OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

20902

United Nations Industrial Development Organization

Training Course
Ecologically Sustainable Industrial Development

Learning Unit 7

The Role of Government in Industrial Environmental Management

LU7

Further information may be obtained from:
Environment Coordination Unit, UNIDO
Tele: (Austria) 43-1-21131-0 / Fax: 43-1-230-74-49

Contents

LU7

Additional Course Material

Video: *Development and the Environment: A New Partnership*, a film by the World Bank.

Introduction

Ecologically Sustainable Industrial Development cannot be achieved through the efforts of industry alone. It requires the participation of all sectors of society. Governments play a major role through their laws, regulations, taxation systems and a great variety of other activities. Learning Unit 7 reviews the most important environmental management activities that Governments pursue, discusses how these can be used to promote Cleaner Production and examines the barriers that Governments may encounter in promoting Cleaner Production in developing countries.

LU7

Objectives

The specific learning objectives of this unit are as follows:

- To present the rationale for government intervention in industrial environmental management.
- To describe the basic features of a command-and- control regulatory programme.
- To introduce complementary approaches to regulation.
- To discuss innovative measures Governments can take to promote Cleaner Production.
- To recognize the difficulties of Government intervention in promoting Cleaner Production in developing countries.

Key Learning Points

1 Government intervention is necessary to eliminate market and policy failures that encourage excessive resource use and pollution intensity.

2 Government environmental management activities include:

- Establishing regulatory programmes.
- Developing environmental plans and adopting appropriate national policies.
- Collecting environmental data and disseminating information.
- Participating in international environmental agreements.

LU7

3 Traditional command-and-control regulatory programmes require four government activities: establishing standards, issuing permits, monitoring compliance and enforcing regulations.

4 Multimedia command-and-control regulations (those covering air, water and land discharges simultaneously) can promote the least-cost solution to reducing pollution, increase the ability of industry to set priorities, simplify administrative systems and promote more effective cooperation with other policy sectors.

5 Governments can use monetary and fiscal incentives to encourage pollution reduction. Possible programmes include pollution charges, marketable permits, subsidies and deposit refund programmes.

6 Governments can use siting and relocation policies to ensure that industrial activities do not locate in environmentally sensitive areas (high density of human population, critical wetlands, cultural sites etc.) and to encourage industry to locate in industrial estates, where they can benefit from common systems for waste-water treatment and waste disposal.

7 Some of these actions promote Cleaner Production directly, some promote it indirectly; others may actually discourage the introduction of Cleaner Production.

8 Many Governments are formulating national environmental plans and or policies that integrate industrial development and environmental considerations.

9 To promote the collection of more reliable and consistent environmental data, UNDP and the World Bank are promoting the development of an environmental accounting framework that will be compatible with the national income accounts complied according to System of National Accounts (SNA) of the United Nations.

10 At the international level, Governments have recognized that many environmental problems have regional and global significance, and they have developed several agreements designed to reduce industrial pollution across international borders. These include:

- The Montreal Protocol.
- The Basel Convention.
- The United Nations Framework Convention on Climate Change.

LU7

11 Governments need to combine these various actions—sustainable development strategies (based on meaningful environmental data), envrionmental regulation (command-and-control programmes, economic incentives and locational policies), Cleaner Production programmes and international agreements—in a manner that is responsive to their environmental problems and sensitive to their institutions and culture. There is no one combination of actions that is best for all countries.

12 The key issue in developing countries is government ability to implement new environmental programmes. This depends upon many things, including the state of the country's infrastructure, the relative power of government and industry, political priorities and the availability of environmental expertise.

Suggested Study Procedure

1 Take the test in the *Review*. Think about the questions raised and what you need to learn from this Learning Unit.

2 Work through the *Study Materials*, including the *Reading Excerpts* and the video. Prepare answers to the questions and check your answers against those suggested.

3 Read the *Case Studies*. If possible, work with a small group to discuss the questions raised. Compare your answers with those suggested.

4 Complete the exercises in the *Review*.

Study Materials

The traditional role of Government in environmental management has been to develop and enforce regulations requiring some degree of pollution reduction. Such activities have resulted in a significant reduction in pollution, but the cost has often been very high and many times the regulations have discouraged the use of Cleaner Production techniques. Now, the attention of the international community is turning towards finding ways in which Governments can promote Cleaner Production.

The Environmental Actions of Governments

LU7

Pollution intensity increases when organizations that use resources ignore or underestimate the cost of the resulting damage to the environment.

The appropriate role of Governments is to eliminate the market failures and policy failures that cause the difference between what the polluter pays and the full cost of using environmental resources:

- Market failures occur because environmental resources (air. water. soil) are often treated as free goods or as common property and are overutilized or indiscriminately polluted.

- Policy failures occur when Government policies promote the excessive use of resources, which in turn causes environmental damage. Examples include subsidies for energy and water use and tax policies (accelerated depreciation) that favour end-of-pipe technologies over pollution prevention.

Essential activities to be undertaken by Governments in industrial environmental management are as follows:

- Using command-and-control regulations and economic incentives to force industry to internalize the costs of damaging the environment, thereby making the polluter (and ultimately the consumer) pay.
- Developing environmental plans and adopt policies that encourage industry to use environmental and natural resources appropriately without adversely affecting productivity.
- Undertaking or sponsor environmental research.
- Collecting and disseminating meaningful data on industrial pollutant emissions and their effects on human health and the environment so as to create public awareness about the problem and a demand for environmentally benign products and services.
- Participating in international agreements designed to reduce industrial pollution that crosses national borders.

LU7

Command-and-Control Regulation

The role of environmental regulations is to modify industry's behavior in order to reduce the environmental damage associated with industrial production. In environmental jargon, direct regulatory programmes are often called command-and-control programmes.

Effective command-and-control regulatory programmes do four things:

- They establish standards for industry that specify the required pollution control activities or the permitted amount of pollutant discharges.
- They issue permits that specify the environmental requirements for each industrial plant or location.
- They monitor the compliance of industry with the permit requirements. This may be done through self-monitoring by the industrial plant, independent inspections, citizen complaints and/or ambient monitoring.

- They enforce permit conditions with informal, administrative, civil and criminal sanctions. Without enforcement, some industrial plants will not comply with the regulations. If this situation becomes too common, there will be general non-compliance, and the regulatory programme will be ineffective.

Environmental standards may be defined in three ways:

- Technology-based standards require industry to reduce pollutant discharges based on the expected performance of the available technology but do not consider the effects on the environment. Government regulators usually prefer technology-based standards because they are easy to administer. Industry usually finds them too expensive for the results achieved.

- Ambient-based standards require industry to reduce pollutant discharge to the extent necessary to achieve a defined ambient concentration level or condition; they do not consider costs. Government regulators find the procedures to link industrial pollution discharge to ambient standards and also assigning responsibility for violations to individual sources difficult and costly . Industry likes ambient standards because they direct scarce resources to the more serious problems.

- Between these two extremes are benefit-based standards. These require industry to reduce pollutant discharges only to the extent that there would be a reasonable balance between the benefits and the costs of the measures. Government regulators find it difficult to set benefit-based standards because of the need for extensive data collection and analysis. Industry encourages this type of standard.

One criticism of the traditional command-and-control regulatory approach is that its single-medium emphasis (air or water or land) can generate new environmental problems:

- The successful reduction of local air and water pollution problems has often contributed to waste problems on the land; pollutants removed from the air and water have been dumped into landfills and ponds.

LU7

- Solving air pollution problems in local areas by building tall stacks (dilution) has led to acid deposition in distant areas. As a result, in the 1990s more countries are expected to make organizational and legislative changes that will enable institutions to adopt a multimedia approach to environmental management.

There are several arguments for a multimedia approach to command-and-control regulations:

- Industry can choose the least-cost solution. Engineers find that an integrated approach to reducing all releases from a factory is likely to be less costly than dealing with releases to each medium.

- Priorities can be set. An integrated approach allows environmental risks to be compared with the costs of pollution reduction. It allows scarce resources to be assigned to the problems with the greatest potential for damage reduction.

LU7

- Administrative systems are simpler. An integrated approach requires only one permit covering all media. The follow-up monitoring and enforcement for all media can be done at one time.

- Cooperation with other policy sectors is promoted. An integrated approach makes a convincing argument that all sectors (energy, agriculture, transport and manufacturing) are sources of industrial-related pollution problems and that all relevant ministries must work together to solve these problems.

Imposing command-and-control regulations on an industry is an adversarial process that often involves substantial legal costs and many delays. If industry representatives are willing to cooperate, Governments may be able to negotiate voluntary agreements. A voluntary agreement is a pledge by industry to meet environmental goals acceptable to the Government. Voluntary agreements work best in industrial sectors with relatively few but relatively large firms.

Not all command-and-control regulations or voluntary agreements promote Cleaner Production.

- Technology-based command-and-control regulations that specify end-of-pipe treatment may actually discourage a Cleaner Production approach.

- Command-and-control regulations that allow industry latitude in choosing least-cost solutions are more likely to promote Cleaner Production.

Economic Incentives

Although command-and-control regulation has considerably reduced the amount of some pollutants, it is criticized for being economically inefficient and difficult to enforce. It can lead to distortions in the price structure and the misallocation of resources.

An OECD survey of economic instruments, published in 1989, states that a central feature of such instruments is "the use of monetary incentives or disincentives to improve the environment directly or indirectly".

LU7

Economic incentive policies that can reduce pollution include:

- Pollution charges. Governments establish a fee or tax on pollutants but allow the level of pollutant discharge to vary. Common forms of such charges are effluent or emission fees applied to direct pollutant discharge and user charges paid by plants that discharge their wastes into public treatment works.

- Tradeable permits. Governments establish a limit on the level of pollutants that can be discharged with each permit issued. The permits become marketable property rights, tradeable among parties. The price of a permit is allowed to fluctuate according to market conditions.

- Subsidies. Subsidies can take various forms, including grants, below-market-rate loans and accelerated depreciation. Although these inducements provide an economic incentive to reduce pollutant discharges, they violate the polluter-pays principle and, in the case of grants, create a bias towards overbuilding pollutant reduction facilities.

- Enforcement incentives. These are usually fees charged for failing to comply with the conditions in a discharge permit. The automatic assignment of fees avoids time-consuming negotiation with polluters. Non-compliance fees are not true economic incentives in that they are not voluntary, non-coerced actions like those found in private markets.

Economic incentives can:

- Promote least-cost solutions for solving environmental problems.
- Stimulate the development of pollution prevention and control technology and expertise in the private sector.
- Provide Governments with a source of revenue to support pollution prevention and control programmes.
- Provide flexibility in the choice of pollution prevention and control technology.
- Reduce the amount of paperwork associated with environmental regulations.

LU7

Locational Policies

Policies for the siting and relocation of industry should take into account regional balance, the availability of energy and raw materials and local and regional aspirations. Such policies can minimize environmental damage by prohibiting the siting of industry in, for instance, densely populated areas, wetlands and other animal habitats or historical sites.

Locational policies can also minimize environmental damage by encouraging industries, particularly small and medium-size industries, to locate on industrial estates, where it is possible to provide reasonably priced disposal of wastewater with common treatment systems and solid/hazardous wastes with collection and recycling/disposal systems.

Locational policies that promote industrial free zones and export processing zones can require compliance with environ-

mental regulations as a condition for obtaining and retaining operation permits and receiving tax advantages.

Other Policies Towards Industry

Many Government policies other than environmental regulations and economic incentives can be used to encourage environmentally responsive behaviour.

Many Governments are privatizing State-owned industries. Committments to Cleaner Production strategies can be included in the negotiations that precede this privatization. Privatization itself may make it easier to enforce environmental regulations, because environmental authorities often find that they have more legal and political influence over privately owned industry.

A powerful tool for stimulating environmental responsibility is the adoption of stricter liability laws for environmental damages. The spectre of long-term and unlimited liability for products and wastes has spurred many companies to adopt Cleaner Production techniques in order to minimize their future liability.

LU7

Many Governments now provide electric power, water and other resources to industry at subsidized prices. This encourages waste and promotes environmental pollution. Simply setting prices to reflect the full cost of these resources can do much to promote Cleaner Production. Ideally, resource prices should reflect not only direct costs but also the costs of environmental damages.

Requiring industry to disclose information about its emissions of pollutants and its generation of hazardous wastes heightens public awareness and creates a powerful stimulus for industry to improve its public image by adopting Cleaner Production.

Many Governments and even NGOs are initiating "eco-labelling" programmes to designate the most environmentally benign products. Eco-labelling is designed to stimulate consumer awareness, encourage the development of cleaner products and provide an objective basis for environmental claims in product marketing.

Ideally, Governments should examine all of their policies towards industry to ensure that they promote Cleaner Production

as well as industrial development. In formulating these policies, Governments should do the following:

- Clearly define environmental policy objectives.
- Assess the environmental consequences of existing sectoral policies and development plans.
- Formulate alternative policies and development scenarios at the subsectoral level that would take into account growth, efficiency, equity and ecological sustainability.
- Devise command-and-control regulations, economic incentives and other appropriate policy instruments that would promote Cleaner Production.

Next Steps

LU7

1 Read "Making better decisions: information, institutions, and participation", included in the *Reading Excerpts* at the end of this Learning Unit.

2 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

Questions

1 What are three essential government functions for environmental management?

2 What are five main requirements for policy implementation?

3 What are three lessons learned from the Japanese success in curbing pollution?

LU7

4 What are the main advantages of involving local people in the environmental regulation of industry?

Answers

1. Setting priorities and formulating policies; coordinating and planning; and regulating and enforcing.

2. A clear legislative framework, an appropriate administrative structure, technicals skills, adequate money and decentralized responsibility.

3. Establishing a national environmental policy framework, negotiating agreements at the local level and allowing flexibility in setting emission levels and promoting self-regulation.

4. They give regulators an understanding of which environmental problems are important, they can help in implementing environmental regulations and they can help resolve conflicts between industry and adversely affected parties.

Next Steps

1 Look over the questions below so that you have some idea of what you want to learn from the video.

2 Watch the video *Development and the Environment: A New Partnership.*

3 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

Questions

LU7

1 How can and do environmental problems undermine the goals of development?

2 What are the environmental priorities in developing countries?

3 What is the primary cause of overexploitation of the environment?

4 How is economic development associated with environmental problems?

5 **Why must Governments play a role in environmental management?**

6 **List some policies that can harness the positive links between environment and development.**

7 **List some policies that can break the negative link between environment and development.**

LU7

Answers

1. Environmental problems undermine the goals of development by offsetting welfare gains with the costs that pollution imposes on health and the environment and by reducing the future production of soils, aquifers and ecosystems.

2. The environmental priorities are clean water and air, sanitation, the protection of soils and the protection of forests and other natural habitats.

3. The primary cause is the undervaluation of some resources like water. The value of other resources, such as metals, minerals and energy, is reflected to a great extent in market prices.

4. Some environmental problems are associated with the lack of economic development: inadequate sanitation and clean water, land degradation etc. Others are associated with unconstrained economic development: industrial and energy-related pollution, deforestation due to commercial logging and the overuse of water.

5. Governments must play a role in environmental management because very often the market system results in a misallocation of environmental resources (public goods), leading to overutilization and indiscriminate pollution.

6. Many policies that are good for the efficiency of the economy are also good for the environment (sometimes called win-win policies). Examples are the removal of energy subsidies, the clarification of property rights, education and the effective valuation of natural resources

7. Some policies are needed to change behaviour even after all the win-win policies are in place (a win-win policy is one that builds on the positive links between development and the environment and at the same time breaks the negative links). These policies include targeted regulation and incentives, improved knowledge of environmental and economic trade-offs and accountable institutions.

Government Actions to Promote Cleaner Production

Government actions can encourage Cleaner Production, either directly or indirectly, or they can discourage it. When reviewing environmental management policies and programmes, it is important to examine whether they will provide incentives to adopt Cleaner Production techniques.

Government actions that directly encourage Cleaner Production include:

- Laws and regulations that assign priority to pollution prevention over end-of-pipe treatment.
- Negotiated environmental compliance procedures that encourage waste minimization.
- Full pricing of energy, water and raw materials.
- Privatization of public-sector enterprises, or at least privatization of their management.
- Providing information on waste minimization techniques.
- Funding of Cleaner Production demonstrations.
- Government procurement of cleaner products.

LU7

Government actions that, by requiring pollution reduction, indirectly encourage Cleaner Production include:

- National strategies for sustainable development (Agenda 21) that realistically address industry as well as other sectors.
- Effective environmental regulatory programmes (standards, permits, monitoring, compliance and enforcement activities with sufficient technical and financial support).
- An appropriate balance between centralized and decentralized regulatory activities.
- Economic incentives applied to pollutant discharges.

- Multimedia (air, water and land) rather than single-medium permitting of individual industrial sources.
- Publication of information on the release of pollutants by individual industrial facilities (pollutant release inventories).
- Publication of data on the effects of pollutant discharges on human health and the environment.

Government actions that discourage Cleaner Production include:

- Subsidies for the use of energy, water and other resources.
- Tax concessions (e.g. rapid depreciation) for waste-treatment investments.
- Import restrictions that favour indigenous end-of-pipe technology.

LU7

Questions

1 How does the full pricing of energy or water promote Cleaner Production?

2 How do multimedia permits encourage Cleaner Production?

3 How does privatizing State-owned enterprises promote Cleaner Production?

Answers

1. When resources are priced at their full cost, there is more incentive to conserve them and a greater penalty on waste.

2. Multimedia permits allow industry the most flexibility in determining how to reduce pollution

3. Privately owned enterprises tend to be more efficient and less wasteful because they have a greater motivation to make a profit and are subject to the external disciplinary force of the market.

Sustainable Development Strategies

Many developed and developing countries are preparing national sustainable development strategies (often called action plans or policy plans). Some were started a few years ago and others are being initiated as a result of countries preparing national reports for UNCED.

The purpose of a national sustainable development strategy is to integrate environmental considerations into a nation's overall economic and social development plans and to promote a comprehensive and consistent national environmental policy.

Some of the central elements of a national sustainable development strategy are the following:

LU7

- Quantitative targets, e.g. a reduction of particulate emissions to a certain number of tonnes.
- Dates on which these targets will be met.
- Specified actions on the part of all sectors (agriculture, transport, industry, utilities, construction. commerce etc.).
- Financial and economic implications of the specific actions.
- Clarification of the roles and responsibilities of Government ministries and of central versus local or provincial levels of Government in monitoring and enforcing specific actions.

As an example, the National Environmental Policy Plan for the Netherlands includes the following:

- Environmental problems, with trends extrapolated.
- Principles of environmental management, including polluter pays and pollution prevention.
- Environmental goals for the year 2010, with quantified targets.

- Alternative scenarios for meeting targets and their economic implications.
- Principal features of the policy for 1990-1994 with regard to the major environmental issues such as climate change, acidification, eutrophication and toxic chemicals.
- Specific actions required of target groups, including agriculture, transport, industry and consumers.

Next Steps

1 Read "Highlights of the Dutch National Environmental Policy Plan", included in the *Reading Excerpts* at the end of this Learning Unit.

2 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

LU7

Questions

1 As described in the National Environmental Policy Plan of the Netherlands, what are the five levels of pollution that affect each other?

2 Explain the major goals of the Plan at the global level.

3 Explain the major goals of the Plan at the local level.

4 What negative environmental impacts of traffic and transport were identified in the Plan?

5 What are the main proposals of the Plan for the energy sector?

LU7

Answers

1. Local, regional, national, continental and global.

2. There were two stopping the growth of the production of climate-influencing substances and stopping, before the year 2000, the emission of substances that damage the ozone layer.

3. Sharp reductions in emissions of hazardous substances and in noise and odour production.

4. Traffic and transport have negative consequences for the landscape and nature and also account for a large share of the consumption of energy and raw materials.

5. There were four main proposals:
Public information and subsidies to stimulate energy conservation and the use of renewable energy sources.
Establishment of systems of environmental concern in energy firms.
Reduced emissions of sulphur dioxide and nitrogen oxides from electric power plants.
Increased cogeneration of electricity and heat.

National Accounts

To identify polluters and assess improvement or deterioration in the environment, a country needs reliable and consistent data. Data on current emission levels and ambient conditions is necessary if a Government is to develop an efficient strategy for meeting environmental objectives.

Currently, data in most developing countries are collected in a piecemeal manner. Leading research centres and institutions like UNDP and the World Bank are proposing that environmental data be put into an accounting framework compatible with the national income accounts compiled according to the System of National Accounts (SNA) of the United Nations.

There are two approaches to preparing national environmental accounts, one in physical terms and the other in monetary terms. The advantage of the physical approach, as exemplified by Norwegian and French efforts, is that is it easier to implement and does not require the monetary valuation of environmental goods and services. The advantage of the monetary approach is that it contains more information; however, it is difficult to implement and there still remain conceptual issues to be resolved.

LU7

The Statistical Office of the United Nations is attempting to integrate these two approaches in a System for Integrated Environmental and Economic Accounting. The proposal starts with the well-established SNA and adds a separate system to account for natural resources and the environment.

This effort is important from a Cleaner Production perspective because it is attempting to provide a better estimate of the progress in achieving sustainable development. It suggests that a welfare measure of sustainable development should be adjusted to account for defensive measures against pollution, the monetary value of environmental damages and the depreciation of man-made and environmental capital.

In any one country, whether it is environmental degradation or the depletion of natural assets that is causing the greater economic loss depends on many cultural, political, economic and industrial factors.

Next Steps

1 Read "Accounting for environmental effects at the national income level", included in the *Reading Excerpts* at the end of this Learning Unit.

2 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

Questions

1 Give two criticisms of GDP as a measure of welfare or national prosperity.

LU7

2 What are the advantages and disadvantages of the physical and the monetary approach to preparing national environmental accounts?

Answers

1. Natural assets are not valued and their loss entails no charge against current income. Remediation expenses are accounted for as increases in national income and products despite the fact that they should be considered as a maintenance cost to society rather than as social progress.

2. The physical approach is easier to implement and does not require the monetary valuation of environmental goods. The monetary approach contains more information, but is difficult to implement and still some issues remain unsolved. It can also be linked to other SNA accounts.

International Government Agreements

Some environmental concerns can be resolved only by concerted action on the part of several or many nations:

- Some concerns are regional in nature because several countries share a common resource and one country's action affects other countries. Examples of transboundary pollution are acid rain and the managment of international rivers or regional seas.

- Other concerns are global in nature because all countries share the atmosphere and the deep oceans and their actions affect, to some extent, the global resources. Examples of such problems are global warming owing to the emission of greenhouse gases and thinning of the ozone layer owing primarily to the emission of CFCs.

Resolving international environmental issues is more complicated than resolving national environmental issues, for two reasons: LU7

- The international legal system differs from national legal systems in that there is no central authority, no central monitoring body and no central court to enforce agreements.

- International solutions to global and regional environmental problems must accommodate large variations in the balance of the benefits and costs to different countries and in their ability to pay these costs. Thus, for rich countries to secure action on problems mainly of concern to them, they must begin to pay the poor countries to take actions.

Several recent international agreements are directly related to Cleaner Production. The Vienna Convention and the Montreal Protocol both deal with the depletion of the ozone layer, the Basel Convention deals with the international movement of hazardous wastes, and the United Nations Framework Convention on Climate Change aims to stabilize worldwide emissions of greenhouse gases.

The Vienna Convention for the Protection of the Ozone Layer (1985) is a general agreement on information exchange and research on ozone-depleting substances. Its follow-up, the Montreal Protocol on Substances that Deplete the Ozone Layer (1987), sets limits for the production and consumption of the damaging CFCs and halons in order to curb levels of chlorine and bromide reaching the stratosphere and damaging the ozone layer. Some important features of the Montreal Protocol are as follows:

- The Montreal Protocol calls for periodic reviews of production and consumption targets. Three reassessments have taken place: the London Amendments (1990), the London Adjustments (1991) and the Copenhagen Amendments and Adjustments (1992). Amendments add new ozone-depleting substances and require a new ratification by each country. Adjustments change the scope, timing and amount of control for already regulated substances and occur as a result of a simple decision of the Parties.

LU7

- The ozone-depleting substances now controlled are CFCs, halons, carbon tetrachloride, trichloroethane and methyl bromide.

- The Parties agreed in London to eliminate completely the production and consumption of CFCs and halons by January 2000, with a 50 per cent cut by January 1995 for both these substances and an 85 per cent cut by January 1997 for CFCs. Carbon tetrachloride should be phased out by the year 2000, with an 85 per cent cut by January 1995. Trichloroethane has a slightly more lenient phase-out schedule (because of widespread use), with a 30 per cent cut in 1995, a 70 per cent cut by January 2000 and a full phasing out by 2005. The Parties agreed in Copenhagen to add methyl bromide to the Protocol and to freeze production at 1991 levels by 1995. In addition, they agreed that industrialized countries would phase out halons, used in fire-fighting, by January 1994 instead of January 2000; trichloroethane, used in cleaning metals, by January 1996 instead of January 2000; HCFCs, a less damaging substitute for CFCs, by 2030 and carbon tetrachloride by January 1996 instead of January 2000.

- Developing countries with a consumption of the originally controlled substances (five CFCs and halons) of less than 0.3 kg per capita (the "Article 5" countries) are given a 10-year grace period to comply with control measures.

A specific multilateral fund was added in 1990, through which non-Article 5 countries (developed countries) are obligated to pay the incremental costs for Article 5 countries to eliminate the use of ozone-depleting substances.

- No Party to the Protocol is allowed to sell any of the controlled substances to a non-Party country or to import them from such a country.

- Chemicals that are imported in ready-made products, e.g. in aerosol cans or air-conditioning equipment, are not counted against a country's target. In other words, it is the country where these products are produced that is responsible for finding alternatives to controlled substances.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) aims to control the transboundary movement and disposal of hazardous wastes. It has five main goals:

LU7

- To minimize the generation of hazardous wastes.

- To reduce transboundary movements of hazardous wastes.

- To achieve self-sufficiency in hazardous waste disposal at national levels.

- To create a system of informed consent between waste exporting and importing countries before wastes are shipped.

- To end all exports and imports of hazardous wastes to or from non-Party States unless some other bilateral agreement exists.

The United Nations Framework Convention on Climate Change (1992) aims to stabilize greenhouse gas concentrations at a level that would prevent dangerous interference with the world's climate. Some important provisions of the Convention are as follows:

- All countries are to prepare inventories of emissions and to formulate, implement, publish and regularly update programmes containing measures to mitigate climate change.

- Developed countries "shall adopt policies [which limit] anthropogenic emissions" and report to the Conference of Parties detailed information on these measures "with the aim of returning [emissions] individually or jointly to their 1990 levels".

- Developed countries are committed to meeting the "agreed full costs" of analysis and publication of developing country abatement programmes.

- Developed countries are committed to meeting the incremental costs of developing country emission stabilization programmes as agreed with donors, initially through the Global Environmental Facility.

According to the *International Environment Reporter* on 12 August 1992, "Despite these uncertainties [funding and emission targets], the clear statements of funding responsibilities, the emphasis on the need to adopt policies and the interim 'goal' which must be revisited make the commitments section much stronger than the Vienna Convention ..., which left almost everything to the Montreal Protocol..., signed two years later".

LU7

Next Steps

1 Test your comprehension of the information by answering the questions that follow.

2 Compare your answers with those suggested.

Questions

1 Explain why some environmental problems can be resolved only by international government actions.

2 Give some examples of international pollution.

3 What environmental problem does the Montreal Protocol address?

LU7

4 What are the main goals of the Basel Convention?

Answers

1. Some countries are regional in nature because several countries share a common resource and one country's action affects other countries (e.g. acid rain). Others are global in nature because all countries share environmental resources (e.g. the atmosphere).

2. Acid rain and other air pollutants migrating across national boundaries.
Shipments of hazardous wastes between countries.
Pollution of rivers that flow through many countries.
CFCs destroying the ozone layer.
Greenhouse gases contributing to global climate change

3. Destruction of the earth's ozone layer by CFCs and other pollutants.

4. To minimize the generation of hazardous waste, to reduce transboundary movements of hazardous waste and to achieve self-sufficiency in hazardous waste disposal at national levels

Barriers to Effective Government Action

One barrier to effective government action is a political economy characterized by the following conditions:

- A rich and powerful segment of society that benefits from exploiting natural resources and polluting environmental resources. This segment often impedes the setting of economically appropriate prices for water, energy and raw materials and the enforcement of enviromental regulations.
- Urgent, short-term financial needs that distract Governments from making and adhering to long-term commitments needed to resolve environmental issues.
- Public sector industries that waste water, energy and raw materials, causing high levels of pollution, and that are exempted from environmental regulatory requirements.

LU7

- Military installations and agriculture that are exempted from environmental regulations.
- A poorer, disadvantaged and vulnerable segment of society that suffers the most from environmental degradation but lacks the political influence to bring about change.

Another barrier is information gaps and deficiencies caused by the following constraints:

- Limited data on the nature and extent of environmental degradation (physical indicators of resource depletion as well as air, water and land pollution).
- Limited understanding of the proximate and underlying causes of, and hence feasible remedies for, environmental degradation.
- Insufficient measurement of economic losses resulting from environmental degradation.

Another barrier is an ineffective public sector characterized by:

- An inability to formulate policies that require setting priorities, coordinating activities and resolving conflicts.
- An inability to translate policies into laws and build administrative structures to carry out the laws. One of the difficulties is a shortage of skilled manpower owing to poor salaries in the public sector and an overall absence in the country of the necessary professional skills; another is insufficient financial resources.
- An inability to decentralize and delegate responsibilities to local levels of government, which are usually in the best position to carry out specific duties. There is an even greater shortage of financial resources and skilled manpower at this level.
- An inability to overcome strong regional governments.

Another barrier is a business community that is not supportive of Cleaner Production, for the following reasons:

LU7

- The business community is not convinced of the financial and socio-economic advantages of reducing environmental degradation.
- Even where it is convinced, capital is scarce and expensive, which precludes Cleaner Production changes that are financially attractive but require an initial investment.
- Most industrial enterprises are small and lack the information and skills to carry out changes.

Next Steps

1 Read "Barriers to ecologically sustainable industrial development", included in the *Reading Excerpts* at the end of this Learning Unit.

2 Test your comprehension of the information by answering the questions below. Compare your answers with those suggested.

Questions

1 What are some of the four main barriers to effective government actions to promote Cleaner Production?

2 What are the difficulties of achieving ESID in developing countries?

LU7

Answers

1. Adverse political-economic circumstances;
Information gaps and deficiencies;
An ineffective public sector;
A reluctant business community; and
Limited capacity to absorb (Cleaner Production processes owing to the lack of technical and scientific capacity.

2. All the barriers mentioned above plus indebtedness, which results in shortages of capital needed to finance (Cleaner Production processes.

Additional Suggested Readings

This concludes the study section of Learning Unit 7. For additional information on Government actions to promote environmental management, you may refer to the following sources.

Halter, F., "Toward more effective environmental regulation in developing countries", in D. Eroecal, *Environmental Management in Developing Countries* (Paris, OECD, 1991).

Hirschhorn, J., "Pollution prevention implementation", PRDE Pogramme (Washington, D.C., United States Agency for International Development, 1993).

Luken, R., and L. Clark, "How efficient are national environmental standards? A benefit-cost analysis of the United States experience", *Environmental and Resources Economics*, vol.1 (1991), pp. 385–413.

Netherlands, Government of the, *National Environmental Policy Plan: To Choose or to Lose* (the Hague, 1989).

OECD, "Economic instruments for environmental management in developing countries" (Paris, 1993).

OECD, *Technology and Environment: Government policy options to encourage cleaner production and products in the 1990s* (Paris, 1992)

Panayotou, T., "Economic incentives in environmental management and their relevance to developing countries" in D. Eroecal, *Environmental Management in Developing Countries* (Paris, OECD, 1991).

include →

Tongeren, J. van, and others, "Integrated environmental and economic accounting: a case study for Mexico", Environment Working Paper No. 50, World Bank, 1991.

UNIDO, "Government initiatives in achieving ecologically sustainable industrial development", Working Paper No. IV, *Proceedings of the Conference on Ecologically Sustainable Industrial Development* (PI/112).

LU7

World Bank, *World Development Report 1992: Development and the Environment* (New York, Oxford University Press, 1992).

WHO, "Preliminary assessment of national programmes for health protection against environmental hazards" (PEP/85.8).

LU7

Case Studies

Next Steps

1 Think about the questions raised in each of these *Case Studies* and prepare answers to the questions, preferably working in a small group.

2 Compare your answers with those suggested.

LU7

Case Study 1: Industrial Monitoring

You are visiting a national environmental management authority and observe that they do not have data on pollutant discharge from large industrial sources. When you suggest that a monitoring programme is an essential part of a successful environmental regulatory scheme, the national environmental management authority says that it does not have the necessary trained manpower or the equipment for such an effort. What three suggestions could you make?

Answer

The authority could apply to the United Nations and to bilateral agencies for support for a training programme and for equipment for the more routine analyses. It should ask the group in the country with the best monitoring programme (there usually is at least one that has received significant support from external donors) to provide a training course in data acquisition and processing. Alternatively, it could require that industry monitor itself, reporting to the national authority and verifying its samples with an independent body at least once a year.

Case Study 2: Air Pollution Tax

Given the current interest in economic incentives, a parliament proposes to institute a tax on conventional air pollutants. What do you think would be the reactions of the national environmental authority and of industry associations? How would you respond to their reactions?

LU7

Answer

Environmental authorities would object. They usually prefer a regulation, regime that requires the installation of equipment, because in this regime, there is a visible sign of environmental management. It would also object that such a tax would allow for the release of toxic air pollutants. Industry would object because it would see the tax as just another form of taxation that puts them at a competitive disadvantage.

A reply to the environmental authority would be that it could experiment with such a tax system in one area of the country to see how it would work, limiting it to conventional pollutants, such as dust and SO_x and maintaining emission limits for toxic pollutants. Also, it should be pointed out that a regulatory regime requires more enforcement. A reply to industry would be that funds collected should be used to subsidize loans for the installation of pollution control equipment and for pollution prevention programmes.

Case Study 3: Sustainable Development Strategy

The head of an environment authority opposes the preparation by the Government of a national sustainable development strategy similar to the Dutch National Environmental Policy Plan. He or she says that the authority is in and of itself able to ensure environmental quality in the country. What is your response?

LU7

Answer

You could start out with one of the main themes of Our Common Future*: many countries now recognize that environmental management authorities cannot by themselves achieve environmental goals and that the leading forces of development (agriculture, industry, transport) must take a proactive role in environmental protection.*

You should document the magnitude of the environmental problems caused by these sectors and point out policy failures, such as the subsidized (or even mandatory) use of pesticides, which is unnecessarily degrading water quality; and subsidized electricity prices, which are causing industry to use more electricity than needed and thermal power plants to generate more pollution than necessary.

Case Study 4: Environmental Reporting

A ministry of environment has issued a new regulation requiring large companies to report annually on their use of resources (water, raw materials) as well as all discharges to air, water and soil. What do you think will be the reaction of industry and the public to this requirement? How might the ministry respond to these reactions?

LU7

Answer

Industry will object that such reporting is too time-consuming and would not produce any useful results. You could point out the experience in other countries, where industry was surprised by the results of the inventory and as a result instituted cost-saving measures that are cutting down on the use of resources and pollutant discharges.

The public will not object at first but will react adversely when they find that they are being exposed to any high levels of pollutants. The ministry should prepare a public outreach programme explaining that even though there are pollutant releases, they are not violating health standards (if that is the case.

Case Study 5: Enforcement Against Small Businesses

The chairman of a national environmental management agency has received complaints from a community in which 90 small tanneries are generating obnoxious levels of water pollution. When the chairman approaches the small tanners, they say they cannot afford to install pollution control equipment and that in any case there is no space in their plants for such equipment. How would you advise the chairman to proceed in this situation?

LU7

Answer

You could suggest that the chairman should contact the tanners' association and propose the building of a common waste-water treatment facility that would collect and treat the wastes from all the tanneries. Common waste-water treatment facilities have several advantages: they entail very low cost for any one tanner; they solve the space problem and they need to use household organic wastes to work properly. The last-mentioned advantage would allow the tanners to make a positive contribution to the neighborhood by offering to treat household wastes. UNIDO can provide designs for several common waste-water treatment facilities in developing countries.

In addition, the chairman could point out to the tanners the economic advantage of recovering the chromium that they are now discharging. Several tanneries in developing countries have installed chromium recovery units that have a financial payback period of less than two years.

Case Study 6: Enforcement Against Government-Owned Enterprises

In response to severe adverse international publicity, the government of a large city in a developing country resolved to enforce strictly the existing environmental regulations for the discharge of hazardous waste into the harbor. The river and harbor area had been severely polluted for over 20 years by discharges from chemical factories owned by the city government. The companies protested vigorously and suggested that if the regulations were now enforced, the factories would have to close, causing a loss of production, a loss of thousands of jobs for city workers and a loss of profits for the city government. What do you think the city government did?

LU7

Answer

Short-term enforcement was recognized as unrealistic. Longer-term planning was initiated. The city arranged with the companies to discharge only at night and only when the tide was going out. Thus, no public pollution discharge was evident.

Case Study 7: State-Owned Enterprise

The chairman of the national environment authority is threatening a State-owned fertilizer plant with legal action if it does not control its NO_x emissions. Why do you think that the plant is resisting the request of the chairman and what suggestions might you make to him?

LU7

Answer

The State-owned fertilizer plant must sell its product at a fixed price that does not cover its variable cost of production, so it does not have the funds to install the necessary pollution control equipment. The chairman should work instead with the ministry that is setting the price of fertilizer in order to make the funds available for environmental management. He or she should ask the fertilizer plant to investigate pollution prevention options as a means of reducing NO_x emissions, because such measures tend to be less costly than pollution control measures.

Review

Test

The following test will help you review the material presented in this Learning Unit.

LU7

1 The concept of market failures in environmental management refers to

a. State ownership of enterprises
b. Subsidies for energy use
c. Accelerated depreciation for pollution control equipment
d. Treating environmental resources as free goods

2 An example of policy failure in environmental management is

a. Absence of environmental laws
b. Subsidies for water use
c. Absence of a national environmental action plan
d. Subsidies for building municipal waste-water treatment plants

3 One essential environmental management activity that needs to be undertaken by Governments is

a. Support for environmental NGOs
b. Tax credits to industry for installing pollution control equipment
c. Collection and dissemination of environmental data
d. A ministerial appointment for the head of the environmental management agency

4 An effective command-and-control regulatory programme requires

a. Issuing discharge permits
b. Monitoring compliance
c. Enforcing permit conditions
d. All of the above

5 Ambient-based environmental standards require industry to

a. Install the best practicable technology
b. Conduct environmental compliance audits
c. Reduce pollutants to meet water quality standards
d. Inform workers of the level of pollutants in a factory

6 A multimedia approach to environmental management means

a. Using both command-and-control regulations and economic incentives
b. Documenting pollution problems with a video film
c. Using both self-monitoring and independent inspections to ensure compliance
d. Simultaneously regulating pollutant discharges to air, water and soil

LU7

7 Economic incentives include all of the following except

a. Effluent taxes
b. Marketable permits
c. Corporate income taxes
d. Deposit refund schemes

8 Economic incentives can

a. Promote least-cost solutions
b. Provide flexibility in pollution control technology
c. Stimulate the development of technology
d. All of the above

9 An essential component of a national sustainable development strategy is

a. Funding environmental research
b. Signing of international protocols
c. Reducing pollutants in all sectors (agriculture, industry etc.)
d. Qualitative targets to be met at some unspecified time

10 One limitation of the United Nations System of National Accounts is that they do not include data on

a. Exports and imports
b. Government spending
c. Environmental damages
d. Consumption

11 One approach to including the depreciation of environmental capital in the System of National Accounts is based on

a. Quantitative estimation of resources
b. Ecological mapping
c. Qualitative descriptions of environmental damages
d. Aerial photographs

LU7

12 International solutions to global environmental problems are difficult because of

a. Lack of data on the concentration of pollutants
b. Absence of pollution control laws
c. Lack of data on the effects of pollutants on the environment
d. The inability of developing countries to meet the costs of proposed solutions

13 The Montreal Protocol calls for

a. Information exchange on ozone depletion
b. Research on ozone depletion
c. Prior approval for the transboundary shipment of hazardous wastes
d. Limits on the production and consumption of ozone-depleting substances

14 A Government action that directly encourages Cleaner Production is

a. A national strategy for sustainable development
b. Thje provision of economic incentives
c. Negotiated environmental compliance that allows for innovation
d. Issuing multimedia environmental permits

15 A Government action that indirectly encourages Cleaner Production is

a. Establishing environmental regulatory programmes
b. Government procurement of clean products
c. Issuing policy statement that assigns priority to pollution prevention
d. Information dissemination about low- and non-waste technologies

LU7

Answers

1-5 dbcdc

6-10 dcdcc

11-15 ddddc

Some Ideas to Think About

The following are some additional questions raised by the *Study Materials*. Take some time to think about them. If possible, work in a small group and try to achieve consensus.

1 Should one locality in a developing country have lower environmental standards than the rest of the country?

2 Should a developing country accept toxic and non-toxic waste from a developed country as a source of foreign exchange?

3 Why are legal environmental standards sometimes not enforced in some developing countries?

4 Should one country reprocess and dispose of hazardous waste for another country? How do you justify your viewpoint?

5 Should a developing country have lower environmental standards than a developed country?

6 A major new development project for heavy industry would create severe environmental impacts, but the Government is unconcerned and wants to proceed very rapidly. What issues should UNIDO raise?

LU7

Reading Excerpts

Making Better Decisions: Information, Institutions, and Participation

Excerpted, with permission, from The World Bank, *World Development Report 1992: Development and Environment* (New York, Oxford University Press, 1992).

The principles of sound environmental policy do not conflict with development objectives. Why, then, are wise policies frequently the exception? A principal reason is that such policies often mean the withdrawal of entrenched 'rights'—to pollute or to use resources—that tend to benefit the wealthy and influential, often at the expense of the poor. Effective governmental action is also hampered by incomplete information, uncertainty, and weak regulatory powers.

In implementing change, governments must make the best use of their scarce administrative capacity. To do so requires, first, improved information and analysis to inform priority-setting and policy design; second, responsive and effective institutions suited to the administrative traditions of the particular country; and, third, greater local participation in policymaking, monitoring, and enforcement. The benefits of public participation frequently outweigh its costs.

LU7

This chapter asks why governments find it so hard to develop and implement wise environmental policies. Guidelines for environmental management are easier to describe than to put into practice, so that, in both industrial and developing countries, there is a gap between policy and performance. For example, many middle- and low-income countries set environmental standards that are unrealistically high and then fail to enforce them. In some countries serious environmental problems are apparently ignored, while in others decisions are often based on the lobbying clout of industry or of environmental activists rather than on balanced analysis. Sometimes public investments proceed with little or no attention to environmental impacts, while others are thwarted by NIMBY ("not-in-my-backyard") campaigns that hamper dispassionate analysis of the benefits and costs of alternative measures.

The Political Economy of Environmental Degradation

Governments face many pressures in making environmental policy. Conflicting interest groups lobby noisily, public opinion demands action on the most dramatic rather than the most important issues, and Governments even find it difficult to curb their own damaging behavior. Building constituencies is an important part of the solution to these pressures.

Redistributing Environmental Rights

People benefit from being able to use environmental resources without paying for them, and removing these benefits has direct distributional consequences. Often, those who have been enjoying the benefits are the wealthiest and most politically powerful members of society. Taking away their rights to pollute or to exploit resources can be politically painful and will often require compromises. Second-best policies are not desirable, but if well implemented, they are often preferable to unenforced 'perfect' policies. Chile's new fishing law (Box 1.1) is an example.

LU7

Whereas the rich are often good at protecting their positions, the poor—whether they be slum dwellers in Manila, Lagos, or Rio de Janeiro, pastoralists in East Africa, or artisanal fishermen in Peru and Indonesia—tend to play little part in the environmental debate. Yet they usually bear the brunt of environmental degradation. They may be the ones to suffer most when forests that once provided free fuel are logged or when factories pollute rivers. Unlike the better-off, they lack the means to defend themselves—by switching to other fuels, say, or by boiling polluted water. Thus, the poor generally have the most to gain from effective environmental policies. Governments must represent the interest of those without a voice, including the urban poor and ethnic minorities.

Crisis-Driven Policymaking

Even when environmental cause and effect are well understood by scientists, individuals may make perverse judgments about relative risks when setting priorities. People are more concerned about cancer and nuclear accidents than about many known health problems. Overreaction to environmental disaster is also common. Dramatic images of oil spills or leaking toxic wastes have captured public attention and played a powerful role in initiating policy change. Less attention has been paid to the insidious, chronic problems of exposure to high levels of particulates or to unsatisfactory drinking water—environmental problems that may put many more lives at risk.

The use of the dramatic or photogenic to garner popular support and donations is common. Many environmental activists have found these to be powerful metaphors for broader environmental concerns. The danger remains, however, that priorities can be distorted. Governments must

Box 1.1 Chile's New Fishery Law

Chile has one of the five largest fishing industries in the world. In 1990 exports of fish and fish products totaled more than $900 million, making the sector second only to mining as a foreign exchange earner. Managing the open-access fisheries has become more difficult as additional investment in the fishing sector has led to overfishing. The Chilean government has responded with a new law (*Ley de Pesca*) designed to prevent overexploitation and the collapse of any one fishery by regulating access to the different species being fished. Since any management scheme would imply some restrictions on the fish catch, the law became the subject of public debate. The evolution of the law illustrates some of the constraints on making environmental policy.

Three main regulatory systems were considered in designing the new management scheme: global quotas, individual transferable quotas (ITQs), and limits on individual boats and their gear. The final version of the law combines open access (within an overall quota), selected controls on boats, and a licensing scheme that is to be phased in gradually after the third year and is based on a percentage of the total catch.

The new law is an improvement over the previous situation of completely open access without restrictions on the catch. It was not possible, however, to implement a strict ITQ system—the preferred approach from the standpoint of both sustainable management and the economic viability of the fishermen. Fishing companies in the north opposed the inclusion of ITQs in the law. They preferred open access within overall quotas, which would allow them to switch their boats from a declining fishery to another area. Many fishermen saw any catch restriction as a zero-sum game in which they stood to lose.

The new fishery law is an important step that demonstrates that a compromise solution is frequently better than none. Its implementation will have to be monitored carefully. Chile is receiving assistance from the Nordic countries and the World Bank in strengthening its capacity to monitor and analyze the fishing industry.

LU7

make sober determinations of the relative importance of different environmental problems and set priorities in an informed, cost-effective manner.

Difficulties in Self-Regulation

In many countries the public sector owns the most-polluting industries and controls important natural resources. Instead of performing better on environmental criteria than private enterprises, state-owned enterprises tend to be less efficient, to use more resources, and to produce more wastes. The public sector is also notoriously bad at policing itself. The environmental problems of Eastern Europe and the former USSR clearly demonstrate this. Being both poacher and gamekeeper does not work, especially when public agencies are responsible

for such essential but massive tasks as waste-water treatment or solid waste disposal.

Creating a greater separation between the regulator and the regulated is one option. The establishment of semiautonomous regulatory bodies, or the use of independent commissions to regulate such natural-resource matters as interprovincial water allocation, the fish catch, or logging policies, helps depoliticize decisions and creates greater responsibility for self-regulation. Privatization with appropriate regulation can also help; in the United Kingdom when water companies were privatized, they came under tighter government scrutiny.

Building Constituencies

If governments are to challenge established polluters or reallocate existing rights to resources, they need to build on and promote wider support for good environmental policies. Much evidence suggests that the basis for such support already exists, having been stimulated sometimes by particular environmental issues, sometimes by a powerful book (such as Rachel Carson's *Silent Spring*) or an expert report. As voters, protesters, and consumers, people in many countries show a similar interest in environmental causes.

LU7

'Green' political parties have appeared in a number of countries, and increased activism by non-governmental organizations has made governments and public institutions more accountable for their actions. Environmental causes frequently cross established political divides. Indeed, even in countries where conventional political participation is discouraged, the environment may be one area in which governments are willing to allow and respond to popular protest. It is no accident that the move toward more democratic forms of government has coincided with the worldwide increase in popular environmental awareness.

The behavior of consumers and producers is also changing. In many countries people are willing to recycle, to think about using energy and materials more efficiently, and to alter their consumption patterns. Companies often respond by using the environment as a selling point. 'Green labeling', increased use of recyclable and biodegradable packaging, and more energy-efficient technology are most common in industrial countries, but the same trends are appearing in some developing countries. Businesses sometimes argue that environmental measures will diminish competitiveness or lead to loss of jobs, but they are usually wrong. Business is increasingly realizing that it can take actions which yield both environmental and economic benefits. For example, *Changing Course* (Schmidheiny 1992), a report prepared by the Business Council for Sustainable Development in anticipation of UNCED, forcefully advances the idea that good environmental management is also good business.

Given the multitude of environmental problems and political pressures, governments must conserve their scarce administrative capacity. To develop good environmental policies, they need informed analysis based on accurate information. They also need to improve the way bureaucracies make and enforce decisions. To implement policies, they need to build popular support and encourage local participation. These are the themes of the next sections.

Improving Knowledge and Understanding

Ignorance is an important cause of environmental damage and a serious impediment to finding solutions. This principle holds for international negotiators and poor households alike, as is illustrated by the global damage done to the ozone layer by CFCs and the serious implications of indoor air pollution for family health. It is necessary, first, to know the facts; second, to determine values and analyze the benefits and costs of alternative measures; and, third, to ensure that information is available to inform public and private choices.

Establishing the Facts

Frequently, especially in developing countries, decisions are made in the absence of environmental information. Collecting basic data can be expensive, but the rewards are usually high. Although different countries have different needs, there are some general guidelines. For example, the discussion in chapter 2 suggests some priorities for monitoring pollution and waste problems:

- Quality and availability of drinking water and sanitation facilities
- Exposure to ambient air pollutants, especially particulate matter and lead, in urban areas
- Fecal coliform and heavy metals in rivers and lakes
- Indoor air pollution from the burning of biomass
- Hazardous wastes and pesticides in selected 'hot spots'.

Essential management information on land use and natural resources needed for improved management of these resources includes:

- Data on soils, from surveys and experiments in each agricultural zone
- Rate of depletion and quality of groundwater in threatened aquifers
- Changes in forest area and data on harvesting and replanting
- Data on fish harvest and wildlife depletion in vulnerable areas
- Damage to coastal and wetland resources

Efforts are being made to help countries with environmental monitoring and to compile internationally comparable data. The Global Envi

LU7

ronmental Monitoring System (GEMS), managed by UNEP, has activities related to air and water quality in 142 countries. Monitoring of urban air quality began in 1974. Most of the cities report on concentrations of sulfur dioxide and suspended particulate matter, both important air pollutants. Unfortunately, the amount of financial help has so far been inadequate, and thus the coverage and quality of data are weaker than is desirable.

Given limited resources, it is better to concentrate on the most significant pollutants and to limit collection points to the numbers that can be accurately monitored. In the late 1980s Poland was reported to be regularly monitoring river pollution at more than 1,000 sites. Even if all the samples collected were properly analyzed, the gain in knowledge about river quality over that attainable with a system of 100-200 monitoring points would not justify such an extensive system.

Valuing Resources and Analyzing Benefits and Costs

Ending well-entrenched but environmentally damaging practices is difficult enough for governments when the damage is readily quantifiable. When environmental damage threatens health or jeopardizes economic output, it is relatively easy to point to the benefits of changes in policy. But as previous chapters have stated, some environmental values—important to poor and rich people alike—are not only unmarketed but also intangible. The more difficult it is to quantify the benefits of preserving these values, the harder it will be for policymakers to weigh the gains from conservation against the quick profits from resources degradation or pollution. However, more sophisticated methodologies are now making it possible to estimate the value of less-tangible environmental benefits.

LU7

In many cases local analysis of costs and benefits can build on international experience. Researchers in Bangkok, in analyzing the health impacts of pollution, tested local data against what had been learned in other countries about the links between exposure to pollutants and health. They found that the greatest threats to health were particulate matter, lead and microbiological diseases. Other environmental problems that traditionally receive a great deal of attention—contamination of groundwater and surface water; air pollutants such as sulfur dioxide, nitrogen dioxide, and ozone; and disposal of hazardous wastes—were much less dangerous. (In fact, the gravest threats were at least 100 times more serious than the lowest risks.) This information was used to develop cost-effective pollution control policies.

Improving Information and Education

Environmental education based on careful analysis can add rationally to the environmental debate. Publication of annual reports on the environment is increasingly common. When the public has a well-informed grasp of environmental issues, there is a better prospect of developing positive rather than purely defensive policies. Without such knowledge,

people tend to focus on causes of death (for example, technological hazards and nuclear accidents) that are sensational and are caused by somebody else, and to worry less about the probability of death from causes that are less dramatic and often under an individual's own control, such as cigarette smoking and wood fires. The work of independent research institutes—such as the Thailand Development Research Institute—can help to modify people's views.

Communities are increasingly bombarded with a variety of environmental information and need sources of information that they can trust. Independent commissions can help to depoliticize decision-making by analyzing thorny environmental issues and producing recommendations for policy action. Box 1.2 illustrates how some of these bodies have contributed to the development of the consensus required for policy decisions on such complex topics as global warming, pollution control and urban planning. Independent commissions can also audit public agencies and so make them more accountable.

The most important effect of improved information and environmental education is to change behavior. Well-informed citizens are in a better position to put pressure on governments and on polluters and are more likely to accept the costs and inconveniences of environmental policies. The results can be dramatic. In Curitiba, Brazil, a combination of an energetic mayor, a committed municipal government, and an informed and involved public have led to many environmental innovations and an improved quality of urban life in this city of 2 million. Public transport is used by most of the population, green spaces have been expanded, recycling is widely practiced and industrial location and product mix are carefully chosen to minimize pollution.

LU7

Changing Institutions: Making the Public Sector More Responsive

Given that the scarcest government resource is frequently not money but administrative capacity and that political pressures make environmental policymaking particularly difficult, governments must think carefully about what they do and how they do it. The 'what' of environmental management consists of setting priorities, coordinating activities and resolving conflicts and creating responsible regulatory and enforcement institutions. The institutional response to these tasks—the 'how' of the equation—includes developing legislations and administrative structures, providing needed skills, ensuring funding and donor coordination and implementing decentralization and devolution.

Essential Government Functions

Setting Priorities and Formulating Policies

Since all countries face multiple environmental problems, governments must set priorities on the basis of informed analysis so that they can

Box 1.2 Independent Commissions and Improved Environmental Analysis

Governments have often used independent panels of experts (sometimes constituted as special commissions) to investigate contentious policy issues. In recent years environmental issues have increasingly been referred to such bodies. The procedure has a number of advantages.

- It relieves, at least temporarily, the pressure for an early decision.
- It facilitates open debate, sometimes through public submissions or hearings, without committing the government to adopt any of the recommendations that may emerge. Scientific disagreement can be clarified and the public educated.
- It allows a number of scientific disciplines and interest groups to be brought together. A consensus is more likely to emerge if the commission is chaired by an independent person rather than by a government representative.

There have been several interesting examples of the use of this approach.

LU7

On global issues. In 1990 the Enquete Commission on Preventive Measures to Protect the Earth's Atmosphere presented a comprehensive report to the German Bundestag. The commission, which was made up of scientists and representatives of the country's main political parties, made specific recommendations not only on national energy policy but also on international measures.

In the United States, Congress asked the National Academy of Sciences to review available evidence on global warming and evaluate policy options. The report, issued in 1991, recommended that even though the effect of global warming on the United States was uncertain, selected low-cost actions to reduce greenhouse gas emissions should be initiated.

On national priorities. Industrial companies have occasionally used expert panels to help prepare national environmental strategies. The United Kingdom has had a Royal Commission on Environmental Pollution since 1970. Members serve as individuals, not as representatives of organizations or professions, and are appointed for at least three years. The commission is empowered to request documents and even to visit premises. Over the years it has produced 15 reports, most of which have influenced policy. For example, following the 1983 report on lead, the lead content of gasoline was reduced and unleaded fuel was introduced.

On specific environmental issues. Governments increasingly finance independent 'think tanks,' such as the Thailand Development Research Institute, which analyzes a wide range of issues, including environmental topics. Sometimes governments use interagency task forces to examine discrete issues. In Hungary a group evaluated a proposed hydropower dam on the Danube; in Mexico a task force will analyze the use of economic instruments to control pollution and manage natural resources.

make the most efficient use of scarce administrative and financial resources. Frequently, better environmental policy is more important than more environmental policy. In many developing countries top priority must be given to environmental impacts on health and productivity. Actual priorities will depend on the average level (and distribution) of income. In highly urbanized countries such as Argentina, Korea and Poland, air and water pollution in cities will be priorities. In more rural economies, as in many Sub-Saharan African countries, parts of Central America, and India and Bangladesh, land, forest, and water management may well have top priority.

The distribution of impact is important. Wealthier city dwellers, who can protect themselves against unsafe water, may lobby governments to assign higher priority to air pollution, which affects rich and poor alike, than to ensuring a safe water supply. Yet water investments may have a much larger immediate health benefit.

National environmental action plans are proving useful tools for setting priorities. Plans are being drawn up for a number of African countries and have already been completed for Lesotho, Madagascar, and Mauritius. The experience of Burkina Faso with such a plan (box 1.3) demonstrates the importance of building consensus and the will to act.

LU7

Coordinating and Planning

Once priorities have been determined and appropriate policies designed, implementation of policies and the resolution of conflict become important. Environmental policy often cuts across the normal bounds of bureaucratic responsibility. Whether it is watershed management to protect a new dam, allocation of a region's water resources among competing users, or the complex problem of managing a city's air quality, many different actors must be brought together. Agencies need to collaborate and some machinery for resolving conflict is needed. Although there is a natural bureaucratic tendency for governments to respond to intersectoral conflicts by setting up regional bodies, these organizations have rarely been successful in the past because they are inevitably at odds with strongly established, sectorally organized government bureaucracies.

A common problem with environmental issues that cross normal bureaucratic demarcation lines is the absence of an effective mechanism for coordinating the work. In Sao Paulo, Brazil, the metropolitan area has a planning agency, while the state has agencies with responsibilities for environmental protection, water, and sanitation. A consequence of divided responsibilities is that programs for controlling industrial pollution have not been integrated with investments in waste-water treatment and the sanitation master plan has not been sensibly implemented. (For example, treatment plants have been constructed, but not the needed interceptor and trunk line sewers.)

If regional environmental planning is to be successful, countries need flexible management frameworks that encourage the actors to "think globally, act sectorally." In rural areas resource analysis and planning should be done at the level of the individual watershed or irrigation scheme, even if line ministries take responsibility for implementation. In cities the management of air and water pollution requires a strong mechanism for intersectoral planning and coordination. For example, Santiago and Mexico City recently established special organizations for planning pollution reduction strategies to be implemented by line agencies for the wider metropolitan areas; in Mexico City the commission will include part of the state of Mexico as well as the federal capital. In Jakarta the work of several intersectoral groups has led to the relatively successful implementation of a program to protect the metropolitan area's ecologically sensitive watershed by shifting growth away from the south, where the watershed is located, and toward the east and west of the city.

Box 1.3 Setting Priorities in Burkina Faso

LU7

Improved environmental management requires a commitment from both the government and the wider public. The recent experiences of Burkina Faso in developing a national environment action plan illustrates how the process itself can be an essential component in creating awareness and building the political will needed for action.

When Burkina Faso began to develop its plan, the process was based on a series of previous national meetings synthesized by local consultants in commissioned reports. These resulted in the identification of several key program areas: developing environmental management capability at all levels, improving living conditions in rural and urban environments, focusing on environmental management at the village ('micro') level, addressing key national ('macro') resource issues and, in support of all these, managing information on the environment.

With the aid of funding from a number of bilateral and multilateral organizations, including the World Bank, the entire process took about three years and cost about $450,000. A national seminar was held to debate the draft plan and to set priorities in preparation for approval by the Cabinet in September 1991. A meeting was planned for mid-1992 at which donors were asked to pledge support for specific projects that make up the action plan.

The main lesson from Burkina Faso is that by working with the government and local participants, it was possible to develop a plan that incorporates the work of those who will have to implement it. Although it might have been quicker and cheaper to produce the plan using international consultants, the plan would not have been a Burkinabe product and would probably have joined other 'external' products on a bookshelf instead of resulting in action.

Regulating and Enforcing

Agencies, chronically short of money and manpower, need to devise cost-effective ways of implementing policy. One way is to give citizens more power to challenge polluters, whether public or private. For example, public environmental agencies may give local communities or voluntary organizations substantial responsibility for implementing or monitoring programs. This approach can be formalized through the legal system. In the Clear Air Act of 1970 the U.S. Congress authorized private citizens to seek injunctions (and in some cases financial penalties) against companies that violated the terms of their operating permits, thus making environmental enforcement no longer the exclusive responsibility of the government.

Enforcement may be bolstered by making more use of the private sector or of nongovernmental groups. Many governments now hire private companies and technical consultants to perform environmental assessments, collect and analyze data, undertake monitoring and inspection and provide specialized advice. Mexico City, for example, is implementing air pollution control measures through private vehicle-inspection stations and is considering using private laboratories to analyze air and water samples.

Community groups can play an important role in enforcement. In India an 'environmental audit' procedure has been developed for the 500-megawatt Dahanu Thermal Power project, currently under construction. The authorities in charge of pollution control plan to distribute to local communities and NGOs summaries in nontechnical language of the results of environmental monitoring. Community groups can then check emissions against legal standards and seek redress in the courts if necessary.

The success of such approaches will depend partly on how freely information about polluting activities is available. Sometimes simply obliging large polluters to publish information about specific emissions will have some effect on behavior. Legislation in the United States now requires some 20,000 plants to make public information on their annual emissions of 320 potential carcinogens. Public disclosure can also help focus the attention of senior management on emissions and the opportunities for reducing them and can supplement official monitoring with public and community oversight.

The Institutional Response

Policymaking has frequently outpaced administrative capacity to analyze and implement policies. Laws are multiplying, and often the result is a large number of contradictory regulations that are beyond the capacity of governments to enforce. The situation, in addition to doing little for the environment, breeds skepticism about laws in general and government commitment to the environment in particular and may encourage corruption. It is essential to close the gap between making and implementing

policy. That means reforming the way the machinery of government handles environmental issues.

When the World Bank expanded its lending for environmental purposes in the 1980s, it was clear that the public sector was often unable to deliver the expected results. The World Bank and member governments therefore began drawing up comprehensive country environmental action plans. These plans take into consideration both the legal and the administrative frameworks in countries as diverse as Brazil, Poland and the Philippines (box 1.4). Experience with the plans has shown that there are five main requirements for successful policy implementation: a clear legislative framework, an appropriate administrative structure, technical skills, adequate money and decentralized responsibility.

Enacting Legislation

Laying the legal foundations for environmental management frequently necessitates the repeal of outdated law and the codification of new concepts. If the laws are to be effective, detailed regulations, without which most laws are only general principles, also have to be developed. New environmental provisions need to be integrated into existing government procedures or into traditional local law. In Chile one of the first steps taken by the new National Environment Commission (CONAMA) was to review existing legislation and prepare a comprehensive environmental law. This law and a companion law implementing requirements for environmental assessments, both now under consideration, will provide a rational framework for environmental management.

LU7

Building Administrative Structures

Institution building is a long-term business. It depends on local conditions, political factors and the availability of manpower and money. Frequently, it is easiest to build on existing institutions. In practice, the structure of environmental administration matters much less than the ability to get the job capacity to set priorities, coordinate and resolve conflicts and regulate and enforce. Countries will allocate these roles differently; for instance, coordination and conflict resolution might be undertaken by an independent executive agency, by an interdepartmental committee, or by a small politically and technically astute group in the office of the president. The key is clear statutory powers combined with the authority to resolve intragovernmental disputes and the ability to provide continuity when administrations change.

Institutional arrangements that have been found to be helpful include:

- A formal high-level agency that can provide advice on policy and monitor implementation. Examples are IBAMA in Brazil, the Federal Environmental Protection Agency (FEPA) in Nigeria, and the State Environmental Protection Commission in China

- Environmental units in the principal line ministries that can provide the central unit with technical expertise and monitor those environmental policies that the ministries are responsible for imple-

Box 1.4 The Gap Between Policy and Implementation

In a growing number of borrower countries World Bank assistance for national environment plans includes help with institution building. Here are some examples of attempts to reduce the gap between policies on paper and results on the ground:

The Brazil National Environment Project, a $117 million loan signed in mid-1990, is designed to strengthen the institutional and regulatory framework and promote better management of biological resources. In support of the first three-year phase of Brazil's National Environmental Program, the project finances the strengthening of national conservation units; improved environmental management of threatened eco-systems in the Pantanal, the Atlantic Forest, and the Brazilian coast; and reinforcement of IBAMA (Brazil's national environmental agency, the executing agency for the project) and state environmental agencies. The loan provides support for staff training, equipment, better technical information and legal and technical assistance; improvement of regulations and technical guidelines for environmental management; and environmental education. Implementation of the project has been delayed by fiscal and management problems. The slow start highlights the need to strengthen management capability of executing agencies before they can effectively undertake project implementation.

Building environmental institutions is a key concern in Eastern Europe. The Poland Environmental Management Project, approved in April 1990, was the third World Bank loan to Poland and the first for environmental activities. The purposes of the $18 million loan include strengthening environmental management, introducing consistent standards and enforcement, improving monitoring and regionalizing environmental management. The government has identified the most polluted areas and has told the 80 worst industrial polluters to improve their environmental performance at once. At the same time, government task forces are revising the regulatory system and designing a national environmental monitoring strategy.

In the Philippines a loan and credit package totaling $224 million, approved in 1991, will promote policy reform and strengthen institutions. The loan contains provisions to help protect biodiversity in the country. Since the largest threats to biodiversity are encroachment by land-hungry farmers and illegal commercial logging, the project supports more sustainable patterns of resource use by small farmers in exchange for secure tenure rights and improves the enforcement of logging regulations, partly by strengthening the regional and local offices of the Department of the Environment and Natural Resources. The loan also supports the design of a network of protected areas and provides resources to manage 10 priority areas.

LU7

menting. Oversight, from a public health perspective, of general environmental quality (especially air and water) is frequently carried out by the ministry of health, and the management and conservation of natural resources may be spread among government units responsible for agriculture, forestry, fisheries and parks and wildlife.

- Regional and local environmental units that allow local implementation and monitoring and feed information back to the national government (see below).

Closing the Skills Gap

The public sector in many developing countries is short of qualified staff at all levels. The necessary skills may exist but may not be attracted into the public sector because the salaries are well below the market rate. Environmental agencies are therefore condemned to being outstaffed by the private firms they are charged with regulating or may be forced to rely for expertise on expensive temporary consultants. Some countries have found ways to mitigate this problem. In Latin America, for example, foundations and institutes financed by non-governmental sources sometimes undertake both policy analysis and resource management.

LU7

Another common problem is an imbalance of professional skills. In some countries the agencies are dominated by engineers and contain few natural or social scientists; in other countries the reverse is true. But environmental management requires a mix; natural or biological scientists to manage renewable resources, social scientists—economists, sociologists and anthropologists—to identify problems and formulate policies and engineers to design solutions.

Economic analysis is particularly important to (and frequently absent from) the dialogue between those responsible for environmental management and those in charge of the budget, planning and economic policy. An environmental economics unit in the ministry or agency responsible for economic planning and public finance can fill this role by assessing budgetary allocations, ensuring that economic incentives are consistent with environmental objectives and helping to strike an appropriate balance between environmental and economic goals in determining development priorities.

Obtaining Funding

Environmental agencies have not yet firmly established their place in the competition for scarce government funds. Given the secondary importance usually attached to environmental management, budgetary allocations are sometimes insufficient and highly variable. When money runs out, the effect may be disproportionately damaging. For instance, if a shortage of cash means that enforcement of water pollution regulations has to be suspended, the consequent damage to groundwater and surface water can be substantial. If a national park goes unprotected during a dry

Box 1.5 Japan: Curbing Population While Growing Rapidly

Japan's post-war reconstruction brought about both rapid economic change and major environmental problems. In the 1960s, when it was still a middle-income country, Japan began to invest heavily in control technology to combat severe air and water pollution, largely from industrial sources. Expenditures for pollution control by large firms peaked at more than 900 billion yen in the mid-1970s before declining to 400 billion yen or less by 1980. Japan is now enjoying the benefits of its investment: between 1970 and the late 1980s emissions of sulfur dioxide decreased by 83 percent, emissions of nitrogen oxide by 29 percent and concentrations of carbon monoxide by 60 percent. Similar advances were made in improving water quality. These results were obtained through stringent governmental regulations and negotiations between industry and communities to define solutions that could be fine-tuned to varying local requirements. An estimated 28,000 such agreements are now in force.

Three lessons from the Japanese experience may offer useful guidance to today's middle-income countries:

Establish a national policy framework. The initial legal framework, established by the Diet, included the Basic Law for Environmental Pollution Control (1967), the Air Pollution Control Laws (1967 and 1970), and the Water Pollution Control Law (1970). These laws define responsibilities and divide them among government at various levels, private firms, and individuals, thereby encouraging decentralization

Negotiate agreements at the local level. The open negotiation of agreements between polluting industries, local authorities, and citizens' groups often led to emissions considerably lower than the minimum required by law.

Allow flexibility in setting emissions levels and promote self-regulation. Since industries were often located in the middle of residential areas, firms were very sensitive to local environmental concerns. The negotiating process allowed emissions levels to be tailored to local conditions and also encouraged self regulation by industry, thus fostering the idea of good corporate citizenship.

season because of lack of funds, poachers may quickly undo what has taken years to achieve.

Environmental administration can often be improved even within a tight budget. But an environmental agency needs a core of skilled technical staff, as well as laboratories and other monitoring devices, to do its job properly. In some countries more money is becoming available as environmental management is accepted as an important national objective. Economic instruments--fines for polluters, charges for permits to use forests and fisheries, entrance fees for parks and protected areas and so on --can help to pay for enforcement and administration

Donors, including development banks and multilateral societies, are often reluctant to finance what is needed most—improved operation and maintenance of fledgling national environmental administrations. Rather, they seek to make specific investments that tie up scarce local staff. Sometimes contributions come in the form of technical assistance and other tied aid, which does not necessarily strengthen local capabilities, and sometimes the donor community floods local officials with well-meant but unorchestrated offers of assistance. Finally, most donor-funded projects are relatively short-term and small scale. What is needed most is longer-term reliable funding, especially for institution building and research.

Decentralizing and Delegating

Once national priorities have been set, it is often cost-effective to solve problems at the local level. Many governments therefore pass day-to-day responsibility to local bodies. This approach was used successfully in Japan (Box 1.5) and is being increasingly applied in other countries. In China, for example, the actual work of environmental protection takes place mainly at lower levels of government. The provinces are responsible for carrying out national policy set by the State Environmental Protection Commission. All provinces and municipalities and most counties now have environmental policy committees headed by a vice governor or vice majistrate. China's network of environmental policy commissions headed by a vice governor or vice majestrate. China's network of enforcement protection bureaus (EPBs) that answer to local environmental protection agencies thus consist of the central units and about 2,400 EPBs, which together employ more than 16,500 people.

LU7

In Nigeria, a federal state, most policy is implemented at the state level. Over the years the states have monitored their environmental problems through their administrative systems, which include representation from local governments. Local capacity, however, has been weak. The 1988 decree establishing Nigeria's FEPA encourages the establishment of local environmental protection bodies, but most have only limited capacity to carry out their responsibilities for environmental management. If decentralization is to work, it must be accompanied by a transfer of finance. Otherwise a policy vacuum is created: the center sheds responsibilities, but local agencies are ill equipped to take them up.

Some countries have made specific allocations to local administrations for environmental investments. China and Colombia, for example, have passed national laws that permanently assign a percentage of the income from hydropower sales to local governments for watershed protection, environmental education, soil protection and environmental training programs for municipal officials. In others emissions fees serve as local sources of finance. The Municipal Environmental Protection Bureau of Tianjin, China, has created an industrial pollution control fund financed by emissions fees mandated under national legislation. Revenues are used to finance investments in control and treatment at individual enterprises.

Investments in decentralized treatment of industrial waste water increased the treatment rate from 35 to 46 percent between 1985 and 1990.

Involving Local People

Many environmental problems cannot be solved without the active participation of local people. Few governments can afford the costs of enforcing management programs that local people do not accept. Participation can also help with afforestation, wildlife conservation, park management, improvements in sanitation systems and drainage and flood control. Local people can provide the manpower and knowledge for dealing with the aftermath of environmental disasters, and local knowledge of genetic diversity has led to breakthroughs in crop production.

Participatory approaches offer three main advantages:

- they give planners a better understanding of local values, knowledge and experience;
- they win community backing for project objectives and community help with local implementation; and
- they can help resolve conflicts over resource use.

LU7

Drawing on Local Values, Knowledge and Experience

People's views of their environment strongly influence how they manage it. Even when attitudes toward the natural world do not achieve the sophistication described in box 1.6, few cultures view natural resources as worth nothing more than their cash value in the marketplace. Only if environmental programs reflect local beliefs, values, and ideology will the community support them.

The belief that traditional knowledge of the environment is simple and static is changing rapidly. More and more development projects are taking advantage of local knowledge about how to manage the environment. For example, people in the tropical rainforests in the Amazon and Southeast Asia have accumulated a valuable understanding of local ecosystems, and African pastoralists, such as the Maasai and Samburu of Kenya, are able to exploit apparently marginal savannahs (see box 1.6). Building on these strengths requires great care, expertise and patience. But development projects that do not take existing practices into account often fail.

A particularly costly instance of neglecting local practices occurred in Bali, Indonesia. For centuries the traditional Balinese irrigation calendar had provided a highly efficient way of making the most of water resources and soil fertility and of controlling pests. When a large internationally financed agricultural project tried to replace traditional rice varieties with high-input imported varieties, the result was a sudden increase in insect

Box 1.6 Indigenous Values and Knowledge of Land and the Environment

Many of the world's remaining indigenous people—estimated to number over 250 million in more than 70 countries—take a view of nature that differs strikingly from conventional attitudes. A study commissioned for this Report analyzes the attitudes of three groups of indigenous peoples: the Quichua-speaking Amerindians in the rainforests of eastern Ecuador, the Maasai and Samburu nomadic pastoralists of Kenya, and the indigenous swidden (slash-and-burn) farmers in the upland areas of the Philippines. The study concluded that many indigenous people view land not as a commodity to be bought and sold in impersonal markets but as a substance to be endowed with sacred meanings, embedded in social relations and fundamental to the understanding of the groups' existence and identity.

Tribal Filipinos see land as a symbol of their historical identity: an ancestral heritage to be defended and preserved for all future generations. According to the Episcopal Commission on Tribal Filipinos,

> *They believe that wherever they are born, there too shall they die and be buried, and their own graves are proof of their rightful ownership of the land. It symbolizes their tribal identity because it stands for their unity, and if the land is lost, the tribe too shall be lost.*
>
> *Ownership of the land is seen as vested upon the community as a whole. The right to ownership is acquired through ancestral occupation and active production. To them, it is not right for anybody to sell the land because it does not belong to only one generation, but should be preserved for all future generations.*

LU7

Like many indigenous people, the surviving tribes of the rainforests of South America drew on traditional knowledge and practices to make a living in fragile environments. The study observes,

(Continued on next page)

pests, followed by declining crop yields. A subsequent project built on the indigenous production system has been much more successful.

Sometimes local knowledge can be applied in other parts of the world. Vetiver grass has been used for centuries in the hilly areas of Tamil Nadu and other parts of India as cattle fodder and as a hedge plant to conserve soil and moisture. Experience from the Kabbalama Watershed Development Project in 1987 prompted the World Bank to support the use of vetiver in countries as diverse as China, Madagascar, Nepal, Nigeria, the Philippines, Sri Lanka and Zimbabwe. The costs of vetiver are one-fifteenth those of soil conservation systems that rely more

(Continued from previous page)

> *Quichua forest management is often overlooked and unappreciated by outsiders who are unfamiliar with it, in part because the methods that they use to alter the course of forest succession are technologically simple (consisting of axe and machete and a vast array of knowledge), and also because the forest that regrows is diverse and complex and hard to distinguish from undisturbed mature rainforest. The lowland Quichua achieve this effect by altering the mix of species that regrow in their agricultural clearings...(The result is) a patchwork of habitats of different ages in different stages of succession and with a varying blend of useful resources.*

In most countries legal recognition and practical protection of the customary land and territorial rights of indigenous people are limited or non-existent. Pastoralists in Africa face particular problems in maintaining access to their traditional pastures. An example is the case of the Maasai and Samburu of Kenya. At one time the Kenyan government hoped to set up group ranches as a way of increasing beef exports while retaining collective management. Recently, the government has promoted the privitization of these ranches, asserting that corporate land tenure impedes rational land management. The Bank study notes that Maasai elders regard private land ownership as an 'alien concept' and express fears that "subdivison may lead to a disastrous change of lifestyle for the Maasai people".

LU7

The only source of income for the Maasai people is livestock. Their culture provides them with a system in which they can preserve the arid and semi-arid areas...in such a way that certain areas are put aside in periods of drought in order to keep grazing areas in good condition. Although lately it has become more difficult to do, it still works within and among group ranchers, especially where upgraded cattle breeds are introduced. However, in the fragile (semi-) arid areas it might even become impossible to keep livestock on an individual basis on small plots; it will also irrevocably lead to soil erosion, overuse of resources, and desertification.

heavily on engineering. However local management practices—embedded as they are in specific culture—are not always so transferable.

Improving Project Design and Implementation

Projects are more successful if they are participatory in design and implementation. A review of thirty completed World Bank projects from the 1970s found an average rate of return of 18 percent for projects that were judged culturally appropriate but only 9 percent for projects that did not include mechanisms for social and cultural adaptation. A more detailed study of 52 USAID projects similarly found a strong correlation

between participation and project success, especially when participation took place through organizations created and managed by the beneficiaries themselves.

The contrasts between environmentally beneficial projects designed on participatory principles and those that fail to include participatory designs can be striking. Haiti's top-down afforestation program, plagued by high sapling mortality rates on forest department lots and by conflicts with villagers, consistently fell short of tree-planting targets. Starting in 1981, an alternative approach was tried. NGOs helped to provide trees that were selected by farm households. The result was dramatic: instead of the 3 million trees on 6,000 family farms originally planned, 20 million seedlings were planted on the farms of 75,000 families who voluntarily joined the program.

Ideally, both local communities and the responsible agencies gain from participation, as the experience of the National Irrigation Authority (NIA) in the Philippines illustrates. Early involvement of community groups in planning construction and in finding ways to avoid the silting of channels and drains has brought about better maintenance of irrigation works and higher agricultural yields. Users have also been more willing to pay for the NIA's services.

LU7

Growing numbers of countries are devising partnerships with local people to provide municipal environmental services. In Accra sanitation services in low-income areas have improved greatly since NGOs and local entrepreneurs have been allowed to operate improved community pit latrines. Desludging and disposal are carried out by the city's central waste management department. This division of responsibility has proved more effective than attempting to operate a completely centralized sewerage system that had fallen into disrepair. In Jakarta neighborhoods organize the collection of solid wastes by collecting monthly dues that are used to buy a cart and hire a local garbage collector. At least once a month, one volunteer from each household assists in collecting garbage and cleaning the neighborhood drainage system. The wastes are taken to a transfer station. There they are picked up by municipal authorities—a task that is gradually being contracted out to private companies. This combination has allowed Jakarta to achieve an 80 per cent waste collection rate—high by developing country standards.

Resolving Local Conflict

Properly planned participation eases resolution of the conflicts inherent in environmental decision-making. When mechanisms for resolving conflicts exist, people may be less likely to overuse natural resources out of fear of losing their access to them. All too often, top-down rules that govern access to natural resources appear arbitrary and unfair. Many governments are changing resource allocation rules to reduce conflicts between authorities and local communities and to set up procedures for resolving disputes among competing claimants to resources.

When large infrastructural investments—dams, irrigation facilities, roads and ports—are planned, listening to public opinion and local NGOs at an early stage is a good way to avoid trouble later on. If this is not done, community opposition can gather momentum and delay or stop the project. A good environmental assessment should clarify potential environmental and social impact, propose mitigative measures and present the costs and benefits of alternatives.

A particularly difficult challenge for conflict resolution is posed by projects such as dams, highways and some types of wildlife reservations that change land use and lead to involuntary displacement and resettlement. Rarely have local views been consulted to any extent in making such an investment decisions or, until recently, in planning resettlement programs. This omission has led to inefficiency, as well as injustice; traditional resettlement has turned out to be needlessly slow and expensive. Governments and donors now broadly agree on several principles:

- project designers should explore ways of minimizing resettlement;
- resettlers' living standards should be as good or better than before resettlement;
- compensation for lost assets should be paid at replacement costs; and
- communities should be encouraged to participate in all stages of resettlement planning and implementation. Examples from Mexico and Thailand illustrate this new approach (box 1.7)

LU7

The Limitations and Costs of Participation

Public participation has its drawbacks. Extensive participation, especially when information is inadequate, can delay decisionmaking. Communities with political influence sometimes reject proposals to construct facilities such as waste disposal centers on the most suitable sites because of the impact on local property values, aesthetics or safety. Making compensatory payments for local use and giving communities control over how the project is sited and designed can defuse opposition.

Participatory approaches tend to be expensive. Consultation requires plenty of staff and time, and government agencies, already short of funds, may cut corners. If they do, the most remote and marginal—and often the neediest—communities will be the ones to suffer.

The extra net expense of seeking participation need not be large, however. In the Philippine example described above, the additional cost for the community organization program was about $25 a hectare, but savings in construction costs—largely as a result of information provided by farmers—brought the net increase down to less than $2.50 a hectare. The outcome was a better irrigation system with higher utilization and higher revenues. Increased participation was clearly cost effective.

Box 1.7 Reforming Resettlement through Participation: Mexico and Thailand

Resettlement of people displaced by large hydroelectric dams has typically been the extreme case of nonparticipatory planning. But experience with two recent projects in Mexico and Thailand illustrates how participation can help with issues as difficult as involuntary displacement and resettlement.

The 200-meter dam at Zimapan, central Mexico, and the 17-meter Pak Mun dam on the Mun River in Thailand are at the core of two World Bank-assisted projects designed to provide urgently needed clean energy. But the national benefits of the dams meant little to the nearly 25,000 people who would be displaced. Nor was previous experience in either country encouraging; new housing and compensation for lost assets had proved no substitute for submerged farmland and uprooted communities. It was not surprising that resettlement proposals were greeted with skepticism and opposition.

In both countries the impact of resettlement was taken into account when the dams were designed. In the case of Pak Mun a review of technical options showed that locating the dam slightly upstream and lowering its height would reduce the number of people to be resettled from approximately 20,000 to fewer than 2,000. Detailed resettlement plans that followed the World Bank's guidelines were prepared to help the affected farmers recover their lost livelihoods.

LU7

Under repeated prodding by NGOs and community groups, the energy company began working with the affected communities on improving its approach to resettlement.

(Continued on facing page)

A potential disadvantage of participation is that decentralization of decision-making can easily reinforce the power of local elites. In these cases strong supervision is needed to overcome local conflicts.

When projects involve voluntary provision of labor, participatory approaches can widen income differentials. This often happened with community woodlot programs in India in the 1970s and early 1980s. In many of these projects, despite an approach ostensibly built on village participation, poor villagers commonly found their time and labor were welcome, but that the benefits went disproportionately to wealthier farmers who made a smaller contribution. More thought was needed to ensure that participatory approaches are able to balance the interests of different groups.

How Participation Can Be Improved

How can the large benefits of participation be realized while minimizing the costs? Community organizations often require strengthening through

(Continued from previous page)

Although the problems remain, sharing information about resettlement alternatives, preparing meetings and publications to inform resettlers of their rights and entitlements, and providing farmers with good-quality replacement farmland are important steps in improving the resettlement program.

To implement the resettlement policy for Mexico's Zimapan project, the parent company set up a unit that reported directly to the company's president. The unit included anthropologists, technicians, economists, architects, and social workers, all of whom were to live in the affected villages, help identify local concerns and resettlement preferences, and provide a channel of communication between the villagers and the company. As villagers in Zimapan organized, they repudiated the local administration and elected their own much tougher council to manage the negotiations on compensation and resettlement. Farmers have been active in selecting and supervising designs for replacement housing, and the company has purchased farms that will improve their incomes and living standards.

In neither case has participation in resettlement planning led to the disappearance of opposition—that was not the purpose. Indeed, opposition remains strong and confrontational encounters between the company and antidam organizations still occur. Nevertheless, in both projects pressure for more active participation by local people has led to significant improvement in what will always be a difficult process. Participation has allowed the people most adversely affected by the projects to be actively involved in directing the course that resettlement will take.

LU7

technical assistance, management training, and gradually increased levels of responsibility. Several measures can enhance participation.

Use of Indigenous Institutions

Indigenous institutions (such as the *subak*, or traditional water users, in Bali) that are already involved in managing natural resources can be useful, particularly when decisions on land use have to be made. Where such institutions do not exist, it is often necessary to create them. All too often, however, user groups have been legislated into existence rather than built on existing social foundations. User groups can be effective only when they enjoy broadly based local support.

Use of Local Voluntary Organizations

Among the strengths of community groups and NGOs are their ability to reach the rural poor in remote areas and to promote local participation; their effective use of low-cost technologies; and their innovativeness. They work best when they complement the public sector but may also have an important 'watchdog' function, thereby influencing

public policy. The disadvantages of NGOs include generally a weak financial base and administrative structure and limited technical capabilities. Many NGOs are small and by themselves cannot be expected to cover large populations. The challenge is to retain the NGO's expertise and energy while simultaneously enlarging their financial and administrative bases.

Increased Access to Information

Many countries now support local involvement in environmental impact assessments. But if such consultations are to be effective, the people who are involved need to be well informed. Some ways to achieve that are

- to share information with local communities at the early stage of identifying a project,
- to discuss local worries with the affected communities,
- to allow public comments on background studies,
- to encourage public comments on the draft environmental assessment, and
- to include hearings and comments in the final document. The World Bank expects its borrowers to arrange public discussion of environmental assessments prepared for the projects it finances.

LU7

Institutional Reforms

The attitudes of bureaucracies often thwart the benefits of local participation. Forestry departments, for example, generally see as their mission protecting trees from people. Wildlife conservation agencies (sometimes justifiably) fail to distinguish between local communities and game poachers. Often, the institutional units that have the best relations with the local communities are themselves on the margins of their own agencies. Most technical agencies lack the skills to foster participation. High priority should therefore be given to increasing the organizational weight of units that specialize in participation, to hiring professional staff trained in the social sciences and to providing institutional incentives for participation.

Policies for mitigating the worst effects of pollution and degradation without sacrificing development are available. Although such policies may appear simple and logical, no one should underestimate the political difficulties entailed in implementing them. As this chapter has argued, governments can reduce those difficulties by introducing well-designed administrative structures for making and implementing environmental policy and by carefully building constituencies of support.

Highlights of the Dutch National Environmental Policy Plan

Excerpted, with permission, from Ministry of Housing, Physical Planning and Environment, *Highlights of the Dutch National Environment Policy Plan: A Clean Environment: Choose It or Lose It* (The Hague, 1991).

Drastic Intervention

The state of the environment is extremely serious. In spite of improvements in certain areas, the situation as a whole is continuing to deteriorate. It would be irresponsible to delay drastic measures any longer. Radical decisions, which will affect everyone, are unavoidable. Not only the improvement of environmental quality, but also the very survival of mankind is at stake. Unless we set a different course quickly and resolutely, we are heading for an environmental catastrophe. The only way to avoid it, is to lay a basis now for sustainable development.

In the National Environmental Policy Plan (NEPP), the Dutch Government sets out how and with what resources it intends to enter this struggle. The NEPP also makes clear the contribution to sustainable development which are expected from every group and sector in society. It is no longer enough for the government to issue laws and regulations which must then be complied with. A positive, active attitude on the part of everyone in society is indispensable to the realization of a clean environment.

This requires a firm foundation. It is important, then, that the NEPP has been drafted jointly by four ministries (Housing, Physical Planning and Environment, Agriculture and Fisheries, Transportation and Public Works, and Economic Affairs), in consultation with the target groups which must ultimately implement the policy.

The NEPP contains concrete measures for the period 1990-1994, but it focuses emphatically on the long term. It sets out the course to be followed by environmental policy until 2010. This is the first time such a long-term course has been charted. Never before were there enough possibilities and information available to make such a plan. Of course, the NEPP cannot work out in detail everything that must be done a quarter of a century from now. So it is being revised every four years. The concrete measures are being elaborated every year in an "Environmental Programme".

LU7

Concern of Tomorrow

"If we want to remain the norms for environmental pollution, then reductions of 70-90 percent are required. This is beyond the capacity of most of the end-of-pipe technologies that we know about".

An ominous statement but a solidly grounded one. It was taken from the summary of the well-known report "Concern for Tomorrow" which was published in late 1988. This study has received a great deal of attention and deservedly so. Never before has there been such a complete, scientifically based picture presented of the long-term environmental developments that we can expect in the Netherlands. Numerous universities and institutions contributed to the research.

LU7

The report presents the environment as a system of reservoirs and natural cycles of all sorts of substances which circulate within and between these reservoirs. Intervention by man has disrupted many of these processes profoundly. In order to promote understanding of the system and of the consequences of these disruptions, "Concern for Tomorrow" distinguishes five levels of scale: local (the development environment), regional (the landscape), fluvial (the basins of rivers and coastal seas), continental (air and ocean currents), and global (the higher air layers). Each level has its "own" problems, yet they all affect each other. Local problems can contribute to problems at "higher" levels. And conversely, global problems have effects all the way down to the local level. The higher the scale level, the longer it takes before these problems become clear. But also, the more difficult it is to do something to counter them and the longer it is before such counter-action has an effect.

Acid rain provides a good example. Warnings regarding their risks appeared as long ago as the last century. In the 1960's when energy consumption had increased sharply, acidifying substances (especially sulphur dioxide) were already causing health problems at the local level (respiratory disorders). In response, people began to build taller stacks. And the result was that the acidifying substances were precipitated hundreds of kilometers away, for example in Scandinavia, where they made lakes unlivable for fish and other organisms. However, it was a long time before reports about this phenomenon were taken seriously. By then, all kinds of other consequences had become clearly visible: dead trees, and damage to agricultural crops, buildings and cultural property all over Europe. The problem, then, had been lifted from the local to the continental level, which has not made it any easier to solve.

The environment can tolerate a certain amount of rough handling, but continuous overburdening exhausts its capacity to recover. And the longer and more intense the assault on the environment's health, the longer and more difficult is recovery. Exactly the same as with someone wounded or ill who goes too long without treatment.

The growth in scientific and technical knowledge since the Industrial Revolution, about 200 years ago, has made it possible for mankind to make use of ever increasing amounts of natural resources. We assume that these resources, the formation of which took a very long time, are inexhaustible. And we take too little account of the negative environmental consequences in the long term. Examples:

- Deforestation is consuming the "reservoirs" of centuries in a short time;
- Soil erosion and peat depletion are exhausting "reservoirs" of millennia at a rapid pace;
- The formation of fossil fuels (oil, gas, coal and lignite) and mineral raw materials (such as metals) required tens to hundreds of millions of years, but current consumption is racing through the existing reserves at an incredible speed.

This rapid exhaustion is accompanied by enormous amounts of pollution, which are affecting essential aspects of the composition of the atmosphere, soil and water in a harmful way. What the consequences of this will be is to a large degree still unknown. This is also true for the consequences of massive extinction of plant and animal species. But there are enough signals to warrant sounding the alarm, to have "Concern for Tomorrow". LU7

Brundtland: Towards Sustainable Development

Concern about the future quality of the environment is not limited to our country. In 1987, before "Concern for Tomorrow", the important report "Our Common Future" was issued by a special United Nations commission. This commission consisted of individuals from both "developed" and "Third World" countries. "Our Common Future" is also referred to as the "Brundtland report", after the commission's chairwoman, the current Prime Minister of Norway, Mrs. Gro Harlem Brundtland. The report concludes that the most significant threat facing humanity is development characterized by increasing numbers of poorer people and simultaneous deterioration in environmental quality. Projections indicate that the world's population will double in the near future. Ninety per cent of that growth will occur in the poorest nations (and 90 per cent of that will be concentrated in already overpopulated cities). What will this mean to the economy? Industrial production has already grown fifty-fold during this century; 80 per cent of this growth has occurred since 1950.

What will the expected five-fold or even ten-fold growth in economic activity mean for the environment, which is not becoming larger but is becoming increasingly dirty? Acid rain, the hole in the ozone layer, the "greenhouse effect", the enormous erosion of fertile agricultural land, and the extinction of plant and animal species are only some of the numerous threats that "Brundtland" records.

The commission makes the important observation that the environmental, development and energy crises are all part of a whole. None of these crises can be resolved unless solutions are also found for the others. The solutions are dependent on one another.

Based on this, "Brundtland" formulates the goal of sustainable development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The commission notes that world ecology and world economy are becoming increasingly tightly interconnected. But the perspective has also changed. We used to look with concern at the detrimental effects of economic growth on the environment. Now it is high time to concern ourselves with the disastrous consequences for the economy of environmental destruction.

In order to promote both global justice and environmental protection, the Third World must be granted the opportunity to grow economically— in an environmentally responsible manner. An important facet in this is the creation of fair international trade conditions.

LU7

Drastic measures are also needed in the energy area. Economic growth must be coupled with increasingly lower energy use. Ultimately, according to the Brundtland report, current energy use in the industrialized nations must be reduced by 50 per cent. The "Third World", however, has a right to substantial growth in its energy use in view of its enormous economic disadvantage. The developed world must—in its own interest—play a role in meeting the challenge of sustainable, environmentally responsible production.

Drastic measures are also needed to curb the rapid growth in population. "Brundtland" notes, too, that a more equitable distribution in welfare can provide part of the solution.

The Dutch National Environmental Policy Plan

The reports mentioned above indicate, then, that it is high time for rigorous measures. They form the basis and the point of departure for the National Environmental Policy Plan (NEPP). The NEPP is a strategic plan directed at the long term: 1990-2010.

It sketches the main features of the environmental policy which the government believes is necessary in order to be able to achieve sustainable development.

The NEPP notes that the nature of environmental problems is that they are becoming increasingly larger in scale.

In years gone by, the problems involved were largely local and regional (noise, odor, local water pollution and so forth); now we are also confronted with: global problems such as the hole in the ozone layer and the greenhouse effect.

And where the damage used to be limited to health effects and impacts on nature, nowadays the essential social and economic functions of the environment are at stake. As environmental problems become larger scale and more fundamental, the realization of solutions requires more effort, more money and more time.

Some effects will never be able to be undone: the extinction of plant and animal species, the loss of the tropical rain forests, and the desolation of certain regions (desertification).

According to the NEPP, the causes can be traced to:

- the breaking open of cycles;
- the more intensive use of energy;
- the emphasis on quantity, leading to neglect of quality considerations in production processes and products.

LU7

Environmental problems are also rolled off constantly to other people, other places and the future. It starts out small (neighbourhood noise, emptying car ashtrays on the street, dog litter), but at the other end of the spectrum there is raw materials waste, the pollution of areas from Alaska to Antarctica, the dumping of chemical waste in the Third World.

This roll off leads to sizable "environmental loans" on a worldwide scale. The current generation is consuming huge amounts of energy and other raw materials, leaving (chemical) waste belts behind everywhere, destroying fertile regions, chopping down unique rain forests, heating up the atmosphere, creating a hole in the ozone layer. All of this poses serious dangers to the pursuit of sustainable development.

How will the NEPP turn this disastrous development around? To begin with, the following well-known premises will be adhered to in initiating and assessing new developments:

- stand still principle: environmental quality may not deteriorate;
- abatement at the source: remove causes rather than ameliorate effects; these source-oriented measures are determined on the basis of effect-oriented norms (the goal determines how stringent the measures must be);
- polluter pays principle;
- application of best practical means in abating pollution (preventing unnecessary pollution);

- carefully controlled waste disposal;
- internalization: motivating people to good environmental behaviour.

The core of the new approach which must lay the basis for sustainable development is:

- closing substance cycles (including product life-cycle management): the chain from raw material through production process to product and waste must contain as few "leaks" as possible which cause energy and raw material losses and environmental pollution;
- conserving energy, together with improving the efficiency and utilization of renewable energy sources (solar, wind and water power);
- promoting the quality of production processes and products.

In addition to controlling detrimental environmental effects as such, the NEPP also wants to reduce the chances of negative effects occuring (risks). The norms being established to that end will take into account the health of people, environmental functions and nature values.

LU7 Major Goals for Each Level of Scale

Globally, the growth in concentrations of climate influencing substances must be brought to a halt by 2010 (and that in substances which damage the ozone layer sooner). To this end, emissions of carbon dioxide must be reduced by 90 per cent in the industrialized nations (assuming an equitable distribution in per capita emissions among the world population).

The emission of substances which damage the ozone layer must be stopped completely before 2000. Decreases in the area of tropical rain forests must be halted well before 2 00.

For the time being the Netherlands is striving to stabilize CO_2 emissions in 2000 on the 1989 1990 level. In addition industrialized countries will in due time possibly decide on joint, substantial reductions of CO_2 for the first coming decades of the next century.

Continentally, reductions on the order of 80 or 90 per cent are needed in emissions of acidifying substances, certain hydrocarbons and poorly or non-degradable substances (such as heavy metals, certain hydrocarbons, pesticides). These reductions are necessary, *inter alia*, for the conservation and recovery of healthy forests.

Flurially, measures are needed to preserve and restore safe drinking-water supplies without high costs for purification, swimming water, fish cultivation, and fresh and saltwater ecosystems with their characteristic animal species such as seals, otters, badgers, salmon and pike.

In order to achieve these goals, emissions of eutrophying poorly or non-degradable substances must be reduced by 90 percent. Measures are also needed to reduce the change of calamities on or near rivers and at sea.

Regionally, substantial reductions (70 to 90 percent) in emissions of acidifying, eutrophying and poorly degradable substances must also take place before 2010. The quantity of waste (***inter alia*** through reuse) must decrease by 70 to 90 percent.

Extra measures are needed to preserve dunes and meadows on peat soils, for which the Netherlands bear a special responsibility. The chance of large-scale accidents in factories and during transportation of hazardous substances must be reduced to the point where the risks are acceptable.

Locally, sharp reductions are also needed in emissions of environmentally hazardous substances and in noise and odor production. These reductions must improve the quality of the daily living environment.

Measures

As already noted, measures at the same source are to be preferred to measures which ameliorate negative affects. After all, an ounce of prevention is worth a pound of cure. There are three kinds of source-oriented measures: LU7

- Emission-oriented: emissions of pollutants and waste production can be reduced with extra equipment ("end-of-pipe" techniques); the production process itself does not change;
- Volume-oriented: less raw materials are used and fewer products are made as a result of policy measures; the production process itself does not change;
- Structure-oriented: production and consumption processes are changed structurally (for example, through more economical or cleaner technologies).

The kind of measures required (emission, volume or structure-oriented) depends on the nature of a given environmental problem as well as on the objective to be achieved. In general, the emphasis will continue to be on emission-oriented measures during the period until 1994. However, these measures will not be sufficient to achieve the goals set.

A disadvantage of using extra equipment is that it does not really contribute to sustainable development: cycles are not closed; often even more energy is used; and no contribution to improved product quality is made.

Structural source-oriented measures offer better prospects, but their development and implementation usually require a lot of time. As a

consequence, volume-oriented measures may also be needed in the period until 2010.

The NEPP also formulates goals for achieving sustainable development with the help of structural measures jointly referred to as integrated life-cycle management:

- Considerable savings in use of raw materials (20-30%) by 2010 (through more economical use and better utilization of wastes); in 2010 the use of renewable raw materials (wood, agricultural products) must be at a level which makes renewal sustainable;
- The use of finite energy supplies in 2000 may not exceed its current level; in industrialized countries conservation of several tens of percents must be realized in 2010;
- The pursuit of quality improvement must double the length of time that raw materials, capital goods and products remain in the economic production and consumption cycle and they must be reusable as raw materials in their waste phase.

Needed: Time, Economic Support and Instruments

LU7

Instruments and measures are needed in order to be able to achieve the objectives described above and they must be affordable. It also takes time to institute the necessary measures. These, then, are the basic ingredients for a good environmental policy.

In principle there is a very broad set of instruments available to the government. First of course, are legislation and regulations. Adequate control of compliance with these laws and regulations ("enforcement") is then essential for the credibility and effectiveness of the environmental policy promulgated.

Strict adherence to a principle such as the polluter pays (including a detailed system of environmental liability) is also an efficient instrument which at the same time provides an incentive effect. This is just one of the numerous financial possibilities which the government can use in stimulating environmentally friendly behaviour. Fiscal measures are another of those financial possibilities.

Internal corporate systems of environmental concern can also play a positive role in prompting firms to integrated and "internalized" environmental behaviour.

Setting environmental standards for products and promoting or requiring the provision of clear product information can help to encourage environmentally aware choices in a more general way. Environmental public information can create the right "acceptance framework" for all these measures.

Influencing the development of technology is also an important instrument of environmental policy. Many environmental problems can be solved through prevention "on the drawing boards". Such an approach is not only more elegant; it is also less expensive. It requires governmental efforts in the areas of research, schooling, increasingly strict standard setting, public information and, of course, financing, among others.

Three scenarios have been analyzed to provide insight into costs of the environmental policy desired. Current environmental policy is continued increase from Dfi. ~ billion (in 1985) to Dfi. 16 billion in 2010. This is then 2 per cent of Gross National Product (GNP).

Scenario II is based on the maximum introduction of emission-oriented measures. Such a policy would incur annual costs of Dfi. 26 billion in 2010, which would amount to about 3 per cent of GNP.

Scenario III reflects an environmental policy which not only includes emission oriented measures, but also focusses on a fundamental, structural approach to problems with an eye to sustainable development. In the first instance, this is the most expensive scenario with annual costs of about Dfi. 57 billion.

However, these costs are offset by "compensating effects": fewer emission oriented measures are required. Energy conservation, for example, is not only good for the environment but it also generates financial savings. LU7

The total compensating effect could amount to Dfl 20 billion annually based on current trends in the development of fuel prices. If energy prices will rise, this figure could add up to 30 billion.

In this case just described, the following structural measures, among others, would be taken:

- far-reaching energy conservation; less car driving, more public transportation;
- fewer beef cattle, but a greater yield per animal;
- efficient use of raw materials and their recovery from waste in industry and agriculture as well as in households;
- product quality improvement.

"Concern for Tomorrow" concludes that structural changes or reductions of production and consumption are needed. A start towards making these changes must be made during the period 1990-1994. Implementing them, however, will take time.

The most urgent problems, therefore, must be ameliorated now through maximum utilization of the existing technical means. In the meantime, the instruments of environmental policy must ensure that

technological development, investments and consumption expenditures move in the direction of the structural changes desired.

Further, the Netherlands will strongly urge the other EC countries, in any case, to take the same environmental measures.

After all, most environmental problems are international in character. And distortion of competition must also be prevented as much as possible.

The Main Elements

Environmental policy can be divided into a number of themes. Certain measures are needed in each theme.

Climate change is a new theme. Carbon dioxide emissions must be reduced in order to control the heating up of the atmosphere (and with it the "greenhouse effect"). The objective for 2000 is that carbon dioxide emissions may not increase above their 1990 level.

LU7

This requires limiting energy use among other things. In particular traffic, heating systems and electricity producers will have to contribute to this. Even more extreme measures are needed until 2010, especially in an international context.

A complete elimination of CFC emissions is necessary in order to leave intact the protective ozone layer around the Earth.

Acidification will have to be abated largely with numerous emission-oriented measures during the coming years. Examples: three-way catalytic converters on cars, extra fuel gas desulfurization at coal-fired power plants, working manure directly under the soil and large-scale manure processing. The measures must ensure that healthy forests can grow, in any event on the richer soils, in the year 2000.

In order to reach that goal, not only emission-oriented measures but also effect-oriented measures will be needed in forests and nature areas. To be on the safe side, deposition in the areas should not exceed 400-700 "acid equivalents" per hectare per year. On a level of deposition of 1400 acid equivalents the most serious effects acidification can be avoided. The NEPP sets an interim objective for the year 2000 of a maximum of 2400 acid equivalents.

Eutrophication is a problem that is caused mainly by industry, agriculture and animal husbandry. With respect to agriculture, the NEPP is aiming for structural measures which must ensure a "fertilizer balance".

No more phosphate and nitrate may enter water and soil than can be absorbed again via natural processes. To give a concrete example: this

means that groundwater must satisfy the standards which apply to the preparation of drinking-water.

And because policies still have not resulted in adequate reductions in surface water eutrophication (over fertilization) despite great efforts, installations to remove nitrate and phosphate from waste water must be constructed at sewage treatment plants.

Diffusion of substances in the environment also receives a great deal of attention in the NEPP. The current policy is being continued and intensified. A "screening test" is being introduced for new substances in order to be able to asses their possible risks in an early stage and to take measures.

This can, moreover, contribute to a "products policy": products as such will also be assessed on their environmental aspects in the future. A great deal of attention is being devoted to controlling the diffusion in the environment of "priority", especially harmful substances such as cadmium and solvents. In cooperation with industry, preventive and process integrated measures will be taken to this end. This policy must ensure that no more unallowable risks exist in 2000.

Disposal is the theme directed at reducing waste generation and at environmentally responsible processing or recycling of that waste which is still generated. The concrete goal for 2000 is that only a maximum of twelve million tons will be dumped or incinerated and that waste which is produced in the Netherlands will also, in principle, be processed here. This will require very sizable efforts. Concrete and drastic plans will have to be drawn up and implemented jointly with private industry.

LU7

Such plans must be made in the short term for used oil, building and demolition waste, halogenated hydrocarbons, bottom and fly-ash from coal-fired power plants, shipping waste, purification sludge and hospital waste. Supplementary measures will be taken if implementation of the plans falls behind the objectives. Possibilities include raising dumping tariffs gradually and a more stringent permitting policy.

Disturbance pertains to odor, noise nuisance and risks. The current policy in this area will be continued. This means that structural measures will be taken in addition to effect-oriented measures such as the construction of biofilters and noise walls. In a number of cases process integrated measures will be able to prevent odor as will, for example, zoning of industrial sites and "quieter" motors can reduce the noise load. The concrete policy goal for odor in the year 2000 is that the number of dwellings at which "odor nuisance" is suffered must be no greater than 750,000. The number of people experiencing noise nuisance in 2000 may be no higher than it was in 1985.

The chance of accidents involving industrial installations and transportation of hazardous substances must be reduced considerably by 2000 to an acceptable level.

Dehydration-policy is aimed at extensification of groundwater use to avoid drying out of soils on local or regional levels of scale. Dehydration is caused by supplying the large demands for water of domestic use, industry and agriculture. Aims are set on limiting the area showing signs of dehydration to the 1985 level. Water use should then be in balance with the capacity of the sources.

In the *anti-squandering policy* the environment is considered as stocks. Aims for the year 2000 are set on inventorising environmental resources (such as raw materials, energy, clean water and fertile soils) and making a strategy on environmental resources management. Feedback at the source will be developed. This means that necessary conditions for closure of substance cycles, energy extensification and quality improvement have to be realized as soon as possible.

Target Groups

LU7

No matter how well a policy is thought out and written down, it must, of course, be implemented or else nothing happens. The target group policy, therefore, also has a central place in the NEPP: much is expected from agriculture, traffic and transport, industry (particularly the chemical industry), the energy sector, the construction branch, and drinking-water, waste and environmental production firms as well as from research institutes and organizations in society.

The NEPP is introducing consumers as a new, extremely important target group. All segments of society will be asked to make large efforts. The environmental problems warrant that. The following section presents a number of the concrete NEPP goals for each sector in the year 2000.

Agriculture

The agriculture sector has managed to achieve tremendous growth in productivity during recent years, both per hectare and in an absolute sense. The new challenge awaiting this sector is to maintain this accomplishment, but in an environmentally friendly way. Several of the concrete accomplishments which are being asked of this sector are:

- Reducing ammonia emissions in 2000 by 70 per cent (relative to 1980);
- Balanced fertilization with phosphorus and nitrogen in 2000 (via physical regulation, levies on fodder and fertilizer and working with minerals balances);
- A 50 per cent drop in use of pesticides in kg active substance by 2000;

- Experiments with screening firms and setting up manageable systems of environmental concern;
- Improvement of manure acceptance in arable farming by way of quality certification;
- Construction of manure processing plants with a joint capacity of 20 million tonnes by 2000;
- Intensification of research into sustainable agricultural methods (integrated cultivation systems, optimal utilization of manure and fodder etc.).

Traffic and Transport

The mobility of people and the transportation of goods have increased dramatically during recent decades.

In addition to numerous other effects, this has also had substantial negative consequences for landscape, nature and environment. Traffic and transportation are also accounting for an increasingly large share of the consumption of energy and raw materials.

LU7

This development must urgently be diverted. The NEPP considers the following measures, among others, to this end:

- Reducing emissions of nitrogen oxides and hydrocarbons from passenger cars by 75 per cent and those from trucks by 35 percent in the year 2000 (relative to 1980);
- Controlling the increase in carbon dioxide emissions; a 10 percent reduction must be reached by 2010;
- Equipping passenger cars with three-way catalytic converters;
- Using no more harmful substances in vehicles;
- Recycling raw materials used for 85 % in the waste stage;
- Taking structural measures (such as bringing residential and work areas closer together again) to reduce the need for mobility;
- (Partly as a result) realizing a shift in the modes of transportation used: more use must be made of bicycles for distances of 5 to 10 km; the train must play a more important role for longer distances (up to 200 km). The train must "win ground" from the airplane for distances between 200 and 1000 km;
- Expanding and improving bicycle routes and public transportation; stimulate their use via, among other things, reward instruments and influencing the price mechanism (road-pricing, fiscal measures).

Industry

Industry is also a very important target group of the NEPP. However, it is difficult to describe in a few words precisely what is expected from this group since numerous, extremely different kinds of firms are involved. In broad outline, what is expected of them is that they thoroughly investigate the environmental aspects of their own operations. "Internal environmental concern" is becoming an important pillar of policy.

Sulfur dioxide emissions must in any event be reduced by 80 per cent in the year 2000. The reduction percentages for nitrogen oxides and volatile organic compounds are 45 and 45-60 respectively. Emissions of phosphorus and nitrogen into water must be halved by 1994. Waste "production" must also decrease substantially. Reuse will have to play an important role in this.

The chemical industry will play a major role in achieving these objectives. Not only is it a very large industry in the Netherlands, but it is also one which uses large quantities of hazardous substances.

Reducing the chance of serious accidents is thus also an NEPP objective in which the chemical industry must play a major part.

LU7

The energy sector will not only benefit from improved efficiency by saving money but it also reduces pollution and contributes to the fight against the "greenhouse effect".

Important concrete objectives include:

- Electric power plants will have to have achieved an 85 percent reduction (relative to 1980) in their sulfur dioxide emissions by 2000. The reduction percentage for nitrogen oxides is more than 50;
- Construct 900 MWe of cogeneration capacity before 1994 and another 1500 MWe before 2000;
- Establish systems of environmental concern in energy firms;
- Public information and subsidies to stimulate more energy conservation and the use of renewable energy sources.

Building Trade

The construction sector uses large quantities of raw materials, the reserves of which are usually not inexhaustible. Their extraction, moreover, often has major impacts on nature and landscape. The construction method and the choice of raw materials to a large extent determine the energy use and the environment in and around developed areas.

And finally, the demolition of abandoned buildings, roads etc. generates waste which can, in turn, be a burden on the environment. For

all these reasons the NEPP also focusses on the construction and demolition sector. Among the things being asked are:

- Doubling the recycling of construction and demolition waste by the year 2000;
- Replacing materials whose extraction or use has serious environmental impacts;
- 25 per cent energy conservation in heating systems;
- Construction quality such that risk limit values are not exceeded in the indoor environment;
- Improving the training of and transfer of information to employees, contractors and consumers;
- Providing environmentally friendly products through the do-it-yourself branch;
- Developing environmental yardsticks, stimulating experiments, improving national government buildings.

Waste Processing Firms

LU7

The waste problem receives a great deal of attention in the NEPP — both prevention of waste production and recycling and reusing waste that is generated. Separate collection of recyclable waste components and hazardous waste can play a useful role in this.

The dumping of waste must decrease considerably. In the long term, moreover, all dumping sites must satisfy stringent environmental standards. A larger share of the waste must be incinerated; the heat generated must be put to use.

The disposal structure must be improved in order to bring these goals within reach. The same thing applies to the waste problem as to energy: everyone, every sector of society has a responsibility here.

The NEPP expects *drinking-water companies* to expand their role as environmental firms. Drinking-water quality, after all, is crucial to human health.

They must, therefore, remain vigilant for threats to the quality of their raw material-surface and groundwater. Groundwater reserves must remain well protected through the expansion of protection regions among other things. Water conservation must be undertaken by industry and agriculture and central partial water softening must be introduced.

A contribution from *environmental production firms* is expected in the area of the development and introduction of structural process integrated measures and the transfer of relevant information.

Societal organizations (including environmental organizations, labor unions and employers' organizations, women, youth and senior citizen organizations) will be asked to contribute to the NEPP goals. Environmental organizations fulfill an indispensable "antenna function" for environmental policy and play a major role in recommending ideas for structural measures. They have an important function in consiousness raising, education and the provision of public information. Labour unions and employers' organizations have an important task in setting up and expanding internal corporate systems of environmental concern. But the other organizations can also make significant contributions by adopting objectives in the fields of environment and sustainable development.

Consumers

In addition to all of these target groups, consumers as a target group have a special position. This is a target group to which everyone belongs. Environmental awareness in consumers has, therefore, a large carry over effect. Whoever acts in an environmentally friendly way at home is also more likely to do so at work or in other contexts.

LU7

A concrete example of what is expected from consumers is that they store all of their small chemical waste, tin, glass and paper separately for waste collection by the year 2000. Their electricity consumption must decrease considerably. Cars will have to be driven much less in 2000 than they would have been without directed development. Consumers are, of course, also affected indirectly by (the effects of) environmental measures being taken "elsewhere" (for example, in agriculture or in the area of traffic).

There is, then, an enormous environmental task awaiting each of the target groups mentioned, who together form the whole of Dutch society. In many cases the efforts required will not be easy. But they are necessary. Otherwise we will be behaving ourselves like people who are at a party in someone else's home, plundering the refrigerator and the wine cellar, demolishing the garden and the interior, and just walking away from the mess.

The earth is not our property. We just have it on loan from our children.

There are abundant opportunities and possibilities for sustainable development. What the issue boils down to is that we have the daring, creativity and political will to take advantage of them.

Barriers to Ecologically Sustainable Industrial Development

Excerpted from UNIDO, "Issues in support of ecologically sustainable industrial development", *Proceedings of the Conference on Ecologically Sustainable Industrial Development Copenhagen, Denmark, 2-6 [illegible]*

Common to both developed and developing countries are barriers to the achievement of ESID. These encompass information gaps and deficiencies, scientific, technological, professional and related institutional capacities to support the process of transition to ESID, as well as political and economic obstacles to its implementation.

Information deficiencies include limitations of data on the nature and extent of environmental degradation (physical indicators of resource depletion, as well as air, water and land pollution); limited understanding of the proximate and underlying causes of, and hence feasible remedies for, environmental degradation; and insufficient measurement of economic losses resulting from environmental degradation.

LU7

Most of the problems cited above may be more acute in some developing countries where government activity is constrained by urgent, short-term financial needs. The gathering and dissemination of information and applied research do not receive sufficient attention. Consequently, Governments have inadequate information on the nature, magnitude, causes and consequences of environmental degradation; furthermore, because of low economic and technological capacities of their countries, they often lack access to non-commercial and non-profit technical information to deal adequately with pollution-related problems.

Obstacles to ESID-related measures are numerous. Heading the list of such obstacles are conflicts between short term economic costs and long term economic benefits of environmental protection. Regulatory and monitoring capacity and skilled personnel may not be sufficient for dealing with new problems. Small and medium-scale industries have limited information and lack the skills and capital needed to implement Cleaner Production processes. Political and social constraints often limit the setting of economically appropriate prices for water, energy and raw materials. States may ignore the consequences of industrial activity that result in damage begin done outside of their borders. Finally, the poor, disadvantaged and vulnerable tend to suffer most from environmental degradation, but lack the political influence required to bring about the introduction of remedial measures.

Obstacles to the implementation of ESID-related measures are intensified in developing countries. Weak institutional capacity, particularly the ability to implement and coordinate programmes, and shortages of skilled personnel are major problems in developing countries. Even if existing industry wanted to invest in more environmentally sound technologies, it would often be faced with financial constraints. The scarcity and high cost of capital may preclude importing those technologies, even if the investments are economically justified. Lastly, a sizeable portion of the population lacks the awareness, education and experience needed to deal with environmental problems, and the few non-governmental organizations (NGOs) that are involved in such matters lack political influence.

More importantly, developing countries are faced with particular difficulties in achieving ESID. One barrier can be in part traced to their indebtedness, which results in shortages of capital needed to finance Cleaner Production processes. Another is their limited capacity to absorb Cleaner Production practices, which is attributable in part to their lack of technical and scientific capacity. A third is the potential risk of new non-tariff barriers emerging as a side-effect of new environmental measures that, in effect, close markets to exports from developing countries. Keeping markets open to manufactured products from developing countries will provide such countries with better conditions for the repayment of debts to developed countries.

LU7

Accounting for Environmental Effects at the National Income Level

Excerpted, with permission, from *Environmental Accounting: Current Issues, Abstracts and Bibliography* (United Nations publication, Sales No. E.92.II.A.23), chap. VII.

Environmental issues in national income accounting reflect many of the same concerns as corporate accounting. Those who seek to improve accounting for the environment at the corporate level can learn from the attempts to adjust national accounts to reflect environmental costs.

The United Nations System of National Accounts (SNA), first developed in the 1950s, is cited by economists as one of the major social inventions of the century. The SNA is followed by many countries in developing their national economic statistics. Economic decisions are often made on the basis of resulting gross domestic product (GDP) statistics or other measures of national income. However, such measures largely ignore the productive role of natural resources. Critics of policy-making based on SNA measures assert that integration of the environment into economic indicators is of great importance, since the lack of systematic, integrated environmental indicators is likely one reason why such factors are given little emphasis in economic decision-making.

LU7

There are numerous criticisms of GDP as a measure of welfare or national prosperity. The two most frequent criticisms related to the environment involve the scarcity of natural resources and the consequences of environmental damage. First, although man-made assets are valued as productive capital and are depreciated against income; natural assets are not so valued, and their loss entails no charge against current income. A country could exhaust mineral resources, cut down forests, erode its soils, pollute its aquifers and hunt its wildlife and fisheries to extinction, but measured income would not be affected as these assets disappeared. Rapid economic growth from exploitation of resources results in illusory income gains and permanent losses in wealth.[1]

Second, while environmental damage is not included as a cost to national income, remediation expenses are accounted for as increases in national income and products, despite the fact that such outlays should

[1] Repetto, R., "Wasting assets: the need for national resource accounting", *Technology Review* (Cambridge, Massachusetts) 93(1):38-44, January 1990.

be considered as a maintenance cost to society rather than social progress.[2] The national income treatment of clean-up expenses is inconsistent if they are expended by Government, industry or individuals.[3]

Political and economic leaders have recognized the need to improve national income reporting. The United Nations' World Commission on Environment and Development (Brundtland Commission) declared in 1987 that economic development must take full account in its measurements of growth of the improvement or deterioration in the stock of natural resources.[4]

Several countries have experimented with production of environmental national accounts. Germany has established physical accounts for energy supply and use.[5] In France, general principles and methods of natural resource accounting, and pilot accounts, have been produced both on the national and corporate level, but practical implementation has not yet been achieved.[6] Italy produces environmental statistics and is working on an accounting system. Japan has calculated a measure of net national welfare for 1955-1985, which subtracts the costs of remediation of pollution above certain standards.[7] Norway has published physical environmental accounts annually since 1978.[8] Other countries and international organizations have also experimented in producing environmental statistics or accounts. A case study of Indonesia reduced GDP growth from 7.1 per cent using traditional methods to 4.0 per cent for 1971-1984, using environmentally adjusted accounts, a depletion rate of 1.4 per cent of GDP.[9] A study of Costa Rica indicated a depletion rate of natural resources which totalled 5.7 per cent of GDP.[10]

LU7

---

[2] Bartelmus, P., "Accounting for sustainable growth and development," *Structural change and economic dynamics* (Oxford) forthcoming

[3] Repetto, R., "Wasting assets: the need for national resource accounting," *Technology Review* (Cambridge, Massachusetts) 93(1):38-44, January 1990.

[4] World Commision on Environment and Development (WCED), *Our Common Future*, Oxford and New York, Oxford University Press, 1987

[5] Leipert, C., and Simonis, U. E., "Environmental damage--environmental expenditure I: statistical evidence on the Federal Republic of Germany", *The Environmentalist* (Middlesex, United Kingdom) 10(4):301-309, 1990.

[6] Theys, J., "Environmental accounting in development policy: the French experience", *Environmental accounting for sustainable development*, Ahmad and others (eds.) Washington, D.C., The World Bank, 1989. p. 49-53.

[7] Uno, K., "Economic growth and environmental change in Japan—net national welfare and beyond", Tsukuba, Japan, Institute of Socioeconomic Planning, University of Tsukuba, 1988.

[8] Norway, Central Bureau of Statistics, *Natural resource accounting and analysis. The Norwegian experience, 1978-1986*. By Alfsen, K.H., Bye, T., and Lorentsen, L. 32p.

[9] Repetto, R., "Wasting assets: the need for national resource accounting", *Technology Review* (Cambridge, Massachusetts) 93(1):38-44, January 1990.

[10] Bartelmus, P., "Accounting for sustainable growth and development", *Structural change and economic dynamics* (Oxford) forthcoming

The emphasis in most countries has been on information regarding physical quantities, rather than information provided in money terms. However, the United Nations has been reviewing the SNA for several years, in part to incorporate environmental concerns. The present revision of SNA will not include major revisions; it will recommend linked satellite accounts to deal with environmental issues. No consensus has yet been reached on the optimal ways to reflect environmental concerns in the SNA.

LU7