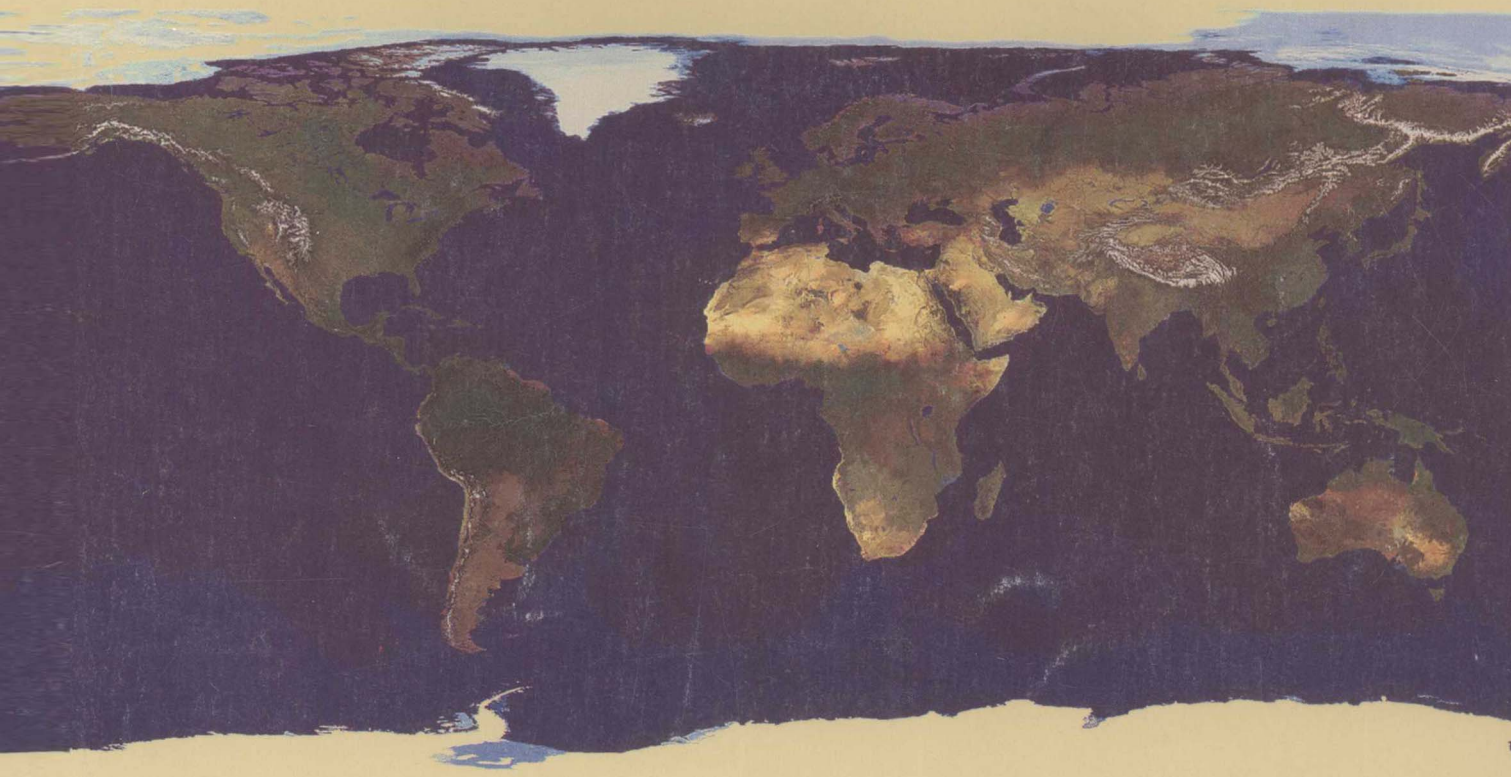
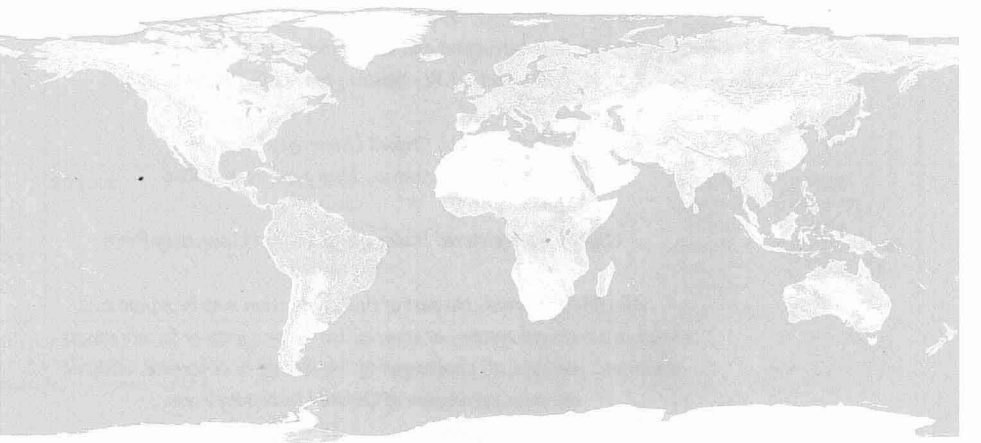
World Development Report 1992

Development and the Environment



WORLD DEVELOPMENT INDICATORS

World Development Report 1992
Development and the Environment



Published for the World Bank
Oxford University Press

Oxford University Press
OXFORD NEW YORK TORONTO DELHI
BOMBAY CALCUTTA MADRAS KARACHI
KUALA LUMPUR SINGAPORE HONG KONG
TOKYO NAIROBI DAR ES SALAAM
CAPE TOWN MELBOURNE AUCKLAND
and associated companies in
BERLIN IBADAN

Published by Oxford University Press, Inc.
200 Madison Avenue, New York, N.Y. 10016

Oxford is a registered trademark of Oxford University Press.

Manufactured in the United States of America
First printing May 1992
Second printing May 1993

The maps that accompany the text have been prepared solely for the convenience of the reader; the designations and presentation of material in them do not imply the expression of any opinion whatsoever on the part of the World Bank, its affiliates, or its Board or member countries concerning the legal status of any country, territory, city, or area, or of the authorities thereof, or concerning the delimitation of its boundaries or its national affiliation.

The composite satellite photograph on the front cover is reproduced with the permission of
The GeoSphere Project, Tom Van Sant, Inc.
146 Entrada Drive, Santa Monica, Calif. 90402 U.S.A.

ISBN 0-19-520877-3 clothbound
ISBN 0-19-520876-5 paperback
ISSN 0163-5085


Text printed on recycled paper that conforms to the American National Standard for Permanence of Paper for Printed Library Materials, Z39.48-1984

Foreword

World Development Report 1992, the fifteenth in this annual series, explores the links between economic development and the environment. The 1990 report on poverty, last year's report on development strategies, and this Report constitute a trilogy on the goals and means of development.

The main message of the Report is the need to integrate environmental considerations into development policymaking. The value of the environment has been underestimated for too long, resulting in damage to human health, reduced productivity, and the undermining of future development prospects. The Report argues that continued, and even accelerated, economic and human development *is* sustainable and can be consistent with *improving* environmental conditions, but that this will require major policy, program, and institutional shifts. A twofold strategy is required. First, the positive (''win-win'') links between efficient income growth and the environment need to be aggressively exploited. This calls, for example, for the removal of distortionary policies (such as subsidies for energy, chemical inputs, water, and logging) that encourage the overuse of natural resources; for expanded emphasis on population programs, female education, agricultural extension and research, and sanitation and clean water; for more local participation in the design and implementation of development programs; and for open trade and investment policies, which encourage technological innovation and transfer. Second, strong policies and institutions need to be put in place which cause decisionmakers—corporations, households, farmers, and governments—to adopt less-damaging forms of behavior. Both types of policy are essential.

Where tradeoffs exist between income growth and environmental quality, the Report argues for a careful assessment of the costs and benefits of alternative policies, taking account of uncertainties and irreversibilities that may be associated with ecological processes. Some would prefer a more absolute approach to protection, but for policymakers with scarce resources seeking to raise the well-being of their citizens in an environmentally responsible manner, it is essential that tradeoffs be clarified in a rational manner and cost-effective policies designed. The Report demonstrates that much damage takes place with little or no benefit in the form of increased income and that a careful assessment of benefits and costs will result in much less environmental damage.

In emphasizing the essential consistency between sound development and environmental policies, the Report follows in the tradition of earlier analyses, including the seminal work of the World Commission on Environment and Development (*Our Common Future*, 1987). It also draws on research and experience in many parts of the World Bank and builds on the foundations laid by the Bank's Environment Department and regional environment divisions, set up in 1987. The discussion and research involved in the preparation of this Report have encouraged our economists, sector specialists, and environment staff to think more clearly and constructively about the links between environment and development and about the design of policies and programs for development that is sustainable. The lasting result is that environmental considerations will become more deeply embedded in every aspect of the Bank's work.

Like its predecessors, *World Development Report 1992* includes the World Development Indicators, which offer selected social and economic statistics on 125 countries. The Report is a study by the Bank's staff, and the judgments made herein do not necessarily reflect the views of the Board of Directors or the governments they represent.

Lewis T. Preston
President
The World Bank

March 31, 1992

This Report has been prepared by a team led by Andrew Steer and comprising Dennis Anderson, Patricia Annez, John Briscoe, John A. Dixon, Gordon Hughes, Maritta Koch-Weser, William Magrath, Stephen Mink, Kenneth Piddington, Nemat Shafik, and Sudhir Shetty. Major papers and valuable advice were contributed by Jock Anderson, Wilfred Beckerman, Nancy Birdsall, Ravi Kanbur, Theodore Panayotou, David Pearce, Anwar Shah, and David Wheeler. The team was assisted by Lara Akinbami, Ifediora Amobi, Wendy Ayres, Sushenjit Bandyopadhyay, William Cavendish, Nathalie Johnson, Andrew Parker, and Salenna Wong-Prince. The work was carried out under the general direction of Lawrence H. Summers.

Many others in and outside the Bank provided helpful comments and contributions (see the bibliographical note). Mohamed T. El-Ashry provided advice and coordinated inputs from the Bank's Environment Department. The International Economics Department prepared the data and projections presented in Chapter 1 and the environmental data appendix. It is also responsible for the World Development Indicators. The production staff of the Report included Ann Beasley, Kathryn Kline Dahl, Stephanie Gerard, Jeffrey N. Lecksell, Nancy Levine, Hugh Nees, Carol Rosen, Kathy Rosen, Walton Rosenquist, and Brian J. Svikhart. The support staff was headed by Rhoda Blade-Charest and included Laitan Alli, Trinidad S. Angeles, Kathleen Freeman, Denise M. George, Jajuk Kadarmanto, and Lucy Kimani. Frances Cairncross was the principal editor.

Acronyms and initials

BOD	Biological oxygen demand
CFC	Chlorofluorocarbon
CGIAR	Consultative Group on International Agricultural Research
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
EC	European Community (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, and United Kingdom)
FAO	Food and Agriculture Organization of the United Nations
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GEF	Global Environment Facility
GEMS	Global Environment Monitoring System
GHG	Greenhouse gas
GNP	Gross national product
G-7	Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, and United States)
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature and Natural Resources (now World Conservation Union)
NGO	Nongovernmental organization
OECD	Organization for Economic Cooperation and Development (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States)
R&D	Research and development
SPM	Suspended particulate matter
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNSO	United Nations Statistical Office
USAID	U.S. Agency for International Development
VOC	Volatile organic compounds
WHO	World Health Organization

Definitions and data notes

Country groups

For operational and analytical purposes the World Bank's main criterion for classifying economies is gross national product (GNP) per capita. Every economy is classified as low-income, middle-income (subdivided into lower-middle and upper-middle), or high-income. Other analytical groups, based on regions, exports, and levels of external debt, are also used.

In this edition of the *World Development Report* and its statistical annex, the World Development Indicators (WDI), the Europe, Middle East, and North Africa group has been separated into two groups, (a) Europe and (b) Middle East and North Africa. As in previous editions, this Report uses the latest GNP per capita estimates to classify countries. The country composition of each income group may therefore change from one edition to the next. Once the classification is fixed for any edition, all the historical data presented are based on the same country grouping. The country groups used in this Report are defined as follows.

- *Low-income economies* are those with a GNP per capita of $610 or less in 1990.
- *Middle-income economies* are those with a GNP per capita of more than $610 but less than $7,620 in 1990. A further division, at GNP per capita of $2,465 in 1990, is made between lower-middle-income and upper-middle-income economies.
- *High-income economies* are those with a GNP per capita of $7,620 or more in 1990.

Low-income and middle-income economies are sometimes referred to as developing economies. The use of the term is convenient; it is not intended to imply that all economies in the group are experiencing similar development or that other economies have reached a preferred or final stage of development. Classification by income does not necessarily reflect development status. (In the World Development Indicators, high-income economies classified as developing by the United Nations or regarded as developing by their authorities are identified by the symbol †.) The use of the term "countries" to refer to economies implies no judgment by the Bank about the legal or other status of a territory.

- *Other economies* are Cuba, Democratic People's Republic of Korea, and the former Union of Soviet Socialist Republics (U.S.S.R.). In the main tables of the World Development Indicators, only aggregates are shown for this group, but Box A.2 in the technical notes to the WDI contains selected indicators reported for each of these economies.
- *World* comprises all economies, including economies with less than 1 million population, which are not shown separately in the main tables. See the technical notes to the WDI for the aggregation methods used to retain the same country group across time.

Analytical groups

For analytical purposes, other overlapping classifications based predominantly on exports or external debt are used in addition to geographic country groups. Listed below are the economies in these groups that have populations of more than 1 million. Countries with less than 1 million population, although not shown separately, are included in group aggregates.

- *Fuel exporters* are countries for which exports and reexports of petroleum and gas account for at least 50 percent of exports in the period 1987–89. They are Algeria, Angola, Congo, Islamic Republic of Iran, Iraq, Libya, Nigeria, Oman, Saudi Arabia, Trinidad and Tobago, United Arab Emirates, and Venezuela. Although the former U.S.S.R. meets the established criterion, it is excluded from this group measure because of data limitations.
- *Severely indebted middle-income countries* (abbreviated to "Severely indebted" in the World Development Indicators) are fifteen countries that are deemed to have encountered severe debt-servicing difficulties. These are defined as countries in which, averaged over 1988–90, three of four key ratios are above critical levels: debt to GNP (50 percent), debt to exports of goods and all services (275 percent), accrued debt service to exports (30

percent), and accrued interest to exports (20 percent). The fifteen countries are Algeria, Argentina, Bolivia, Brazil, Bulgaria, Congo, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nicaragua, Peru, Poland, Syrian Arab Republic, and Venezuela.

- In the World Development Indicators and the Environmental data appendix, *OECD members*, a subgroup of "High-income economies," comprises the members of the Organization for Economic Cooperation and Development except for Greece, Portugal, and Turkey, which are included among the middle-income economies. In the main text of the *World Development Report*, the term "OECD countries" includes all OECD members unless otherwise stated.

Geographic regions (low-income and middle-income economies)

- *Sub-Saharan Africa* comprises all countries south of the Sahara except South Africa.
- *East Asia and the Pacific* comprises all the low- and middle-income economies of East and Southeast Asia and the Pacific, east of and including China and Thailand.
- *South Asia* comprises Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka.
- *Europe* comprises the middle-income European countries of Albania, Bulgaria, Czechoslovakia, Greece, Hungary, Poland, Portugal, Romania, Turkey, and Yugoslavia. Some analyses in the *World Development Report* use the categories "Eastern Europe" (the countries listed above except for Greece, Portugal, and Turkey) or "Eastern Europe and former U.S.S.R."
- *Middle East and North Africa* comprises the low- and middle-income economies of Afghanistan, Algeria, Egypt, Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Oman, Saudi Arabia, Syrian Arab Republic, Tunisia, and Republic of Yemen.
- *Latin America and the Caribbean* comprises all American and Caribbean economies south of the United States.

Data notes

- *Billion* is 1,000 million.
- *Trillion* is 1,000 billion.
- *Tons* are metric tons, equal to 1,000 kilograms, or 2,204.6 pounds.
- *Dollars* are current U.S. dollars unless otherwise specified.
- *Growth rates* are based on constant price data and, unless otherwise noted, have been computed with the use of the least-squares method. See the technical notes to the World Development Indicators for details of this method.
- *The symbol* / in dates, as in "1988/89," means that the period of time may be less than two years but straddles two calendar years and refers to a crop year, a survey year, or a fiscal year.
- *The symbol* .. in tables means not available.
- *The symbol* — in tables means not applicable.
- *The number* 0 or 0.0 in tables and figures means zero or a quantity less than half the unit shown and not known more precisely.

The cutoff date for all data in the World Development Indicators is March 31, 1992.

Historical data in this Report may differ from those in previous editions because of continuous updating as better data become available, because of a change to a new base year for constant price data, and because of changes in country composition in income and analytical groups.

Economic and demographic terms are defined in the technical notes to the World Development Indicators.

Contents

Boxes

Text figures

Text tables

Statistical appendix tables

Overview

The achievement of sustained and equitable development remains the greatest challenge facing the human race. Despite good progress over the past generation, more than 1 billion people still live in acute poverty and suffer grossly inadequate access to the resources—education, health services, infrastructure, land, and credit—required to give them a chance for a better life. The essential task of development is to provide opportunities so that these people, and the hundreds of millions not much better off, can reach their potential.

But although the desirability of development is universally recognized, recent years have witnessed rising concern about whether environmental constraints will limit development and whether development will cause serious environmental damage—in turn impairing the quality of life of this and future generations. This concern is overdue. A number of environmental problems are already very serious and require urgent attention. Humanity's stake in environmental protection is enormous, and environmental values have been neglected too often in the past.

This Report explores the two-way relationship between development and the environment. It describes how environmental problems can and do undermine the goals of development. There are two ways in which this can happen. First, environmental quality—water that is safe and plentiful and air that is healthy—is itself part of the improvement in welfare that development attempts to bring. If the benefits from rising incomes are offset by the costs imposed on health and the quality of life by pollution, this cannot be called development. Second, environmental damage can undermine future productivity. Soils that are degraded, aquifers that are depleted, and ecosystems that are destroyed in the name of raising incomes today can jeopardize the prospects for earning income tomorrow.

The Report also explores the impact—for good and bad—of economic growth on the environment. It identifies the conditions under which policies for efficient income growth can complement those for environmental protection and identifies tradeoffs. Its message is positive. There are strong "win-win" opportunities that remain unexploited. The most important of these relates to poverty reduction: not only is attacking poverty a moral imperative, but it is also essential for environmental stewardship. Moreover, policies that are justified on economic grounds alone can deliver substantial environmental benefits. Eliminating subsidies for the use of fossil fuels and water, giving poor farmers property rights on the land they farm, making heavily polluting state-owned companies more competitive, and eliminating rules that reward with property rights those who clear forests are examples of policies that improve both economic efficiency and the environment. Similarly, investing in better sanitation and water and in improved research and extension services can both improve the environment *and* raise incomes.

But these policies are not enough to ensure environmental quality; strong public institutions and policies for environmental protection are also essential. The world has learned over the past two decades to rely more on markets and less on governments to promote development. But environmental protection is one area in which government must maintain a central role. Private markets provide little or no incentive for curbing pollution. Whether it be air pollution in urban centers, the dumping of unsanitary wastes in public waters, or the overuse of land whose ownership is unclear, there is a compelling case for public action. Here there may be tradeoffs between income growth and environmental protection, requiring a careful assessment of the benefits and costs of alternative policies as they affect both today's population and future generations. The evidence indicates that the gains from protecting the environment are often high and that the costs in forgone income are modest if appropriate policies are adopted. Experience suggests that policies are most effective when they aim at underlying causes rather than symptoms, concentrate on addressing those problems for which the benefits of reform are greatest, use incentives rather than regulations where possible, and recognize administrative constraints.

Strong environmental policies complement and reinforce development. It is often the poorest who suffer most from the consequences of pollution

Box 1 Development and the environment: key messages of this Report

The protection of the environment is an essential part of development. Without adequate environmental protection, development is undermined; without development, resources will be inadequate for needed investments, and environmental protection will fail.

The coming generation presents unprecedented challenges and opportunities. Between 1990 and 2030, as the world's population grows by 3.7 billion, food production will need to double, and industrial output and energy use will probably triple worldwide and increase fivefold in developing countries. This growth brings with it the risk of appalling environmental damage. Alternatively, it could bring with it better environmental protection, cleaner air and water, and the virtual elimination of acute poverty. Policy choices will make the difference.

Priorities for action

Inadequate attention has been given to the environmental problems that damage the health and productivity of the largest number of people, especially the poor. Priority should be given to:

- The one-third of the world's population that has inadequate sanitation and the 1 billion without safe water
- The 1.3 billion people who are exposed to unsafe conditions caused by soot and smoke
- The 300 million to 700 million women and children who suffer from severe indoor air pollution from cooking fires
- The hundreds of millions of farmers, forest dwellers, and indigenous people who rely on the land and whose livelihoods depend on good environmental stewardship.

Addressing the environmental problems faced by these people will require better progress in reducing poverty and raising productivity. It is imperative that the current moment of opportunity be seized to bring about an *acceleration* of human and economic development that is sustained and equitable.

Policies for sustained development

Two types of policies are required: those that build on the positive links between development and the environment, and those that break the negative links.

Building on the positive links

The scope for actions that promote income growth, poverty alleviation, and environmental improvement is very large, especially in developing countries. Such "win-win" policies include:

- Removing subsidies that encourage excessive use of fossil fuels, irrigation water, and pesticides and excessive logging
- Clarifying rights to manage and own land, forests, and fisheries
- Accelerating provision of sanitation and clean water, education (especially for girls), family planning services, and agricultural extension, credit, and research
- Taking measures to empower, educate, and involve farmers, local communities, indigenous people, and women so that they can make decisions and investments in their own long-term interests.

and environmental degradation. Unlike the rich, the poor cannot afford to protect themselves from contaminated water; in cities they are more likely to spend much of their time on the streets, breathing polluted air; in rural areas they are more likely to cook on open fires of wood or dung, inhaling dangerous fumes; their lands are most likely to suffer from soil erosion. The poor may also draw a large part of their livelihood from unmarketed environmental resources: common grazing lands, for example, or forests where food, fuel, and building materials have traditionally been gathered. The loss of such resources may particularly harm the poorest. Sound environmental policies are thus likely to be powerfully redistributive.

Making decisions about some environmental problems is complicated by uncertainties about physical and ecological processes, by the long-term nature of their effects, and by the possibility of thresholds beyond which unexpected or irreversible change may occur. New evidence that the impact of chlorofluorocarbons (CFCs) on stratospheric ozone depletion is greater than earlier thought is a timely reminder of how little we know. Such uncertainties call for much greater attention to research and to designing flexible precautionary policies.

Because this Report is about development and the environment, it focuses primarily on the welfare of developing countries. The most immediate environmental problems facing these countries—unsafe water, inadequate sanitation, soil depletion, indoor smoke from cooking fires and outdoor smoke from coal burning—are different from and more immediately life-threatening than those associated with the affluence of rich countries, such as carbon dioxide emissions, depletion of stratospheric ozone, photochemical smogs, acid rain,

Targeted environmental policies

But these "win-win" policies will not be enough. Also essential are strong policies and institutions targeted at specific environmental problems. Lessons for effective policymaking include the following:

- Tradeoffs between income and environmental quality need to be carefully assessed, taking long-term, uncertain, and irreversible impacts into account. Carefully balancing costs and benefits is especially important for developing countries, where resources are scarce and where basic needs still must be met.
- Standards and policies need to be realistic and consistent with the monitoring and enforcement capacity and the administrative traditions of the country.
- Blunter and more self-enforcing policies are likely to be attractive in developing countries. Policies need to work with the grain of the market rather than against it, using incentives rather than regulations where possible.
- Governments need to build constituencies for change—to curb the power of vested interests, to hold institutions accountable, and to increase willingness to pay the costs of protection. Local participation in setting and implementing environmental policies and investments will yield high returns.

The costs of a better environment

The costs of protecting and improving the environment are high in absolute terms, but they are modest in comparison with their benefits and with the potential gains from economic growth. Improving the environment for development may make it necessary to raise investment rates in developing countries by 2–3 percent of GDP by the end of this decade. This would enable stabilization of soil conditions, increased protection of forests and natural habitats, improved air and water quality, a doubling of family planning expenditures, sharply improved school enrollment rates for girls, and universal access to sanitation and clean water by 2030. The costs of addressing global atmospheric issues would be additional.

Partnership for solutions

Finding, implementing, and financing solutions will require a partnership of effort among nations. Specifically:

- Improved know-how, new technologies, and increased investment are essential. Open trade and capital markets, the restoration of creditworthiness through policy reform and selective debt relief, and robust, environmentally responsible growth in the world economy will all be needed.
- The close link between poverty and environmental problems makes a compelling case for increasing assistance to reduce poverty and slow population growth and for addressing environmental damage that hurts the poor.
- High-income countries must play a major role in financing the protection of natural habitats in developing countries from which the whole world benefits. They must also assume the primary responsibility for addressing worldwide problems of which they are the primary cause (greenhouse warming and depletion of stratospheric ozone).

and hazardous wastes. Industrial countries need to solve their own problems, but they also have a crucial role to play in helping to improve the environments of developing countries.

- First, developing countries need to have access to less-polluting technologies and to learn from the successes and failures of industrial countries' environmental policies.
- Second, some of the benefits from environmental policies in developing countries—the protection of tropical forests and of biodiversity, for example—accrue to rich countries, which ought therefore to bear an equivalent part of the costs.
- Third, some of the potential problems facing developing countries—global warming and ozone depletion, in particular—stem from high consumption levels in rich countries; thus, the burden of finding and implementing solutions should be on the rich countries.
- Fourth, the strong and growing evidence of the links between poverty reduction and environmental goals makes a compelling case for greater support for programs to reduce poverty and population growth.
- Fifth, the capacity of developing countries to enjoy sustained income growth will depend on industrial countries' economic policies; improved access to trade and capital markets, policies to increase savings and lower world interest rates, and policies that promote robust, environmentally responsible growth in industrial countries, will all help.

Policy reforms and institutional changes are required to bring about accelerated development and better environmental management. The obstacles are great. Nevertheless, the present time is unprecedented in its potential for change. The growing recognition of the importance of environ-

mental concerns, the rapid introduction of economic reform programs around the world, and the trend toward democratization and participation in the development process all point in the right direction. The United Nations Conference on Environment and Development (UNCED)—the "Earth Summit"—in June 1992 has provided an opportunity for the world's nations to commit themselves to an agenda of reform. It is essential that the energies that have been unleashed by UNCED not be dissipated but rather be channeled toward addressing those environmental problems that most urgently threaten development.

Focusing on the right problems

This Report makes no attempt to be comprehensive in its discussion of environmental problems. Rather, it seeks to identify the most serious challenges and suggests strategies for addressing them. Not every problem can be a priority for every country. Taking the view that the highest environmental priorities are those that directly affect the welfare of large numbers of people, the Report concludes that the current environmental debate has paid too little attention to the problems of sanitation and clean water, urban air pollution, indoor air pollution, and severe land degradation.

Damage to the environment has three potential costs to present and future human welfare. Human health may be harmed. Economic productivity may be reduced. And the pleasure or satisfaction obtained from an unspoiled environment, often referred to as its "amenity" value, may be lost. All are difficult to measure, but the third is especially so. "Amenity" includes values that range from those associated with recreation to those associated with deeply held spiritual views about the intrinsic worth of the natural world. The difficulty in measuring it argues for much more public involvement in setting priorities. Table 1 outlines the potential consequences for health and productivity of different forms of environmental mismanagement. Since environmental problems vary across countries and with the stage of industrialization, each country needs to assess its own priorities carefully.

Table 1 Principal health and productivity consequences of environmental mismanagement

Environmental problem	*Effect on health*	*Effect on productivity*
Water pollution and water scarcity	More than 2 million deaths and billions of illnesses a year attributable to pollution; poor household hygiene and added health risks caused by water scarcity	Declining fisheries; rural household time and municipal costs of providing safe water; aquifer depletion leading to irreversible compaction; constraint on economic activity because of water shortages
Air pollution	Many acute and chronic health impacts: excessive urban particulate matter levels are responsible for 300,000–700,000 premature deaths annually and for half of childhood chronic coughing; 400 million–700 million people, mainly women and children in poor rural areas, affected by smoky indoor air	Restrictions on vehicle and industrial activity during critical episodes; effect of acid rain on forests and water bodies
Solid and hazardous wastes	Diseases spread by rotting garbage and blocked drains. Risks from hazardous wastes typically local but often acute	Pollution of groundwater resources
Soil degradation	Reduced nutrition for poor farmers on depleted soils; greater susceptibility to drought	Field productivity losses in range of 0.5–1.5 percent of gross national product (GNP) common on tropical soils; offsite siltation of reservoirs, river-transport channels, and other hydrologic investments
Deforestation	Localized flooding, leading to death and disease	Loss of sustainable logging potential and of erosion prevention, watershed stability, and carbon sequestration provided by forests
Loss of biodiversity	Potential loss of new drugs	Reduction of ecosystem adaptability and loss of genetic resources
Atmospheric changes	Possible shifts in vector-borne diseases; risks from climatic natural disasters; diseases attributable to ozone depletion (perhaps 300,000 additional cases of skin cancer a year worldwide; 1.7 million cases of cataracts)	Sea-rise damage to coastal investments; regional changes in agricultural productivity; disruption of marine food chain