - Millennium Summit 17, 23, 71, 297
  - need for synergy 20–21
  - official development assistance 23
  - role in aid allocation 158–159
  - role in combating land degradation 255–257
  - role in environmental governance 295–298
  - role in global governance 7, 34–35
  - role in preserving biodiversity 279–281
  - role in sustainable energy production 230–232
  - role in technological development 122–124
  - role in urban planning 194
  - role in water monitoring 211
- United Nations University 26–28
- Interlinkages Conference 1999 289–290
- Millennium Project 111–112, 116, 120, 122
- role in technological development 124
- Threshold of New Millennium Conference 1–2, 21–22, 26–28
- urbanization 8
  - air pollution 192, 193
  - cause of inequality 90
  - causes of 191
  - challenges for policy-makers 194–195
  - energy requirements 225
  - environmental problems 191
  - history of 190
  - increase in 185–186, 190–191

- 
- local sustainability 190–194
  - spatial planning 193–194
  - water scarcity 191
  - USA
    - control over IMF 171–172
    - importance of World Trade Organization 175–176
  - Voices of the Poor* study 6
  - Walters, Maxine 172
  - Washington Consensus 5, 76–77, 149, 171
    - cause of inequality 91–95
    - Post-Washington Consensus 103–106, 150
    - role in poverty reduction 103
  - water
    - acid rain 206
    - availability of 8–9, 198–200, 204
    - crisis situation 286
    - developed countries 209–210
    - developing countries 208–209
    - development targets 207–208
    - Global Water Partnership 198, 207, 209–211
    - groundwater pollution 204–205
    - groundwater supplies 202
    - heavy metals in 205
    - human health issues 203–207
    - increased usage 197
    - international discussion 198
    - investment requirements 208
    - malaria 206
    - man-made chemicals in 205
    - microbiological contamination 203
    - quality of 203–207
    - role of UN system 211
    - scarcity of 200–203
    - supply of 206
    - surface water eutrophication 203–204
    - treatment of 205–206
    - urbanization 191–192
    - water ethic 210
    - water security 207
    - water stress 200–203
    - withdrawal rates 201, 202–203
    - World Water Vision 198, 208, 286
  - Wolfensohn, James 26, 35, 63
  - women, employment insecurity 57
  - World Bank
    - Comprehensive Development Framework 70–71
    - failure of structural adjustment programmes 171–172
    - heavily indebted poor countries initiative 72–73
    - reform of 173
    - role in development 163–164
    - structural adjustment programmes 166–167
  - World Civil Society Conference 1999 297
  - World Environment Strategy 13
  - World Income Inequality Database 85
  - World Summit for Social Development 1995 46
  - World Trade Organization (WTO)
    - crisis situation 161, 174–176
    - formation of 170–171, 175–176
    - reform of 174–176, 177–180
    - role in development 176–177
    - Seattle ministerial 174
  - World Water Vision 198, 208, 286

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